FORM OF GENERAL CONDITIONS
1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT IS ATTACHED FOLLOWING THIS PAGE.

RELATED REQUIREMENTS
2.01 SECTION 00 7300 - SUPPLEMENTARY CONDITIONS.
2.02 SECTION 01 4216 - DEFINITIONS.
2.03 AIA DOCUMENT A201, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, 2007 EDITION, IS THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

END OF SECTION
SECTION 00 7300
SUPPLEMENTARY CONDITIONS

INTENT

1.01 THESE SUPPLEMENTARY CONDITIONS AMEND AND SUPPLEMENT THE GENERAL CONDITIONS DEFINED IN DOCUMENT 00700 AND OTHER PROVISIONS OF THE CONTRACT DOCUMENTS AS INDICATED BELOW. ALL PROVISIONS WHICH ARE NOT SO AMENDED OR SUPPLEMENTED REMAIN IN FULL FORCE AND EFFECT.

1.02 THE TERMS USED IN THESE SUPPLEMENTARY CONDITIONS WHICH ARE DEFINED IN THE GENERAL CONDITIONS HAVE THE MEANINGS ASSIGNED TO THEM IN THE GENERAL CONDITIONS.

MODIFICATIONS TO AIA A201

2.01 ARTICLE 3.6 - TAXES

Add the following subparagraph:

3.6.2: The Owner will obtain rebate on taxes paid by the Contractor on certain Products or items. Provide administrative assistance and cooperation to the Owner in this regard.

ARTICLE 7.3 - CONSTRUCTION CHANGE DIRECTIVES

Add the following subparagraph:

7.3.10: The following fees apply to Changes in the Work in accordance with Subparagraph 7.3.6:

5 percent overhead and profit on the net cost of Work done by the Contractor;
10 percent overhead and profit on the cost of Work done by any Subcontractor;
7 percent overhead and profit on the cost of Work done by any Sub-Subcontractor and or Vendor;

ARTICLE 8 - TIME

Add the following subparagraph:

8.1.5: Contract Time commences at the time of Notice To Proceed and continues for 365 days.

END OF SECTION
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07 2400 EXTERIOR INSULATION AND FINISH SYSTEMS
07 2500 WEATHER BARRIERS
07 5400 THERMOPLASTIC MEMBRANE ROOFING
07 6200 SHEET METAL FLASHING AND TRIM
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08 1113 HOLLOW METAL DOORS AND FRAMES
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08 4313 ALUMINUM-FRAMED STOREFRONTS
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DIVISION 09 - FINISHES

09 2116 GYPSUM BOARD ASSEMBLIES
09 3000 TILING
09 5100 SUSPENDED ACOUSTICAL CEILINGS
09 9113 EXTERIOR PAINTING
09 9123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES

10 2800 TOILET, BATH, AND LAUNDRY ACCESSORIES
10 4400 FIRE PROTECTION SPECIALTIES
10 7500 FLAGPOLES

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14 2010 PASSENGER ELEVATORS
14 9100 FACILITY CHUTES

MECHANICAL, ELECTRICAL AND PLUMBING – SEE SEPARATE TABLE OF CONTENTS
PART 1 GENERAL

1.01 PROJECT
   A. Project Name: Tru-El Paso, TX
   B. Owner's Kana Hotel Group.
   C. River Street Architecture, LLC's Name: River Street Architecture, LLC.
   D. The Project consists of the construction of a 4 story hotel. Constructed of wood framing, concrete slab on grade EIFS exterior finish system.

1.02 CONTRACT DESCRIPTION
   A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement Form.

1.03 WORK BY OWNER
   A. Kana Hotel Group will award a contract for supply and installation of FF&E which will commence on TBD.

1.04 OWNER OCCUPANCY
   A. Kana Hotel Group intends to occupy the Project upon Substantial Completion.
   B. Cooperate with Kana Hotel Group to minimize conflict and to facilitate Kana Hotel Group's operations.
   C. Schedule the Work to accommodate Kana Hotel Group occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES
   A. Provide access to and from site as required by law and by Kana Hotel Group:
      1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
      2. Do not obstruct roadways, sidewalks, or other public ways without permit.
   B. Utility Outages and Shutdown:
      1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Kana Hotel Group and authorities having jurisdiction.
      2. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Procedures for preparation and submittal of applications for progress payments.
B. Change procedures.

1.02 RELATED REQUIREMENTS
A. Document 00 5200 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.
B. Document 00 7200 - General Conditions and Document 00 7300 - Supplementary Conditions: Additional requirements for progress payments, final payment, changes in the Work.
C. Document 00 7300 - Supplementary Conditions: Percentage allowances for General Contractor's overhead and profit.

1.03 SCHEDULE OF VALUES
A. Forms filled out by hand will not be accepted.
B. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS
A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Forms filled out by hand will not be accepted.
C. Present required information in typewritten form.
D. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
E. For each item, provide a column for listing each of the following:
   1. Description of work.
   2. Scheduled Values.
   3. Previous Applications.
   4. Work in Place and Stored Materials under this Application.
   5. Authorized Change Orders.
   6. Total Completed and Stored to Date of Application.
   7. Percentage of Completion.
   9. Retainage.
F. Execute certification by signature of authorized officer.
G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
H. Submit three copies of each Application for Payment.
I. Include the following with the application:
   1. Partial release of liens from major Subcontractors and vendors.
J. When River Street Architecture, LLC requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, River Street Architecture, LLC will issue instructions directly to General Contractor.

B. River Street Architecture, LLC will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. For other required changes, River Street Architecture, LLC will issue a document signed by Kana Hotel Group instructing General Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, River Street Architecture, LLC will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. General Contractor shall prepare and submit a fixed price quotation within 5 working days.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

G. Execution of Change Orders: River Street Architecture, LLC will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

J. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01770.
PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 9 01260
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Contract Modification Procedures:
      a. Submittals
      b. Documentation of Change in Contract Sum and Contract Time
   2. Contract Modification Pricing Guidelines
   3. Requests for Information and Supplemental Instructions
   4. Change of Contract Procedures
   5. Allowances
   6. Construction Change Directive
   7. Change of Contract:
      a. Stipulated price change order
      b. Unit price change order
      c. Time and material change order
      d. Execution of Change of Contract written orders
   8. Correlation of Contractor Submittals
   9. Related Sections:
      a. Agreement: Monetary values of established unit prices and percentage allowances for Contractor's overhead and profit.

1.02 SUBMITTALS

A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ and Subcontractors of changes to the Work.

1.03 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

A. Maintain detailed records of work performed on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

C. On request, provide additional data to support computations:
   1. Quantities of products, labor, and equipment.
   2. Taxes, insurance, and bonds.
   3. Overhead and profit.
   5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work done, with additional information:
   1. Origin and date of claim.
   2. Dates and times work was performed, and by whom.
   3. Time records and wage rates paid.
   4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.04 CONTRACT MODIFICATION PRICING GUIDELINES

A. For each change, the Contractor shall furnish a detailed, written proposal itemized according to General Conditions, Article 19.
1.05 REQUESTS FOR INFORMATION AND SUPPLEMENTAL INSTRUCTIONS

A. Definition: Requests for Information (RFI), is a formal process used during bidding and during construction to facilitate communication between the Contractor and the Architect with regard to requests for information and clarification of the intent of the Contract Documents.

1. Procedure:
      1) Submit Requests for Information from Contractor's office or field office only. Requests for Information submitted directly from subcontractors or suppliers will not be accepted.
      2) Generate Requests for Information by one source per project and number accordingly.
   b. The Architect will review formal requests from the Contractor with reasonable promptness and the Contractor will be notified in writing of decisions made, via the RFI form.
      1) The Architect's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Sum or Contract Time.
   c. Maintain log of Requests for Information sent to, and responses from the Architect.
   d. Scheduling, Costing, and Owner Furnished Products/Work Coordination: Direct to the Architect.

2. RFI Form: Submit requests for information on attached Request for Information form, attached at end of this Section. The Architect will not respond to requests for information unless this format is utilized.
   a. Where submittal form does not provide space needed for complete information, additional sheets may be attached.

1.06 CHANGE PROCEDURES

A. The Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Owner/Architect Agreement, and by issuing supplemental instructions on RFI form attached.

B. The Contractor may propose a change by submitting a request for change to the Owner's Representative, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document requested substitutions in accordance with Section 01 33 00.

1.07 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change of Contract Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
   1. Include installation costs in the purchase amount only where indicated as part of the allowance.
   2. When requested, prepare explanations and documentation to substantiate the margins claimed.
   3. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change of Contract authorizing work to proceed. The Owner will reject claims submitted later than 21 days.
1. Do not include the Contractor’s or Subcontractor’s indirect expense in the Change of Contract cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor’s indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.08 CORRELATION OF CONTRACTOR SUBMITTALS
   A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change of Contract as a separate line item and adjust the Contract Sum.
   B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
   C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS
2.01 NOT USED

PART 3 EXECUTION
3.01 NOT USED

3.02 AIA DOCUMENTS
   A. AIA G701 CHANGE ORDER
   B. AIA G710 ARCHITECTS SUPPLEMENTAL INSTRUCTIONS
   C. AIA G714 CONSTRUCTION CHANGE DIRECTIVE
   D. AIA G716 REQUEST FOR INFORMATION

END OF SECTION
SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Electronic document submittal service.
   B. Preconstruction meeting.
   C. Progress meetings.
   D. Construction progress schedule.
   E. Progress photographs.
   F. Coordination drawings.
   G. Submittals for review, information, and project closeout.
   H. Number of copies of submittals.
   I. Submittal procedures.

1.02 RELATED REQUIREMENTS
   A. Document 00 7200 - General Conditions: Dates for applications for payment.
   B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
   C. Section 01 7800 - Closeout Procedures & Submittals: Project record documents.
   D. Section 01 9113 - General Commissioning Requirements: Additional procedures for submittals relating to commissioning.
      1. Where submittals are indicated for review by both River Street Architecture, LLC and the Commissioning Authority, submit one extra and route to River Street Architecture, LLC first, for forwarding to the Commissioning Authority.
   E. Section 15990 - Commissioning Requirements, by Commissioning Authority

1.03 PROJECT COORDINATION
   A. Project Coordinator: Designated by the General Contractor.
   B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for truck access, traffic, and parking facilities.
   C. During construction, coordinate use of site and facilities through the Project Coordinator.
   D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
   E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
   F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
   G. Make the following types of submittals to River Street Architecture, LLC through the Project Coordinator:
      1. Requests for interpretation.
      2. Requests for substitution.
      3. Shop drawings, product data, and samples.
      4. Test and inspection reports.
      5. Design data.
      6. Manufacturer's instructions and field reports.
      7. Applications for payment and change order requests.
      8. Progress schedules.
      9. Coordination drawings.
      10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, General Contractor’s correction punchlist, and any other document any participant wishes to make part of the project record.

2. General Contractor and River Street Architecture, LLC are required to use this service.

3. It is General Contractor’s responsibility to submit documents in PDF format.

4. Subcontractors, suppliers, and River Street Architecture, LLC’s consultants will be permitted to use the service at no extra charge.

5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.

6. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.

7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Project Closeout: River Street Architecture, LLC will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Kana Hotel Group.

3.02 PRECONSTRUCTION MEETING

A. Attendance Required:

1. Kana Hotel Group.

2. River Street Architecture, LLC.

3. General Contractor.

B. Agenda:

1. Execution of Kana Hotel Group-General Contractor Agreement.

2. Submission of executed bonds and insurance certificates.


4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.

5. Designation of personnel representing the parties to Contract, _________ and River Street Architecture, LLC.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

7. Scheduling.

C. Record minutes and distribute copies within two days after meeting to participants, with two copies to River Street Architecture, LLC, Kana Hotel Group, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum as agreed upon by project team.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
C. Attendance Required:
   1. General Contractor.
   2. Kana Hotel Group.
   3. River Street Architecture, LLC.
   4. General Contractor's Superintendent.
   5. Major Subcontractors.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
   9. Coordination of projected progress.
  10. Maintenance of quality and work standards.
  11. Effect of proposed changes on progress schedule and coordination.
  12. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to River Street Architecture, LLC, Kana Hotel Group, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE
A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.05 PROGRESS PHOTOGRAPHS
A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to River Street Architecture, LLC.

D. In addition to periodic, recurring views, take photographs of each of the following events:

E. Take photographs on date for each application for a payment and as follows:
   1. Completion of site clearing.
   2. Excavations in progress.
   3. Foundations in progress and upon completion.
   4. Structural framing in progress and upon completion.
   5. Enclosure of building, upon completion.
   6. Final completion, minimum of ten (10) photos.

F. Views:
   1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
   2. Consult with River Street Architecture, LLC for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
   4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.06 COORDINATION DRAWINGS
   A. Provide information required by Project Coordinator for preparation of coordination drawings.
   B. Review drawings prior to submission to River Street Architecture, LLC.

3.07 SUBMITTALS FOR REVIEW
   A. When the following are specified in individual sections, submit them for review:
      1. Product data.
      2. Shop drawings.
      3. Samples for selection.
      4. Samples for verification.
   B. Submit to River Street Architecture, LLC for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   C. Samples will be reviewed only for aesthetic, color, or finish selection.
   D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Procedures & Submittals.

3.08 SUBMITTALS FOR INFORMATION
   A. When the following are specified in individual sections, submit them for information:
      1. Design data.
      2. Certificates.
      3. Test reports.
      4. Inspection reports.
      5. Manufacturer's instructions.
      6. Manufacturer's field reports.
      7. Other types indicated.
   B. Submit for River Street Architecture, LLC's knowledge as contract administrator or for Kana Hotel Group.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT
   A. Submit Correction Punch List for Substantial Completion.
   B. Submit Final Correction Punch List for Substantial Completion.
   C. When the following are specified in individual sections, submit them at project closeout:
      1. Project record documents.
      2. Operation and maintenance data.
      3. Warranties.
      5. Other types as indicated.
   D. Submit for Kana Hotel Group's benefit during and after project completion.
3.10 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to General Contractor unless specifically so stated.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by River Street Architecture, LLC.
   1. After review, produce duplicates.

3.11 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Transmit each submittal with approved form.

D. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

E. Identify Project, General Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

F. Apply General Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

G. Deliver submittals to River Street Architecture, LLC at business address.

H. Schedule submittals to expedite the Project, and coordinate submission of related items.

I. For each submittal for review, allow 10 business days excluding delivery time to and from the General Contractor.

J. Identify variations from Contract Documents and Product or system limitations or any and all deviations, including ones which may be detrimental to successful performance of the completed Work.

K. Provide space for General Contractor and River Street Architecture, LLC review stamps.

L. When revised for resubmission, identify all changes made since previous submission.

M. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

3.12 AIA DOCUMENTS

A. AIA G810 - LETTER OF TRANSMITTAL

END OF SECTION
PART 1  GENERAL

1.01  SUMMARY

A. Section Includes:
   1. Coordination
   2. Administrative Procedures
   3. Meetings:
      a. Pre-construction Meetings
      b. Progress Meetings
      c. Preinstallation Meetings
   4. Coordination Drawings
   5. General Installation Provisions
   6. Cleaning and Protection

B. Related Sections:
   1. Section 01712 - Field Engineering
   2. Section 01731- Cutting and Patching

1.02  COORDINATION:

A. Coordinate construction activities included in various Sections of these Specifications to assure efficient and orderly installation of each component. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.

C. Coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

I. Make provisions to accommodate items scheduled for later installation.

1.03  ADMINISTRATIVE PROCEDURES

A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.
   1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
B. Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:
   1. Preparation of Schedules
   2. Installation and Removal of Temporary Facilities
   3. Delivery and Processing of Submittals
   4. Progress Meetings
   5. Project Closeout Activities

C. Staff Names: Within 15 days of Notice to Proceed, submit a list of Contractor's staff assignments, including Superintendent and personnel at the site; identify individuals, their duties and responsibilities, addresses and telephone numbers.

1.04 PRE-CONSTRUCTION MEETING
A. Refer to General Conditions, Article 15, for requirements
B. Agenda:
   1. Execution of Owner-Contractor Agreement
   2. Submission of executed bonds and insurance certificates
   3. Distribution of Contract Documents
   4. Submission of lists of Subcontractors, Products, Schedule of Values, and Progress Schedule.
   5. Designation of personnel representing the parties in Contract
   6. Procedures and processing of field decision, submittals, substitution, applications for payments, proposal request, Change Orders, and Contract Closeout Procedures.
   7. Scheduling
C. Record minutes and distribute copies within one day after meeting faxed to participants, within one day after meeting gased to participants, with one copy to Architect, Owner, Participants, and those affected by decisions made.

1.05 PROGRESS MEETINGS
A. Refer to General Conditions, Article 15, for requirements.
B. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress
   3. Field observations, problems, and decisions.
   4. Identification of problems which impede planned progress.
   5. Review of submittals schedule and status of submittals
   6. Review of off-site fabrication and delivery schedules
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules
   9. Planned progress during succeeding work period.
   10. Coordination of projected progress.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule and coordination.
   13. Other business relating to work.

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

1.07 COORDINATION DRAWINGS:
A. Prepare Coordination Drawings where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.
   1. Show relationship of components shown on separate Shop Drawings.
   2. Indicate required installation sequences.

PART 2 PRODUCTS
2.01 NOT USED

PART 3 EXECUTION

3.01 INSPECTION OF CONDITIONS
A. The installer of each component shall inspect the substrate and conditions under which is performed. Do not proceed until unsatisfactory conditions have been corrected.
B. Verification of Conditions:
   1. Verify that existing conditions, surfaces, and substrates are acceptable for subsequent Work.
   2. Verify that field measurements, are as required to receive subsequent Work.
   3. Verify that existing substrate is capable of structural attachment of new Work being applied or attached.
   4. Examine and verify specific conditions described in individual specification sections.
   5. Verify that utility services are available, of the correct characteristics, and in the correct location.
C. Report in writing to the Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

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

3.03 MANUFACTURER’S INSTRUCTIONS
A. Comply with the manufacturer’s installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
C. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.

3.04 VISUAL EFFECTS
A. Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
B. Recheck measurements and dimensions before starting each installation.
C. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

3.05 ENCLOSURE OF THE WORK
A. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

3.06 MOUNTING HEIGHTS
A. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decisions.

3.07 CLEANING AND PROTECTION
A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
B. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
C. Limiting Exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include, but are not necessarily limited to, the following:
   1. Excessive Weathering
   2. Excessively High or Low Temperatures or Humidity
   3. Water or Ice
   4. Chemicals or Solvents
   5. Heavy Traffic, Soiling, Staining and Corrosion
   6. Contact Between Incompatible Materials
   7. Theft or Vandalism
   8. Excessive Static or Dynamic Loading
   9. Thermal Shock
   10. Combustion

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or reference to recognized industry standards.
   2. To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data for its review and approval or rejection by the Architect.
   3. This Section specifies administrative and procedural requirements for submittals required for performance of the work, including:
      a. Contractor's Progress Schedule
      b. Shop Drawings, Product Data, and Samples
      c. Letters of Conformance
      d. Certificates
      e. Manufacturer Installation Instructions
   4. Substitution Procedures
   5. Manuals
   6. Miscellaneous Submittals
   7. Related Documents:
      a. Letter of Conformance Form
      b. Contractor's Substitution Request Form
   8. Related Sections:
      a. Contractual Requirements for Submittals: General Conditions
         1) Two (2) copies of all Submittals, plus number of copies to be returned to Contractor, shall be submitted unless otherwise specified.
         2) Provide additional copies as required for use in Project Record Documents.
      b. Section 01 77 00 (01770) - Contract Closeout
      c. Individual Submittals Required: Pertinent Sections of these Specifications.

1.02 SUBMITTALS

A. Coordination: Coordinate preparation and processing of Submittals with performance of construction activities. Transmit each Submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Refer to General Conditions, Article 16, for additional requirements.
2. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals and related activities that require sequential activity.
3. Coordinate transmittal of different types of Submittals for related elements of the work so processing will not be delayed by the need to review Submittals concurrently for coordination.
   a. The Architect reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.
   b. No extension of Contract Time will be authorized because of failure to transmit Submittals to the Owner's Representative sufficiently in advance of the work to permit processing.

B. Deliver Submittals to the Architect.
C. Submittal Preparation: Place a permanent label or title block on each Submittal for identification. Indicate the name of the entity that prepared each Submittal on the label or title block.

1. Provide a space approximately 10” x 10” on the label or beside the title block on Shop Drawings to record the Contractor’s and Architect review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken:
   a. Project Name
   b. Name of the Owner
   c. Date
   d. Name and Address of Architect
   e. Name and Address of Contractor
   f. Name and Address of Subcontractor or Vendor
   g. Location Where Item is to be Used
   h. Name of Manufacturer
   i. Drawing Number and Detail References, as Appropriate
   j. Certification by the Contractor

D. Submittal Transmittal: Package each Submittal appropriately for transmittal and handling. Transmit each Submittal from Contractor to Architect. Submittals received from sources other than the Contractor will be returned without action.

1. Transmit each submittal to the Architect with “AIA Document G810 - Transmittal Letter” and “Letter of Conformance”.

2. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

3. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

4. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

5. After Architect review of Submittal, revise and resubmit as required, identifying changes made since previous Submittal.

6. When re-submittal is required for any reason, transmit under new letter of transmittal, indicating by reference to a previous Submittal that this is a re-submittal.
   a. Identify on submittal all changes made since previous submission.

7. Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

8. All Submittals shall bear the stamp of approval of the Contractor submitting same as evidence that they have been checked by him, or they will be rejected.
   a. Must be signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

9. Schedule submittals to expedite the Project, and deliver to Architect. Coordinate submission of related items. Instruct parties to promptly report any inability to comply with provisions.

1.03 PROGRESS SCHEDULES

A. Submit initial Construction Progress Schedule in duplicate within 15 days after date of Owner-Contractor Contract. Submit in the form required by the General Conditions of the Contract.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
1.04 LETTERS OF CONFORMANCE

A. Letter of Conformance: Short-form informational submittals which are to be used instead of shop drawings, product data and samples. They are also to be used to supplement shop drawings, product data and samples. A sample "Letter of Conformance" is located at the end of this Section. Use copies of this form for each submittal unless a more specific Letter of Conformance is located at the end of a particular Specification Section.

B. Within 30 days after date of Owner-Contractor Agreement, submit all Letters of Conformance indicating Contractor's selections for products proposed for use, with name of manufacturer, trade name, and model number of each product. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

C. Procedure:
   1. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Architect.
   2. Submit completed Letter of Conformance for products selected as indicated within each Section.
   3. Fill-in required information on form and sign in ink by person authorized to sign on behalf of the Contractor.
   4. Clearly identify applicable products, characteristics, models, and options. Attach supplemental information including product data to each Letter of Conformance as necessary to communicate all information specific to the product.
   5. No modifications to form permitted.
   6. Letters of Conformance are not to be used for substitution requests.

D. By submitting a Letter of Conformance, Contractor declares that the product identified by manufacturer's name and model number:
   1. Is one of the product(s) specified
   2. Is suitable for the intended use as defined within the Contract Documents, and
   3. Will be provided and placed in operational condition in accordance with the Contract Documents and manufacturer's published instructions.

1.05 SHOP DRAWINGS

A. Where Shop Drawings are required, submit newly prepared information drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings shall be drawn at a scale to clearly indicate all of the above conditions and allow for corrections or modifications which the Architect may wish to make. The Architect shall be the sole judge as to the acceptability of manufacturer's literature and catalog sheets as Shop Drawings.

C. Shop Drawings shall clearly indicate all dimensional data for all parts of the item; types and materials for all connections; finishes; the exact relation of the item to adjacent materials and equipment in the completed structure including clearance, any necessary isolation, and fastening methods and devices; and mechanical and electrical connections.

D. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:
   1. Dimensions
   2. Identification of Products and Materials Included
   3. Compliance with Specified Standards
   4. Notation of Coordination Requirements
   5. Notation of Dimensions Established by Field Measurement

E. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11", but no larger than 36" x 48".
F. Submit in the form of one reproducible transparency and one opaque reproduction, or three opaque reproductions plus required amount to be returned to Contractor. After review, reproduce and distribute to appropriate parties.

G. Do not permit Shop Drawing copies, without an appropriate final "Action" marking by the Architect, to be used in connection with the work.

H. The Contractors shall be responsible for distribution of additional prints to vendors, etc.

1.06 PRODUCT DATA

A. Where Product Data is required, collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
   a. Manufacturer's Printed Recommendations
   b. Compliance with Recognized Trade Association Standards
   c. Compliance with Recognized Testing Agency Standards
   d. Application of Testing Agency Labels and Seals
   e. Notation of Dimensions Verified by Field Measurement
   f. Notation of Coordination Requirements
   g. Type and Model Numbers

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

B. Distribution: Furnish copies of final Submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

1. Do not proceed with installation until a copy of Product Data applicable is in the installer's possession.

2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.07 SAMPLES

A. Where Samples are required, submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, full color-range sets, and swatches showing color, texture, and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Include the following:
   a. Generic Description of the Sample
   b. Sample Source
   c. Product Name or Name of Manufacturer
   d. Compliance with Recognized Standards
   e. Availability and Delivery Time

2. Colors:
   a. General: Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Architect for his review and selection.

3. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between the final Submittal and the actual component as delivered and installed.
a. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.

b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample Submittals.

4. Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
   
   a. Preliminary Submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

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

B. Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the work.

   1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.
      
      a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.08 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer to Architect, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

1.09 MANUFACTURER INSTALLATION INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing to Architect.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Source Limitations: To the greatest extent possible for each unit of work, provide products, materials, or equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product or materials, select an option which is compatible with other products and materials already selected (which may have been from among options for those other products and materials). Total compatibility among options, if not assured by limitations within contract documents, must be provided by Contractor. Compatibility is a basic general requirement of product/material selections.

C. Owner's Approval Required:
1. In addition to the following, refer to the General Conditions, Article 4, for additional requirements.
2. The Contract is based on the materials, equipment, and methods described in the Contract Documents.
3. The Contract Drawings and Specifications establish the "minimum standard of quality" each product and/or system must meet to be considered acceptable. Products of other manufacturers will be considered if the product and/or system meets or exceeds the "minimum standard of quality" established by the Contract Documents.
4. The Owner will consider proposals for substitutions under the "or approved substitution" and the "or approved equal" provision of materials, equipment, and methods, only when such proposals are accompanied by full and complete technical data and all other information required by the Owner and Architect to evaluate the proposed substitutions.
   a. It will be the responsibility of the submitting Contractor to prove equality.
   b. Request must include "Contractor's Substitution Request" Form, a copy of which is attached to this Section.
   c. The Submittal shall include a line-by-line, item-by-item description of the specified and proposed product.
5. Requests for substitutions must be submitted to the Architect and Owner's Representative NO later than 60 days after date of Owner-Contractor Agreement.
6. DO NOT SUBSTITUTE MATERIALS, EQUIPMENT, OR METHODS UNLESS SUCH SUBSTITUTIONS HAVE BEEN SPECIFICALLY APPROVED FOR THIS WORK IN WRITING.

D. Substantiated documentation of substitution for "Or Approved Equal" or "Or Approved Substitution"
   1. Where the phrase "or approved equal" or "approved substitution" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Owner and Architect unless the item has been specifically approved for this work by the Owner.
      a. Color choices will be one of the determining factors for approval.
   2. The decision of the Owner will be final.

E. Availability of Specified Items:
   1. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.
   2. In the event specified item or items will not be so available, so notify the [Architect] [Owner's Representative] prior to the receipt of Bids.
   3. Costs of delay caused on non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.

F. Whenever the Contractor secures approval for changing any items and such change involves a corresponding change or adjustment in any adjacent or related item, the responsibility for making the required change, or seeing that it is made, rests with the Contractor. The cost of these changes and/or adjustments shall be paid for by the Contractor unless it is otherwise agreed, in writing, at the time the change is approved. The acceptance of any change will not, in any way, relieve the Contractor from full compliance with the Contract Documents.

2.02 MANUALS

A. General: Where Manuals are required to be submitted covering items included in this work, prepare all such Manuals in durable plastic binders approximately 8-1/2 x 11 inches in size with at least the following:
   1. Identification on or readable through the front cover stating the general nature of the Manual.
   2. Neatly typewritten index near the front of the Manual furnishing immediate information as to location of all emergency data regarding the installation.
   3. Complete instructions regarding operating and maintenance of all equipment involved.
4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.
5. Copy of all guarantees and warranties issued.
6. Copy of approved Shop Drawing(s) with all data concerning all changes made during construction.

2.03 MISCELLANEOUS SUBMITTALS
A. Inspection and Test Reports Not Performed by Owner: Classify each inspection and test report as being either "Shop Drawings" or "Product Data" depending on whether the report is specially prepared for the project or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.

PART 3 EXECUTION
3.01 COORDINATION OF SUBMITTALS
A. Refer to General Conditions, article 16, for additional requirements.
B. General: Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including the following:
   1. Secure all necessary approval from public agencies and others. Signify by stamp or other means that all required approvals have been obtained.
   2. Clearly indicate all deviations from the Contract Documents.
C. The general Contractor shall submit a prioritized tabulation by date of Submittals required during the first 90 days of construction. List those Submittals required to maintain orderly progress of the work, and those required early because of long lead time for manufacture or fabrication.
   1. These dates may be shown on Construction Project Schedule at Contractor's option.

3.02 TIMING OF SUBMITTALS
A. General
   1. Make all Submittals enough in advance of scheduled dates for installation to provide all required time for reviews for securing necessary approvals, for possible revision and Resubmittals, and for placing orders and securing delivery.
   2. In scheduling, allow a minimum of fourteen (14) full calendar days for the Architect's initial review following receipt of the Submittals. Allow additional time if the Architect requires coordination with subsequent Submittals.
      a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related Submittals are received.
      b. If an Intermediate Submittal is necessary, process the same as the initial Submittal. Allow fourteen (14) calendar days for reprocessing each Submittal.

3.03 LETTER OF CONFORMANCE
A. Attach a copy of the letter of conformance.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. These Special Requirements contain changes and additions to the General Conditions and other Contract Documents. Where any Article or paragraph is modified or voided by these Special Requirements, the unaltered provisions shall remain in effect. In any case of conflict, these Special Requirements shall prevail.

B. Related Documents:
   1. Drawings and Articles of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this Section.
   2. All Contractors shall be governed by all applicable Sections of these Documents with reference to their respective areas of work. It shall be the responsibility of the General Contractor to apprise its Subcontractors and suppliers of these requirements.
      a. The Contractor and each Subcontractor shall review all Sections of the Specifications and all Drawings and are responsible for all work pertaining to their trade regardless of Drawing or Section of Specifications it is written in.

1.02 GENERAL

A. The Contractor and each Subcontractor affirmatively represents that they are skilled and experienced in the performance of work as required by this project and in the use and interpretation of Drawings and Specifications such as those included in the Contract Documents; that they have carefully reviewed the Drawings and Specifications of this project; and that their Contract is based solely on these Documents, not relying in any way on any explanation or interpretations - oral or written - from any other source. The Contractor agrees that it shall be conclusively presumed that the Contractor has exercised his aforementioned skill and experience and found the Drawings and Specifications sufficient and free from ambiguities, errors, or omissions for the purpose of determining its Contract for the performance of the work in conformity with the Drawings, Specifications, and all other Contract Documents.

B. Each Contractor shall provide sufficient and adequate labor, materials and construction equipment necessary to properly correlate all phases of the work to the end that the approved Progress Schedule can be adhered to and the Substantial Completion Date met.

C. Each Contractor is responsible for all necessary development of the work to fulfill the intent of the Contract Documents for a complete and/or functioning system whether totally defined by the Drawings and Specifications or not.

D. In no case shall any Contractor proceed with work in uncertainty.

1.03 COMMUNICATIONS

A. The Contractor shall forward all communications to the Owner through the Architect.

B. Request for Information (RFI) and Supplemental Instructions
   1. It shall be the Contractor's obligation to check the Contract Documents and to request of the Architect any clarification necessary and in time so as not to delay the progress of the work.

1.04 RELATIONS WITH ADJOINING PROPERTY OWNERS

A. To facilitate his work, the Contractor may choose to make necessary arrangements for use and subsequent rehabilitation of the adjoining Owner's property. Such arrangements are solely the Contractor's responsibility.

B. If work is required off-site, outside the Contract limit lines, or on property of others, such areas shall be restored by said Contractor to their original condition, or as required by local authorities, immediately following completion of the work.
1.05 ACCESS TO SITE AND BUILDING
A. Access and security of the project site are the responsibility of the Contractor and not that of the Owner, the Architect, or the Owner's Representative.
   1. All construction personnel shall protect work, existing facilities, and Owner's operations from unauthorized entry, vandalism, and theft.

1.06 EXAMINATION OF THE SITE
A. All Contractors submitting proposals for this work shall first examine the site and all conditions thereon. All proposals shall take into consideration all such conditions as may affect the work under this Contract.

1.07 GRADES, LINES, LEVELS, AND SURVEYS
A. Verify all grades, lines, levels, and dimensions as shown on the Drawings, and report any errors or inconsistencies discovered in the above to the Architect before commencing work. Provide and maintain established bench marks in not less than two widely separated places.

1.08 FIELD MEASUREMENTS
A. The Contractor shall take measurements in the field to verify or supplement dimensions indicated on Drawings and shall be responsible for accurate fit of specified work. Any discrepancy between the Drawings and the actual conditions shall be reported immediately to the Architect.

   B. Tolerances: The Contractor shall be responsible to maintain dimensions for spaces requiring close tolerances for such items as equipment or fixtures by "grounding" such locations. Uneven surfaces and joints will not be accepted which prevent the installation of units whose dimensions are shown in the documents.

1.09 USE OF SITE
A. Material Delivery and Storage
   1. It shall be the responsibility of the Contractor to direct all deliveries to the construction site and not the Architect, the Owner's Representative, or the Owner.

B. The Contractor shall exercise control over all trucks and equipment using public roads and the Owner's property to preclude spillage, tracking of dirt or debris thereon. Should spillage occur, that Contractor is held to promptly clean and remove same.

1.10 PROTECTION
A. The Contractor shall provide and maintain guard lights for all work at all barricades, railings, obstructions in the streets, roads, or sidewalks, parking garages, and at all trenches or pits as necessary to direct automobile and truck traffic as well as pedestrians. Remove such work when directed after necessity for same ceases.
   1. The Contractor is responsible for all required OSHA temporary protection and barricades necessary for the completion of his work.
   2. Any temporary fencing and sidewalk barricades required will be provided by the General Contractor.

B. The Contractor will be held responsible for all of his work and materials provided for by the Plans and Specifications until the work is completed and accepted.
   1. The Contractor shall:
      a. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
      b. Prohibit traffic and storage on waterproofed and roofed surfaces and on lawn and landscaped areas.
      c. Clean and repair damage caused by installation or use of temporary facilities.

C. Weather Protection
   1. The Contractor shall at all times provide protection against weather -- rain, wind, storms, frost, or heat -- so as to maintain his work, materials, apparatus, and fixtures free from
injury or damage. At the end of the day's work, all work likely to be damaged shall be covered.

2. During cold weather, the Contractor shall protect the work from damage. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, the Contractor shall cease work.

3. Any work damaged by failure to provide above protection shall be removed and replaced with new work at the Contractor's expense.

D. Dust Control and Partitions

1. The Contractor is responsible to completely control dust during the performance of his work, including any and all necessary measures such as dust enclosures, proper ventilation, etc. This also includes dust control during operations on the part of the Contractor in which services are provided by others. This cost is the responsibility of the Contractor.

2. The Contractor shall provide and remove upon completion all required weather and necessary dust-proof partitions, including doors, at locations required to phase the work, and as directed by the Architect.

E. Water Control:

1. The Contractor shall provide, operate, and maintain pumps or other equipment necessary to drain his work. Keep excavation pits, trenches, and ditches, including the entire subgrade, free of any water under any circumstances that may arise.

1.11 FIRE REGULATIONS AND EXTINGUISHERS

A. The Contractor is responsible for fire extinguishers and fire protection for all work, equipment, office, sheds, and roof restoration areas, etc., as required by OSHA regulations.

B. Free access shall be maintained at all times from the street to fire hydrants and to outside connections for standpipes. Fire doors shall be installed and in operation at the earliest possible time.

C. Combustible materials shall not be stored in the building.

D. The use of wood scaffolding shall be kept to a minimum and entirely eliminated when possible in order to eliminate fire hazards from this source. No part of the building where forms are in place shall be used for the storage of flammable materials of any kind. Temporary structures of combustible material shall be located not less than 30 feet from the building.

E. No smoking or use of tobacco in any form shall be permitted within the building or on the roof surfaces.

1.12 HAZARDOUS MATERIALS

A. The Contractor shall comply with all laws concerning hazardous materials. Hazardous material shall be disposed in a legal manner. MSDS sheets for hazardous materials shall be filed at the Contractor's job site office and as otherwise required by law.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Submittals.
B. Quality assurance.
C. Control of installation.
D. Testing and inspection agencies and services.
E. Control of installation.
F. Defect Assessment.

1.02 RELATED REQUIREMENTS
A. Section 01 2100 - Allowances: Allowance for payment of testing services.
B. Section 01 3000 - Administrative Requirements: Submittal procedures.
C. Section 01 4216 - Definitions.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Design Data: Submit for River Street Architecture, LLC’s knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Kana Hotel Group’s information.
C. Test Reports: After each test/inspection, promptly submit two copies of report to River Street Architecture, LLC and to General Contractor.
1. Include:
   a. Date issued.
   b. Project title and number.
   c. Name of inspector.
   d. Date and time of sampling or inspection.
   e. Identification of product and specifications section.
   f. Location in the Project.
   g. Type of test/inspection.
   h. Date of test/inspection.
   i. Results of test/inspection.
   j. Conformance with Contract Documents.
   k. When requested by River Street Architecture, LLC, provide interpretation of results.
D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and General Contractor or installation/application subcontractor to River Street Architecture, LLC, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Kana Hotel Group's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for River Street Architecture, LLC's benefit as contract administrator or for Kana Hotel Group.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for River Street Architecture, LLC's benefit as contract administrator or for Kana Hotel Group.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by River Street Architecture, LLC or Kana Hotel Group.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Kana Hotel Group will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 01 2100; see Section 01 2100 and applicable sections for description of services included in allowance.

B. General Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

C. Employment of agency in no way relieves General Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. General Contractor Employed Agency:
   2. Inspection agency: Comply with requirements of ASTM D3740, ASTM E329, and ________.
   3. Laboratory: Authorized to operate in Texas.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from River Street Architecture, LLC before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have Work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with River Street Architecture, LLC and General Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify River Street Architecture, LLC and General Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by River Street Architecture, LLC.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of General Contractor.
   4. Agency has no authority to stop the Work.

C. General Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify River Street Architecture, LLC and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by River Street Architecture, LLC.

E. Re-testing required because of non-conformance to specified requirements shall be paid for by General Contractor.

F. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by River Street Architecture, LLC. Payment for re-testing will be charged to the Sub-Contractor by deducting testing charges from the Contract Price.

3.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION
SECTION 01 4216
DEFINITIONS

PART 1 GENERAL
1.01 SUMMARY
A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS
A. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

B. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

C. Supply: Same as Furnish.

D. General: Basic Contract definitions are included in the Conditions of the Contract.

E. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

F. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

G. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

H. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

I. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

J. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

K. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

L. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

M. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

N. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.
1.03 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of the date of the Contract Documents, unless otherwise indicated.

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

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

F.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Temporary utilities.
B. Temporary telecommunications services.
C. Temporary telephone service.
D. Temporary sanitary facilities.
E. Temporary Controls: Barriers, enclosures, and fencing.
F. Security requirements.
G. Vehicular access and parking.
H. Waste removal facilities and services.
I. Project identification sign.
J. Field offices.

1.02 RELATED REQUIREMENTS
A. Section 01 5100 - Temporary Utilities.

1.03 TEMPORARY UTILITIES - SEE SECTION 01 5100
A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

1.04 TELECOMMUNICATIONS SERVICES
A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Telephone Land Lines: One line, minimum; one handset per line.
   3. Internet Connections: Minimum of one; DSL modem or faster.
   4. Email: Account/address reserved for project use.
   5. Facsimile Service: Minimum of one dedicated fax machine/printer, with dedicated phone line.

1.05 TEMPORARY SANITARY FACILITIES
A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS
A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
C. Provide protection for plants designated to remain. Replace damaged plants.
D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 FENCING
A. Construction: Commercial grade chain link fence.
B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.08 EXTERIOR ENCLOSURES
A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.09 SECURITY
A. Provide security and facilities to protect Work, and Kana Hotel Group’s operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING
A. Coordinate access and haul routes with governing authorities and Kana Hotel Group.
B. Provide and maintain access to fire hydrants, free of obstructions.
C. Provide means of removing mud from vehicle wheels before entering streets.
D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.11 WASTE REMOVAL
A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
C. Provide containers with lids. Remove trash from site periodically.
D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION
A. Provide project identification sign of design, construction, and location approved by Kana Hotel Group.
B. No other signs are allowed without Kana Hotel Group permission except those required by law.

1.13 FIELD OFFICES
A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS
A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
C. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL
1.01 SECTION INCLUDES
A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS
A. Section 01 5000 - Temporary Facilities and Controls:
B. Section 01 5000 - Temporary Facilities and Controls: Telephone service for administrative purposes.

1.03 TEMPORARY ELECTRICITY
A. Cost: By General Contractor.
B. Provide power service required from utility source.
C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.
D. Provide main service disconnect and over-current protection at convenient location and meter.
E. Permanent convenience receptacles may be utilized during construction.
F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES
A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft.
B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
C. Maintain lighting and provide routine repairs.

1.05 TEMPORARY HEATING
A. Cost of Energy: By General Contractor.
B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.06 TEMPORARY COOLING
A. Cost of Energy: By General Contractor.
B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.07 TEMPORARY WATER SERVICE
A. Cost of Water Used: By General Contractor.
B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.
PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED
END OF SECTION
SECTION 01 5713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
B. Section 31 2200 - Grading: Temporary and permanent grade changes for erosion control.
C. Section 03 3000 - Cast-in-Place Concrete: Concrete for temporary and permanent erosion control structures indicated on drawings.

1.03 REFERENCE STANDARDS

G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.
J. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service; 2009.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of The City of El Paso, El Paso County and the State of Texas for erosion and sedimentation control.
C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
   1. Obtain and pay for permits and provide security required by authority having jurisdiction.
E. Provide to Kana Hotel Group a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

F. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

G. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

H. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Kana Hotel Group.

I. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.
   3. Prevent mud and sediment from flowing onto sidewalks and pavements.
   4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Kana Hotel Group.

J. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Kana Hotel Group; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

K. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Kana Hotel Group; remove deposited sediments; comply with requirements of authorities having jurisdiction.

L. Open Water: Prevent standing water that could become stagnant.

M. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Erosion and Sedimentation Control Plan:
   1. Submit not less than 30 days prior to anticipated start of clearing, grading, or other work involving disturbance of ground surface cover.
   2. Include:
      a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.

c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.

d. Schedule of temporary preventive measures, in relation to ground disturbing activities.

e. Other information required by law.

f. Format required by law is acceptable, provided any additional information specified is also included.

3. Obtain the approval of the Plan by authorities having jurisdiction.

4. Obtain the approval of the Plan by Kana Hotel Group.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

A. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

B. Bales: Air dry, rectangular straw bales.
   1. Cross Section: 14 by 18 inches, minimum.
   2. Bindings: Wire or string, around long dimension.

C. Bale Stakes: One of the following, minimum 3 feet long:
   1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
   2. Wood, 2 by 2 inches in cross section.

D. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491.
   3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
   6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D4533.
   7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

E. Gravel: See Section 32 1123 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
B. Construction Entrances: Traffic-bearing aggregate surface.
1. Width: As required; 20 feet, minimum.
2. Length: 50 feet, minimum.
3. Provide at each construction entrance from public right-of-way.
4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Made of silt fences.
1. Provide linear sediment barriers:
   a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
2. Space sediment barriers with the following maximum slope length upslope from barrier:
   a. Slope of Less Than 2 Percent: 100 feet.
   b. Slope Between 2 and 5 Percent: 75 feet.
   c. Slope Between 5 and 10 Percent: 50 feet.
   d. Slope Between 10 and 20 Percent: 25 feet.
   e. Slope Over 20 Percent: 15 feet.

D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
2. Straw bale row blocking entire inlet face area; anchor into pavement.

E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downsput outlets and storm water outlets.

G. Soil Stockpiles: Protect using one of the following measures:
1. Cover with polyethylene film, secured by placing soil on outer edges.
2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.

I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Traffic-Bearing Aggregate Surface:
1. Excavate minimum of 6 inches.
2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
3. Place and compact at least 6 inches of 1.5 to 3.5 inch diameter stone.

B. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873.
2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
5. Install with top of fabric at nominal height and embedment as specified.
6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
7. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

C. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
2. Install bales so that bindings are not in contact with the ground.
3. Embed bales at least 4 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

D. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

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

3.06 CLEAN UP
A. Clean out temporary sediment control structures that are to remain as permanent measures.
B. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION
SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Transportation, handling, storage and protection.
B. Product option requirements.
C. Substitution limitations and procedures.
D. Procedures for Kana Hotel Group-supplied products.
E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS
A. Section 01 1000 - Summary: Lists of products to be removed from existing building.
B. Section 01 4000 - Quality Requirements: Product quality monitoring.
C. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

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

PART 2 PRODUCTS

2.01 NEW PRODUCTS
A. Provide new products unless specifically required or permitted by the Contract Documents.
B. DO NOT USE products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.
   2. Made of wood from newly cut old growth timber.
   3. Containing lead, cadmium, asbestos.
C. Where all other criteria are met, General Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 6116.
   2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
   3. Are extracted, harvested, and/or manufactured closer to the location of the project.
   4. Have longer documented life span under normal use.
   5. Result in less construction waste.
   6. Are made of vegetable materials that are rapidly renewable.
   7. Have a published GreenScreen Chemical Hazard Analysis.
D. Urea-Formaldehyde Prohibition:
   1. Overall Project Requirement: Provide composite wood and agrifiber products having no added urea-formaldehyde resins.
      a. Require each installer to certify compliance and submit product data showing product content.
   2. Specific Product Categories: Comply with limitations specified elsewhere.
E. Adhesives and Joint Sealants:
1. Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
   a. Require each installer to certify compliance and submit product data showing product content.
2. Specific Product Categories: Comply with limitations specified elsewhere.

2.02 PRODUCT OPTIONS
A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that 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. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
   7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
D. Product Selection Procedures: Procedures for product selection include the following:
   1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
      a. Substitutions may be considered, unless otherwise indicated.
   2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
      a. Substitutions may be considered, unless otherwise indicated.
   3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
      a. Substitutions may be considered, unless otherwise indicated.
   4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
      a. Substitutions may be considered, unless otherwise indicated.
   5. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" are included and also introduce or refer to a list of manufacturers' names, provide either the specified 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 provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
      a. Substitutions may be considered, unless otherwise indicated.
   6. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and
matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

7. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

8. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

2.03 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 30 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

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

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

2. Requested substitution does not require extensive revisions to the Contract Documents.

3. Requested substitution is consistent with the Contract Documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted.

5. Requested substitution has been coordinated with other portions of the Work.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

2.05 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.
PART 3 EXECUTION

3.01 SUBSTITUTE PROCEDURES

A. Substitutions may be considered when a product becomes unavailable through no fault of the General Contractor.
B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Kana Hotel Group.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

3.02 OWNER-SUPPLIED PRODUCTS

A. Kana Hotel Group's Responsibilities:
   1. Arrange for and deliver Kana Hotel Group reviewed shop drawings, product data, and samples, to General Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with General Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.
B. General Contractor's Responsibilities:
   1. Review Kana Hotel Group reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Kana Hotel Group.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

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

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturers' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.
F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
G. Comply with manufacturer's warranty conditions, if any.
H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
I. Prevent contact with material that may cause corrosion, discoloration, or staining.
J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Examination, preparation, and general installation procedures.
   B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
   C. Cutting and patching.
   D. Surveying for laying out the work.
   E. Cleaning and protection.
   F. Starting of systems and equipment.
   G. Closeout procedures, including General Contractor’s Correction Punch List, except payment procedures.
   H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS
   A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
   B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
   C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
   D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
   E. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
   F. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
   G. Section 01 7800 - Closeout Procedures & Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.03 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
      1. Structural integrity of any element of Project.
      2. Integrity of weather exposed or moisture resistant element.
      3. Efficiency, maintenance, or safety of any operational element.
      5. Work of Kana Hotel Group or separate Contractor.

1.04 QUALIFICATIONS
   A. For survey work, employ a land surveyor registered in Texas and acceptable to River Street Architecture, LLC. Submit evidence of Surveyor’s Errors and Omissions insurance coverage in the form of an Insurance Certificate.
   B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in Texas.
   C. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in Texas.

1.05 PROJECT CONDITIONS
   A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. See Section 01 1000 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Kana Hotel Group occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Kana Hotel Group's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

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

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

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

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

3.05 ALTERATIONS
A. Drawings showing existing construction and utilities are based on existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to River Street Architecture, LLC before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.
B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch,
      and prepare existing surfaces as required to receive new finish; remove existing finish if
      necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged
      surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical,
   Telecommunications, and ): Remove, relocate, and extend existing systems to accommodate
   new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to
      equipment and operational components; if necessary, modify installation to allow access or
      provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require
      reactivation, put back into operational condition; repair supply, distribution, and equipment
      as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new
      services, maintain existing systems in service until new systems are complete and ready
      for service.
      a. Disable existing systems only to make switchovers and connections; minimize
         duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above
      accessible ceilings; remove back to source of supply where possible, otherwise cap stub
      and tag with identification; patch holes left by removal using materials specified for new
      construction.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

E. Patching: Where the existing surface is not indicated to be refinished, patch to match the
   surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch
   so that the substrate is ready for the new finish.

F. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces
      to remain to the specified condition for each material, with a neat transition to adjacent
      finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and
      refinish to match.
   3. Patch as specified for patching new work.

G. Clean existing systems and equipment.

H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site;
   do not burn or bury.

I. Do not begin new construction in alterations areas before demolition is complete.

J. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING
   A. Whenever possible, execute the work by methods that avoid cutting or patching.
   B. See Alterations article above for additional requirements.
C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-conforming work.

D. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400 (which will be released with 100% construction documents), to full thickness of the penetrated element.

K. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

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

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.
EXECUTION AND CLOSEOUT REQUIREMENTS

3.09 SYSTEM STARTUP
A. Coordinate schedule for start-up of various equipment and systems.
B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
D. Verify that wiring and support components for equipment are complete and tested.
E. Execute start-up under supervision of applicable General Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

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

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

3.12 CLOSEOUT PROCEDURES
A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Kana Hotel Group.
B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the General Contractor's Correction Punch List for General Contractor's Notice of Substantial Completion.

C. Notify River Street Architecture, LLC when work is considered ready for River Street Architecture, LLC’s Substantial Completion inspection.

D. Submit written certification containing General Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for River Street Architecture, LLC's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing River Street Architecture, LLC’s and General Contractor's comprehensive list of items identified to be completed or corrected and submit to River Street Architecture, LLC.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Kana Hotel Group-occupied areas.

G. Notify River Street Architecture, LLC when work is considered finally complete and ready for River Street Architecture, LLC's Substantial Completion final inspection.

H. Complete items of work determined by River Street Architecture, LLC listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Furnish service and maintenance of components indicated in specification sections for 1 year from date of Substantial Completion.

D. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

E. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

F. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Kana Hotel Group.

END OF SECTION
SECTION 9 01712
FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY
A. Section Includes:
   1. Quality Assurance
   2. Submittals
   3. Project Record Documents
   4. Survey Requirements
   5. Examination
   6. Survey Reference Points
B. Related Sections:
   1. General Conditions: Basic site engineering requirements.
   2. Section 00313 - Geotechnical Data: Owner's topographic survey.

1.02 QUALITY ASSURANCE
A. Employ a Land Surveyor or Engineer registered in the State where project is located and acceptable to the Owner [and Architect], to perform survey work of this section.
B. Submit evidence of Surveyor's or Engineer's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.03 SUBMITTALS
A. Submit a copy of registered site drawing and a certificate signed by the Land Surveyor or Engineer, that the elevations and locations of the Work are in conformance with Contract Documents.
B. On request, submit documentation verifying accuracy of survey work.

1.04 PROJECT RECORD DOCUMENTS
A. Maintain a complete and accurate log of control and survey work as it progresses.
B. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

1.05 SURVEY REQUIREMENTS
A. Provide field engineering services. Utilize recognized engineering survey practices.
B. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
C. Submit Project Record Documents under provisions of Section 01783.
D. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means.
E. Periodically verify layouts by same means

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify locations of survey control points prior to starting work. Verify set-backs and easements, confirm drawing dimensions and elevations.
B. Promptly notify Architect of any discrepancies discovered.
3.02 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

C. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

D. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

END OF SECTION
1.01 SUMMARY
A. Section Includes:
   1. Administrative and Procedural Requirements for Cutting and Patching

1.02 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 surfaces to original conditions after installation of other Work.

1.03 SUBMITTALS
A. CUTTING AND PATCHING PROPOSAL:
   1. Where approval of procedures is required before proceeding, submit a proposal describing procedures in advance of the time cutting and patching will be performed. Include the following information, as applicable:
      a. Describe the extent of cutting and patching required and how it is to be performed. Indicate why it cannot be avoided.
      b. Describe anticipated results, include changes to structural elements and operating components and changes in the building's appearance and other visual elements.
      c. List products to be used and entities that will perform work.
      d. Indicate dates when cutting and patching is to be performed.
      e. List utilities that will be disturbed, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
      f. Approval by the Architect to proceed does not waive the Architect right to later require complete removal and replacement of work found to be unsatisfactory.

1.04 STRUCTURAL WORK:
A. Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Obtain approval of the cutting and patching proposal before cutting and patching structural elements.

1.05 OPERATIONAL AND SAFETY LIMITATIONS:
A. Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems.

1.06 VISUAL REQUIREMENTS:
A. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.07 PRODUCTS

1.08 MATERIALS:
A. Use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass that of existing materials.
PART 2  EXECUTION

2.01  EXAMINATION:
   A. Before cutting, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.

2.02  PREPARATION:
   A. Provide temporary support of work to be cut.

2.03  CLEANING:
   A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty and similar items. Thoroughly clean piping, conduit, and similar features before painting or finishing is applied. Restore damaged pipe covering to its original condition.

2.04  PROTECTION:
   A. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.
   B. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
   C. Take all precautions to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed, or relocated until provisions have been made to bypass them.
   D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems, when possible, before cutting to minimize interruption to occupied areas.

2.05  PERFORMANCE:
   A. Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
   B. Cut existing construction to provide for the installation of other components or the performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

2.06  CUTTING:
   A. All cutting of areas shall be by Contractor requiring cutting, except where noted otherwise in the Specifications and/or Drawings.
   B. Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review procedures with the original installer. Comply with the original installer's recommendations.
   C. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   D. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill. Overcuts are NOT allowed
      1. At concrete slabs on grade cut existing vapor barrier leaving 6-inches of existing vapor barrier material on each side of cut for splicing in new vapor barrier material.
   E. Comply with requirements of applicable sections of Division 02 where cutting and patching requires excavating and backfilling.

2.07  PATCHING:
   A. All patching shall be provided by Contractor doing cutting work and shall be performed by trade who would customarily be performing that type of work.
   B. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
C. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   1. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.
   2. Patch, point or grout flush all voids, holes, chips, cracks, spalls, broken or otherwise damaged surfaces. Patch with materials which match adjacent surfaces in appearance and quality

D. Repair surfaces exposed by removed finishes, fixtures, or equipment.

END OF SECTION
SECTION 9 01740
CLEANING

PART 1 GENERAL
1.01 SUMMARY
A. Section Includes:
   1. Throughout all phases and items of the construction period, maintain the building and site in a standard of cleanliness as described in this Section including:
      a. Cleaning Materials and Equipment
      b. Progress Cleaning
      c. Final Cleaning
B. Related Sections:
   1. General Conditions.
   2. In addition to standards described in this Section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

1.02 QUALITY ASSURANCE
A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met
B. Codes and Standards: In addition to the standards described in this Section, comply with all pertinent requirements of Governmental agencies having jurisdiction.
C. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 PRODUCTS
2.01 CLEANING MATERIALS AND EQUIPMENT:
A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY:
A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Owner's Representative.

PART 3 EXECUTION
3.01 PROGRESS CLEANING
A. General:
   1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection of materials.
   2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for the construction of this work.
   3. Twice weekly, and more often if necessary, the Contractor shall completely remove all scrap, debris, and waste material from the job site, and shall place into container furnished by the Contractor.
   4. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection.
B. Project Site: The Contractor shall:
   1. Daily, and more often if necessary, inspect the project site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
   2. Weekly, and more often if necessary, sweep all interior places clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by reasonable diligence using a hand-held broom.
   3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer
of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

4. Following the installation of finish floor materials, protect by covering with temporary coverings and/or clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material, which may be injurious to the finish floor material.

3.02 FINAL CLEANING

A. Definition: Except as otherwise specifically provided, "Clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance Subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the work, remove from the job site all tools, temporary structures, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01 above.

C. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

D. Repair, patch, and touch-up marred or damaged surfaces to match adjacent finishes.

E. Clean the following if located within the project area:
   1. Plumbing Fixtures, Strainers and Floor Drains
   2. Light Fixtures and Lamps
   3. Replace filters of ventilating equipment when units have been operating during construction. In addition, clean grilles and louvers.
   4. Excess lubrication is to be removed from mechanical and electrical equipment.
   5. All Electrical Panels

F. Clean all transparent materials, including glass and mirrors. Remove glazing compound and other substances that are noticeable from vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

G. Remove labels that are not permanent labels.

H. Polished and Resilient Surfaces: To all surfaces requiring the routine application of protective waxes and/or buffed polish, apply the specified coating and/or polish as recommended by the manufacturer of the material being treated, as specified in individual Specification Sections.

I. Leave concrete floors broom clean. Vacuum carpeted surfaces.

J. Clean areas traversed by construction personnel.

K. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean. Remove stains, spills, and other foreign deposits.

L. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

M. Timing: Schedule final cleaning as approved by the Architect and Owner's Representative to enable the Owner to accept a completely clean project.

END OF SECTION
SECTION 01 7800
CLOSEOUT PROCEDURES & SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

1.02 RELATED REQUIREMENTS
A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
B. Individual Product Sections: Specific requirements for operation and maintenance data.
C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
A. Project Record Documents: Submit documents to River Street Architecture, LLC with claim for final Application for Payment.
B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. River Street Architecture, LLC will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Kana Hotel Group, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with River Street Architecture, LLC comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Kana Hotel Group’s permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.04 SUBSTANTIAL COMPLETION
A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
      a. Advise Owner of pending insurance changeover requirements.
      b. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
      c. 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.
      d. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
e. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer’s name and model number where applicable.

f. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner’s personnel of changeover in security provisions.

g. Complete startup testing of systems.

h. Submit test/adjust/balance records.

i. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

j. Advise Owner of changeover in heat and other utilities.

k. Submit changeover information related to Owner’s occupancy, use, operation, and maintenance.

l. Complete final cleaning requirements, including touchup painting.

m. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

2. 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.

   a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

   b. Results of completed inspection will form the basis of requirements for Final Completion.

1.05 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

   1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."

   2. Submit certified copy of Architect’s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

   3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

   4. Submit pest-control final inspection report and warranty.

   5. 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.

1.06 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

   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.
PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Kana Hotel Group.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Product substitutions or alternates utilized.
   2. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Kana Hotel Group's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of River Street Architecture, LLC, Consultants, General Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of River Street Architecture, LLC, General Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties and bonds.

3.04 WARRANTIES AND BONDS
   A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Kana Hotel Group's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
   B. Verify that documents are in proper form, contain full information, and are notarized.
   C. Co-execute submittals when required.
   D. Retain warranties and bonds until time specified for submittal.
   E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. This Section specifies the administrative requirements, procedural obligations, terms and conditions and general requirements related to the preparation and submittal of instruction manuals covering the materials installed, care, preservation and maintenance of products, finishes, equipment and systems.

B. Related Sections:
   1. Special operating and maintenance data requirements for specific equipment or building operating systems are included in the appropriate Specifications Sections of Divisions 02 through 33.
   2. Preparation of Shop Drawings and Product Data are included in Specification Section 01 33 00, "Submittals and Substitutions".
   3. General closeout requirements are included in Specification Section 01 77 00.
   4. General requirements for submittal of Project Record Documents are included in Section 01 78 39, "Project Record Documents".

1.02 SUBMITTALS

A. Submittal Schedule: Comply with the following schedule for submittal of operating and maintenance manuals:

   A. Submit two (2) copies of the first and subsequent drafts of each manual for review. Include a complete index and table of contents for each volume. One (1) copy will be returned within 45 days of receipt with comments. The first draft shall be at least 95% complete. Provide FINAL manuals prior to commencement of training; these manuals shall be utilized as instructional text during the building orientation and training processes. Refer to Section 01 78 39.

   B. Form of Submittal: Manuals should be prepared in the form of an instructional manual for use by the Owner's operating personnel and/or property management company. The information should be bound as follows:
      1. Binders: For each manual, provide heavy-gauge, commercial quality, vinyl hanging VUE presentation binders in 3" capacity sized to receive 8-1/2" by 11" paper. Binder color shall be white.
         a. Identify each binder on the spine with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", project name and subject matter covered.
         b. Indicate the volume number for multiple volume sets of manuals.
      2. Dividers: Manual contents shall be organized and divided by specification divisions using index maker dividers.
      4. Text Material: Where written material is required as part of the manual, use the manufacturer's standard printed material.
      5. Drawings: Where drawings or diagrams are required as part of the manual, provide protective plastic jackets for the drawings and bind in with the text.

1.03 GENERAL MANUAL CONTENT

A. In each manual, include information specified in the individual Specification Section and the following information for each major component of building equipment and its controls:
   1. General system or equipment description.
   2. Design factors and assumptions.
3. Copies of approved shop drawings, product data, installation instructions and setup/calibration procedures.
4. Load and performance testing reports including equipment and system startup/performance documentation.
5. Fire/flame spread test certificates.
6. System or equipment identification, including:
   a. Name of manufacturer
   b. Model number
   c. Serial number
7. Standard operating instructions.
8. Emergency operating instructions.
9. Wiring diagrams including color coding, labeling and terminal designations.
10. Inspection and test procedures.
11. Detailed preventative maintenance procedures, frequencies and special tool requirements.
13. Precautions against improper use and maintenance.
14. Copies of warranties, including extended warranty options.
15. General owners operating/service manual.
16. Factory service manuals, including repair instructions and illustrated parts listing.
17. Electronic copies of operating system software (3.5 in. diskettes or CD-ROM).
18. Material safety data sheets.
19. Sources of required maintenance materials repair/replacement parts and related services.
20. Copies of inspections and certifications by governing authorities.

B. Manual Index: Organize each manual into separate Sections for each piece of related equipment. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond and service contract proposal.

C. Title Page: Provide a title page as the first sheet of each manual. Provide the following information.
   1. Subject matter covered by the manual.
   2. Name and number of the Contract.
   3. Date of submittal.
   4. Name, address, and telephone number of the Contractor and Subcontractor.
   5. Name and address of the Architect/Engineer.
   6. Cross reference to related systems in other operating and maintenance manuals.

D. General Table of Contents: After the Title Page, include a typewritten table of contents for each volume (Divisions 02 through 33 inclusive), arranged according to the specification format.

E. General Information: Provide a general information Section immediately following the Table of Contents, listing by Specification Section each major product included in the manual, identified by product name. Under each product, list the name, address, telephone number, and point of contact of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.

F. Product Data: Where manufacturer’s standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.
   1. Manufacturer’s Data: Provide complete information on architectural products, including the following, as applicable:
      a. Manufacturer’s Catalog Number
      b. Size
c. Material Composition  
d. Color  
e. Texture  
f. Re-ordering Information for Specially Manufactured Products  

2. Care and Maintenance Instructions: Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information regarding cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.  

3. Color Schedules: Provide information showing manufacturer's color name and catalog number for all exposed finishes, including paint, carpet, wallcoverings, and other finish materials.  

4. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.  
   a. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:  
      1) Applicable standards  
      2) Chemical composition  
      3) Installation details  
      4) Inspection procedures  
      5) Maintenance information  
      6) Repair procedures  

G. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.  
   1. Description: Provide a complete description of each unit and related component parts, including the following:  
      a. Equipment or system function  
      b. Operating characteristics  
      c. Limiting conditions  
      d. Performance curves  
      e. Engineering data and tests  
      f. Complete nomenclatures and number of replacement parts  
   2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment, provide the following:  
      a. Printed operating and maintenance instructions.  
      b. Assembly drawings and diagrams required for maintenance.  
      c. Recommended parts inventory listing.  
   3. Provide information detailing essential maintenance procedures, including the following:  
      a. Routine operations  
      b. Trouble-shooting guide  
      c. Disassembly, repair and reassembly  
      d. Alignment, adjusting and checking  
   4. Operating Procedures: Provide information on equipment and system operating procedures, including the following:  
      a. Start-up procedures  
      b. Equipment or system break-in  
      c. Routine and normal operating instructions  
      d. Regulation and control procedures  
      e. Instructions on stopping  
      f. Shut-down and emergency instructions  
      g. Day and night operating instructions  
      h. Summer and winter operating instructions
i. Required sequences for pneumatic, electric, electronic or direct digital control systems
j. Special operating instructions

5. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

6. Controls: Provide a comprehensive description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

7. Drawings: Provide copies of each Contractor/Subcontractor set of coordination drawings.

8. Valve Tags: Provide charts of valve tag numbers with the room number location and function of each valve. Valve tag locations shall be clearly indicated on the set of record “As-Built” drawings.

9. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:
   a. Electric power
   b. Lighting
   c. Communications
   d. Fire Alarm

H. Written Test: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

I. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation. Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.

J. Warranties, Bonds, and Service Contracts: Provide a photocopy of each warranty, bond, or service contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to be followed in the event of product failure including the return policies/procedures. List circumstances and conditions that would affect validity of the warranty or bond. Commencement and expiration dates shall be clearly indicated.

K. Provide complete information in the manual on products specified in Divisions 02 through 33.

1.04 TRAINING OF OPERATING AND MAINTENANCE PERSONNEL

A. Prior to final inspection, instruct the hotel personnel in operation, adjustment, and maintenance of products, equipment and systems.
   1. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.
   2. Refer to Specification Section 01 79 00, "Training", for detailed training requirements

1.05 OPERATING MAINTENANCE MANUALS

A. Submit copies of each manual, in the form specified, to the [Architect] [Owner's Representative] for distribution.
   1. Refer to individual Specification Sections and other paragraphs within this Section for additional requirements.

B. Manuals should be organized into separate and distinct volumes (binders) as described hereafter:
   1. "SITE WORK"
      a. Asphalt Concrete Pavement
      b. Tack and Prime Coat
c. Concrete Curbs and Sidewalks
d. Pavement Markings
e. Guide Rail
f. Termite Control
g. Traffic Signage
2. "SITE WORK UTILITIES"
a. Water and Sanitary Sewer Facilities
b. Drainage Structures
c. Underdrains
d. Electrical Power Service
e. Gas Utility
3. "Landscape and Site Improvements"
a. Soil Preparation and Seeding
b. Trees, Plants, and Ground Cover
c. Fences and Gates
d. Playfields and Equipment
e. Site and Street Furnishings
4. "BUILDINGS AND STRUCTURES"
a. Concrete
b. Unit Masonry
c. Metals
d. Woods and Plastics
e. Thermal and Moisture Protection
f. Doors and Windows
g. Finishes
h. Specialties
i. Fixtures, Furnishings, and Equipment
5. "WAYFINDING"
a. Exterior Signage
b. Exterior Post/Panel and Overhead Panel Signs
6. "SWIMMING POOLS AND SPAS"
a. Basic Piping and Pumps
b. Filtering and Deck Equipment
c. Pool Heater and Controls
d. Chemical Treatment
7. "HYDRAULIC ELEVATORS"
8. "MECHANICAL, HVAC"
a. Basic Materials and Methods
b. Piping and Specialties
c. Insulation
d. Pumping
e. Refrigeration
f. Air Handling and Distribution
g. Automatic Temperature Control
h. Testing/Adjusting/Balancing
9. "MECHANICAL, PLUMBING"
a. Basic Materials and Methods
b. Piping and Specialties
c. Insulation
d. Fixtures/Trim/Accessories
e. Water Heaters
f. In-Line Circulating Pumps
g. Water Softening Equipment
10. "FIRE SPRINKLERS"
a. Basic Materials and Methods  
b. Standpipe and Hose Systems  
c. Fire Pumps  
d. Dry Pipe Sprinkler Systems  
e. Wet Pipe Sprinkler Systems  

11. "ELECTRICAL"  
a. Basic Materials and Methods  
b. Service and Distribution  
   1) Service Entrance  
   2) Switchboards  
   3) Disconnects  
   4) Grounding  
   5) Transformers  
   6) Panelboards  
   7) Overcurrent Protective Devices  
   8) Contactors  
   9) Voltage Surge Suppression  
  10) Heat Tracing  
c. Lighting  
   1) Interior and Exterior Luminaries, Lamps and Accessories  
   2) Emergency Lighting  
   3) Lighting Control Equipment  

12. "SOUND SYSTEMS"  

13. "COMMUNICATIONS"  
a. Voice and Data  
b. Television Distribution System  
c. Security Intercom System  

14. "FIRE ALARM SYSTEM"  

1.06 MAINTENANCE OF DOCUMENTS AND SAMPLES:  

A. Store Record Documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition. Make Documents and Samples available at all times for inspection by the Owner's Representative or Architect.

PART 2 PRODUCTS  

2.01 NOT USED  

PART 3 EXECUTION  

3.01 NOT USED  

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. This Section specifies administrative and procedural requirements for Project Record Documents to be prepared and submitted by the General Contractor.
   2. Project Record Documents required include:
      a. Marked-Up Copies of Record Drawings, Specifications, and Product Data
      b. Record Samples
      c. Miscellaneous Record Submittals

B. Related Sections:
   1. General project closeout requirements are included in "Contract Closeout", Section 01 77 00.
   2. General requirements for submittal of Shop Drawings and Product Data are included in General Conditions and the Section "Submittals and Substitutions," Section 01 33 00.
   3. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Divisions 02 through 33.
   4. Operating and maintenance data is specified in Section 01 78 23.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

1.03 RECORD DRAWINGS

A. The Contractor shall maintain a white-print set (blue-line or black-line) of Contract Drawings and Shop Drawings in clean, undamaged condition, with mark-up of actual installations which vary substantially from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of work. Mark-up new information which is recognized to be of importance to Owner, but was for some reason not shown on either Contract Drawings or Shop Drawings. Give particular attention to concealed work, which would be difficult to measure and record at a later date. Note related change order numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on cover of each set.

B. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, Subcontractor, or similar entity, is required to prepare the mark-up on Record Drawings.

A. At time of Substantial Completion, submit Record Drawings to Owner for Owner's records in accordance with General Conditions, Article 17.
   1. Refer to Section 01 78 23 for items to be included in manuals.
   2. Three (3) copies will be required.

1.04 RECORD SPECIFICATIONS

A. The Contractor shall maintain one copy of specifications, including addenda, change orders, and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of option, and similar information on work
where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable. Upon completion of mark-up, submit to [Architect] [Owner's Representative].

1. The Contractor is responsible for collecting marked-up record Sections from each of the other Subcontractors, and for collating these Sections in proper numeric order with its own Sections to form a complete set of record Specifications. Submit to the Owner.
   a. Three (3) copies will be required.

1.05 PRODUCT DATA

A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.
   1. Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site and changes in manufacturer’s instructions and recommendations for installation.
   2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   3. Note related Change Orders and mark-up of Record Drawings, where applicable.
   4. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data. Refer to Section 01 78 23 (01830) for requirements. Submit to the Owner.
   5. The Contractor is responsible for mark-up and submittal of record Product Data.

1.06 SAMPLES

A. Immediately prior to date of Substantial Completion, the Contractor shall meet with the Owner at the site to determine which of the Samples maintained during the construction period shall be transmitted to the Owner for record purposes. Comply with the Owner’s instructions for packaging, identification marking, and delivery to Owner’s storage space. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.07 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Owner.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:
   a. Field Records on Excavations and Foundations
   b. Field Records on Underground Construction and Similar Work
   c. Survey Showing Locations and Elevations of Underground Lines
   d. Invert Elevations of Drainage Piping
   e. Surveys Establishing Building Lines and Levels
   f. Authorized Measurements Utilizing Unit Prices or Allowances
   g. Batch Mixing and Bulk Delivery Records
   h. Load and Performance Testing
   i. Inspections and Certifications by Governing Authorities
   j. Leakage and Water-Penetration Tests
   k. Fire Resistance and Flame Spread Test Results
   l. Final Inspection and Correction Procedures
PART 2 PRODUCTS
2.01 NOT USED

PART 3 EXECUTION
3.01 RECORDING
   A. Post changes and modifications to the Documents as they occur. Do not wait until the end of
      the Project.

END OF SECTION
SECTION 9 01784
SPARE PARTS

PART 1 GENERAL
1.01 SUMMARY
A. Section Includes:
   1. Spare Parts and Materials
B. Related Sections:
   1. Refer to individual sections for items listed herein, as well as other requirements.

PART 2 PRODUCTS
2.01 EXTRA MATERIALS - GENERAL
A. At the time of building acceptance, deliver to the Owner the following extra materials. Deliver in original unopened cartons or containers (except paint) with each item properly identified.

2.02 JOINT SEALANTS
A. Furnish extra sealant materials from same production run as the materials applied in the quantities described below. Package materials in unopened, factory-sealed containers with labels describing contents.
   1. Quantity: Furnish one unused tube of each type and color of exterior sealant applied.

2.03 TILING
A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to one case for each type, composition, color, pattern, and size indicated.

2.04 ACOUSTIC TILE CEILINGS
A. Replacement stock amounting to one full box (minimum 12 tiles) of each type.

2.05 RESILIENT FLOORING
A. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
   1. Furnish not less than one box of each class, wearing surface, color, pattern, and size of resilient floor tile installed.

2.06 CARPETING
A. Furnish extra materials described below before installation begins that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. The Owner shall be permitted to view all carpet scraps and retain any that is chosen for future repairs before they are removed from the job site.

2.07 PAINTING AND SPECIAL COATINGS
A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage.
   1. Quantity: Furnish the Owner with two gallons of each material and color applied in addition to any leftover amounts.
   2. All cans shall be labeled with Finish Index number.

2.08 WALLCOVERING
A. Package materials with protective covering and identify with labels describing contents.
   1. Furnish full-size units equal to two full rolls of each type installed and return all unused material to Owner.
2.09 FIRE SUPPRESSION
   A. Operating key handles: Furnish one extra for each key-operated hose bibb and hydrant installed.
   B. Sprinkler Cabinets:
      1. Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench.
      2. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers.
      3. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

2.10 PLUMBING FIXTURES
   A. Shower Heads: Two units of each type.
   B. Faucet Sets: Five complete sets for Guest Room units.
   C. Toilet Seats: Furnish quantity of identical units not less than 2 of each type installed.

2.11 PLUMBING SPECIALTIES
   A. Operating key handles: Furnish one extra for each key-operated hose bibb and hydrant installed.

2.12 DUCT ACCESSORIES
   A. Fusible Links: Furnish quantity equal to 5 of each type installed.

2.13 POWER VENTILATORS
   A. Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

2.14 SELF-CONTAINED AIR-CONDITIONING UNITS
   A. Filters: One set of filters for each unit for PTAC, VTAC, split A/C and Packaged HVAC units.
   B. Fan Belts: One set of belts for each unit for Packaged HVAC units.

2.15 PACKAGED TERMINAL AIR CONDITIONING UNITS
   A. Replacement stock amounting to providing four complete spare units the most common size used.
   B. Furnish two spare thermostat for each type/size installed.

2.16 ENCLOSED CONTROLLERS
   A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents:
      1. Spare Fuses and Incandescent Indicating Lamps: Furnish one set of three for each kind.

2.17 INTERIOR LIGHTING
   A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
      1. Lamps: Five of each rating installed of the following types (Refer the Light Fixture Schedule located in the Appendix):
         a. Incandescent
         b. Fluorescent
         c. Compact Fluorescent
         d. Metal Halide

2.18 EXTERIOR LIGHTING
   A. Furnish extra materials described below that are packaged with protective covering for storage and identified with labels describing contents.
      1. Lamps: Five of each rating installed of the following types (Refer the Light Fixture Schedule located in the Appendix):
         a. Incandescent.
         b. Fluorescent
c. Compact Fluorescent
d. Metal Halide

2.19 FIRE ALARM AND DETECTION SYSTEMS
   A. Furnish extra materials described below that match products installed and that are packaged
      with protective covering for storage and identified with labels describing contents:
      1. Lamps for remote indicating lamp units: Two units.
      2. Lamps for strobe units: Two units.
      3. Smoke detectors, fire detectors, and carbon monoxide detectors: Two units of each type.
      4. Detector bases: Two units of each type.

2.20 CONCRETE PAVER UNITS
   A. Furnish stock of pavers that match blend of products installed in the amount of 10 sf.

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION
SECTION 9 01790
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY
A. Section Includes:
   1. This Section specifies the administrative requirements, procedural obligations, terms and conditions and training requirements related to instructing the facility engineering personnel in the proper care, preservation, operations and maintenance of materials, finishes, equipment and systems.
      a. Preparation and submittal of instructor qualifications, training schedules, and agendas for various building materials, components, systems and equipment.
      b. Instruction of the Owner's personnel and adjunct organizations in the proper operation and maintenance of all building materials, components, systems and equipment.

B. Related Sections:
   1. Special operating and maintenance data requirements for specific equipment or building operating systems are included in the appropriate Specification Sections of Divisions 02 through 33.
   2. Preparation of Shop Drawings and Product Data are included in Specification Section 01 33 00 (01330), Submittals and Substitutions.
   3. General closeout requirements are included in Specification Section 01 77 00 (01770). Contract Closeout.
   4. General requirements for submittal of Project Record Documents are included in Section 01 78 39 (01785), Project Record Documents.
   5. Additional training requirements for building systems and/or equipment are delineated in the appropriate Specification Sections, Divisions 02 through 33.
   6. Where training manuals include information on work installed by the Contractor and their Subcontractors, the Contractor shall be responsible for the preparation of the manuals, including collection, collation and binding of the material and submittal of data as specified.

1.02 QUALITY ASSURANCE
A. The status of training deliverables shall be an integral part of the Contractor's coordination process. The Contractor shall meet with the Owner as required, to discuss progress-to-date, deficiencies and non-compliance issues.

1.03 TRAINING MANUALS
A. The completed FINAL VERSION of the approved Operation & Maintenance Manuals and the redlined set of the record "as-built" drawings shall be used as the basis of instruction. The Contractor is not responsible for providing additional copies of these documents for training purposes.

1.04 TRAINING HOURS
A. Training shall be conducted during normal working hours. All training shall be completed prior to the public opening of the hotel property.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 TRAINING OF FACILITY ENGINEERING, OPERATING AND MAINTENANCE PERSONNEL
A. Instruct the hotel's personnel in operation, adjustment, and maintenance of all materials, components, equipment and systems.
   1. Use the Operation and Maintenance Manuals and the Record "As-Built" Drawings for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of installation, care and preservation, operation, preventive maintenance, service, and replacement.
2. The detailed review of the materials, components, systems and equipment shall include as minimum the following items:
   a. Materials, components, systems and equipment
   b. Safety precautions and procedures
   c. Installation
   d. Operational features and functions
   e. Operational testing and diagnostics
   f. Preventive and predictive maintenance
   g. Service: Repair and replacement
   h. Operation and Maintenance manual content
   i. Commissioning: Testing, adjusting, calibration and balancing
   j. Contractor furnished spare parts and extra materials
   k. Recommended "spare parts" inventory not furnished by Contractor
   l. Specialty tool requirements
   m. Lubricants
   n. Fuels
   o. Identification systems
   p. Automatic/manual control systems
   q. Hazards/Material Safety Data Sheets
   r. Cleaning
   s. Procurement of replacement parts
   t. Warranty reviews including terms and conditions, points of contact, return material procedures, effective date, extended warranty options
   u. Maintenance agreements and similar continuing commitments
   v. Record "As-Built" Drawings

3. As part of the operations portion of the training session, demonstrate all operational features and functions.

4. Refer to other specification Sections for additional training requirements associated with engineering, operating and maintenance of various systems/equipment.

B. Provide a combination of classroom, field and factory training classes which includes as a minimum the following curricula requirements as indicated hereafter:

A. SITE WORK UTILITIES: one 2-hour class
   1. Water, Storm, and Sanitary Sewer Facilities
   2. Drainage Structures
   3. Underdrains
   4. Electrical Power Service
   5. Gas Utilities

B. BUILDINGS AND STRUCTURES: one 4-hour class
   1. Concrete
   2. Unit Masonry
   3. Metals
   4. Woods and Plastics
   5. Thermal and Moisture Protection
   6. Doors and Windows
   7. Finishes
   8. Specialties
   9. Fixtures, Furnishings and Equipment

C. ELEVATORS: one 1-hour class

D. HVAC: one 8-hour class
   1. Basic Materials and Methods
2. Piping and Specialties
3. Insulation
4. Pumping
5. Refrigeration
6. Air Handling and Distribution
7. Pool Dehumidification
8. Automatic Temperature Controls
9. Testing/Adjusting/Balancing

E. PLUMBING: one 4-hour class
1. Basic Materials and Methods
2. Piping and Specialties
3. Insulation
4. Pumping
5. Fixtures, Trim and Accessories
6. Domestic Water Heaters
7. Water Softening

F. SWIMMING POOLS AND SPAS: one 2-hour class
1. Basis Piping and Pumps
2. Filter and Deck Equipment
3. Pool Heater
4. Water Treatment

G. FIRE SPRINKLERS: one 2-hour class
1. Basic Materials and Methods
2. Standpipe and Hose Systems
3. Wet Pipe Sprinkler Systems

H. ELECTRICAL: one 8-hour class
1. Basic Materials and Methods
2. Service and Distribution
3. Service Entrance
4. Switchboards
5. Disconnects
6. Grounding
7. Transformers
8. Panelboards
9. Overcurrent Protective Devices
10. Contactors
11. Voltage Surge Suppression
12. Testing
13. Lighting
15. Emergency Lighting
16. Heat Tracing

I. SOUND SYSTEM: one 1-hour class

J. COMMUNICATION: one 2-hour class
1. Voice and Data
2. Television Distribution System
3. Security Intercom System

K. FIRE ALARM SYSTEM: one 4-hour class
1. System Zoning and Operations
2. End-Devices
3. Carbon Monoxide Monitoring
4. Supervisory and Control Interface
5. Sprinkler Systems
6. Elevators
7. HVAC Fan Control
8. Telephone
9. Graphic Enuncicators
10. Signage

L. FOOD SERVICE & LAUNDRY EQUIPMENT: one 8-hour class

1. The Food Service & Laundry Equipment Contractor shall schedule demonstrations of all Class 2, 3 and 4 equipment by Factory Authorized Demonstrators, at times convenient to the Owner. Demonstration shall include competent instruction in the use, cleaning, repair, and maintenance of the equipment.
   a. Class 1 - Equipment that requires no demonstration. Written instructions will suffice (i.e. roll warmers, toasters, racks, refrigerators, etc.).
   b. Class 2 - Equipment that is easy to understand and quickly demonstrated by a Factory Authorized Demonstrator (i.e. ranges, slicers, disposers, etc.).
   c. Class 3 - Complex equipment which requires more in-depth knowledge of assembly, operation, maintenance or cleaning. (i.e. steam equipment, multi-tank dish washers, fryer batteries, etc.).
   d. Class 4 - High technology equipment or systems that require extensive training, or for which demonstrations are factory-required. (i.e. cook-chill systems, conveyor ovens, etc.).

END OF SECTION
SECTION 014533 - SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 GENERAL REQUIREMENTS

A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the 2015 International Building Code.

B. The program of Special Inspection and Structural Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents

C. This specification section is intended to inform the Contractor of the Owner’s quality assurance program and the extent of the Contractor’s responsibilities. This specification section is also intended to notify the Special Inspector, Testing Company/Testing Laboratory, and other Agents of the Special Inspector of their requirements and responsibilities.

1.3 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests are described in the attached Schedule of Special Inspections and in the individual Specification Sections for the items to be inspected or tested.

1.4 QUALIFICATIONS

A. The Special Inspector shall be a licensed Professional Engineer who is approved by the Structural Engineer of Record (SER) and Building Official.

B. The Testing Company/Testing Laboratory and individual technicians shall be approved by the Structural Engineer of Record (SER) and Building Official.

C. The Testing Company/Testing Laboratory shall retain a full-time licensed Professional Engineer on staff who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.

1. Special Inspections of soils and foundations may be performed by inspectors with an education and background in geotechnical engineering in lieu of a background in structural engineering.

2. Technicians performing sampling and testing of concrete shall be ACI certified Concrete Field Testing Technicians-Grade 1.

3. Inspectors performing inspections of concrete work such as inspections of concrete placement, batching, reinforcing placement, curing and protection, may be ACI certified Concrete Construction Inspectors or ICBO certified Reinforced Concrete Special Inspector in lieu of being a licensed P.E. or EIT.
4. Inspectors performing inspections of prestressed concrete work may be ICBO/BOCA/SBCCI certified Prestressed Concrete Special Inspector.

5. Inspectors performing inspections of masonry may be ICBO certified Structural Masonry Special Inspector.

6. Technicians performing visual inspection of welding shall be AWS Certified Welding Inspectors or ICBO certified Structural Steel and Welding Special Inspectors, technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing, or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III technician.

7. Inspectors performing inspections of spray fireproofing may be ICBO certified Spray-Applied Fireproofing Special Inspector.

8. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.5 SUBMITTALS

A. The Special Inspector and Testing Company/Testing Laboratory shall submit to the SER and Building Official for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.

B. The Special Inspector and Testing Company/Testing Laboratory shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.6 PAYMENT

A. The Owner shall engage and pay for the services of the Special Inspector, Agents of the Special Inspector or Testing Company/Testing Laboratory.

B. If any materials which require Special Inspections are fabricated in a plant that is not certified and is not located within 150 miles of the project, the Contractor shall be responsible for the travel expenses of the Special Inspector of Testing Company/Testing Laboratory.

C. The Contractor shall be responsible for the cost of any retesting or reinspection of work which fails to comply with the requirements of the Contract Documents.

1.7 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall cooperate with the Special Inspector and his agents so that the Special Inspections and testing may be performed without hindrance.

B. The Contractor shall review the Statement of Special Inspections and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Structural Engineer of Record, Special Inspector or Testing Company/Testing Laboratory at least 48 hours in advance of a required inspection or test. Uninspected work that required inspection may be rejected solely on that basis.
C. The Contractor shall complete the attached Contractor Statement of Responsibility and submit to owner with the signed contracts.

D. The Contractor shall provide the form for the Final Report of Special Inspections to the Special Inspector for completion at the completion of the project.

E. The Statement of Special Inspections will be completed by the Structural Engineer of Record and the Owner and provided to the Contractor after the contracts are signed and returned to the Owner. The Contractor shall submit the completed Statement of Special Inspections to the Building Official for acceptance at the time the building permit is applied for.

F. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

G. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

H. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is to be subjected to Special Inspections shall first be reviewed by the Contractor’s quality control personnel.

I. The Contractor shall be solely responsible for construction site safety.

1.8 LIMITS ON AUTHORITY

A. The Special Inspector or Testing Company/Testing Laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. The Special Inspector or Testing Company/Testing Laboratory will not have control over the Contractor’s means or methods of construction.

C. The Special Inspector or Testing Company/Testing Laboratory shall not be responsible for construction site safety.

D. The Special Inspector or Testing Company/Testing Laboratory has no authority to stop the work.

1.9 STATEMENT OF SPECIAL INSPECTIONS

A. The Statement of Special Inspections will be prepared by the Structural Engineer of Record.

B. The attached Statement of Special Inspections shall be used.

C. The Statement of Special Inspections shall be provided to the Contractor after the contracts are signed and returned to the Owner and shall be submitted with the application of Building Permit.
1.10 RECORDS AND REPORTS

A. Detailed daily reports shall be prepared of each inspection or test and submitted to the Special Inspector. Reports shall include:
   1. date of test or inspection
   2. name of inspector or technician
   3. location of specific areas tested or inspected
   4. description of test or inspection and results
   5. applicable ASTM standard
   6. weather conditions
   7. Engineer’s seal and signature

B. The Special Inspector shall submit interim reports to the Building Official at the end of each month which include all inspections and test reports received last week. Copies shall be sent to the SER, Architect and Contractor.

C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor. If the discrepancies are not corrected, the Special Inspector shall notify the SER and Building Official. Reports shall document all discrepancies identified and the correction action taken.

D. The Testing Company/Testing Laboratory shall immediately notify the Special Inspector and the SER by telephone, fax or electronic mail any test results which fail to comply with the requirements of the Contract Documents.

E. Reports shall be submitted to the Special Inspector within 7 days of the inspection or test. Legible hand written reports may be submitted if final typed copies are not readily available. Formal reports shall follow.

F. At the completion of the work requiring Special Inspections, each inspection agency and Testing Company/Testing Laboratory shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.11 FINAL REPORT OF SPECIAL INSPECTIONS

A. The Final Report of Special Inspections shall be completed by the Special Inspector and submitted to the SER and Building Official prior to the issuance of a Certificate of Use and Occupancy.

B. The attached Final Report of Special Inspections shall be used.

C. The Final Report of Special Inspections will certify that all required inspections have performed and will itemize any discrepancies that were not corrected or resolved.

PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION (not applicable)
Attached are the following forms:

1. Statement of Special Inspections
2. Schedule of Special Inspection Services
3. Quality Assurance Plan
4. Qualifications of Inspectors and Testing Technicians
5. Schedule of Special Inspection Services
6. Final Report of Special Inspections
7. Final Report of Special Inspections (Agent’s Final Report)
8. Contractor’s Statement of Responsibility
9. Fabricator’s Certificate of Compliance

END OF SECTION 014533
Statement of Special Inspections

Project: Tru Hotel
Location: El Paso, TX
Owner: Kana Hotel Group
Owner’s Address: 308 N Peters Road, Knoxville, TN
Architect of Record: Terry Barker, Architect
Structural Engineer of Record: Rebecca L. Brooks, PE

This Statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This Statement of Special Inspections encompass the following disciplines:

☐ Structural  ☐ Mechanical/Electrical/Plumbing
☐ Architectural  ☐ Other: _________________________________

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official, Structural Engineer of Record and Architect of Record. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official, Structural Engineer of Record and Architect of Record. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official, Structural Engineer of Record and Architect of Record.

A Final Report of Special Inspections documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: Monthly or ☐ per attached schedule.

Prepared by:

Rebecca L. Brooks, PE
(type or print name)

Signature Date

Owner’s Authorization: Building Official’s Acceptance:

Signature Date Signature Date

16105 / Tru Hotel- El Paso 014533 - 6
This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- Soils and Foundations
- Cast-in-Place Concrete
- Precast Concrete
- Masonry
- Structural Steel
- Cold-Formed Steel Framing
- Spray Fire Resistant Material
- Wood Construction
- Exterior Insulation and Finish System
- Mechanical & Electrical Systems
- Architectural Systems
- Special Cases

<table>
<thead>
<tr>
<th>Special Inspection Agencies</th>
<th>Firm</th>
<th>Address, Telephone, e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Special Inspection</td>
<td></td>
<td>To Be Determined by Owner</td>
</tr>
<tr>
<td>Coordinator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Inspector</td>
<td></td>
<td>To Be Determined by Owner</td>
</tr>
<tr>
<td>3. Inspector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Testing Agency</td>
<td></td>
<td>To Be Determined by Owner</td>
</tr>
<tr>
<td>5. Testing Agency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.
Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category "C"

Quality Assurance Plan Required (Y/N) Yes

Description of seismic force resisting system and designated seismic systems:

1. The structure is bearing wall with a combination of wood shear walls and intermediate reinforced masonry shear walls.
2. The soils at shear walls must be verified.
3. All foundations under shear walls and transfer girder foundations must be verified, concrete and steel placement must be verified.
4. All masonry shear wall reinforcing and grouting must be verified. All wall reinforcing lap lengths must be verified.
5. All wood shear walls must be verified. Wall sheathing attachment - nail size and spacing. Sill anchoring and rod holdown systems must be verified.
6. Shear wall connections to the roof and floor diaphragms must be verified.

Quality Assurance for Wind Requirements

Basic Wind Speed (3 second gust) 115 mph

Wind Exposure Category "C"

Quality Assurance Plan Required (Y/N) Yes

Description of wind force resisting system and designated wind resisting components:

1. The structure is bearing wall with a combination of wood shear walls and intermediate reinforced masonry shear walls.
2. The soils at shear walls must be verified.
3. All foundations under shear walls and transfer girder foundations must be verified, concrete and steel placement must be verified.
4. All masonry shear wall reinforcing and grouting must be verified. All wall reinforcing lap lengths must be verified.
5. All wood shear walls must be verified. Wall sheathing attachment - nail size and spacing. Sill anchoring and rod holdown systems must be verified.
6. Shear wall connections to the roof and floor diaphragms must be verified.

Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated above must submit a Statement of Responsibility.
Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the Agency Number on the Schedule.

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE/SE</td>
<td>Structural Engineer – a licensed SE or PE specializing in the design of building structures</td>
</tr>
<tr>
<td>PE/GE</td>
<td>Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations</td>
</tr>
<tr>
<td>EIT</td>
<td>Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination</td>
</tr>
</tbody>
</table>

American Concrete Institute (ACI) Certification

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACI-CFTT</td>
<td>Concrete Field Testing Technician – Grade 1</td>
</tr>
<tr>
<td>ACI-CCI</td>
<td>Concrete Construction Inspector</td>
</tr>
<tr>
<td>ACI-LTT</td>
<td>Laboratory Testing Technician – Grade 1&amp;2</td>
</tr>
<tr>
<td>ACI-STT</td>
<td>Strength Testing Technician</td>
</tr>
</tbody>
</table>

American Welding Society (AWS) Certification

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS-CWI</td>
<td>Certified Welding Inspector</td>
</tr>
<tr>
<td>AWS/AISC-SSI</td>
<td>Certified Structural Steel Inspector</td>
</tr>
</tbody>
</table>

American Society of Non-Destructive Testing (ASNT) Certification

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASNT</td>
<td>Non-Destructive Testing Technician – Level II or III.</td>
</tr>
</tbody>
</table>

International Code Council (ICC) Certification

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICC-SMSI</td>
<td>Structural Masonry Special Inspector</td>
</tr>
<tr>
<td>ICC-SWSI</td>
<td>Structural Steel and Welding Special Inspector</td>
</tr>
<tr>
<td>ICC-SFSI</td>
<td>Spray-Applied Fireproofing Special Inspector</td>
</tr>
<tr>
<td>ICC-PCSI</td>
<td>Prestressed Concrete Special Inspector</td>
</tr>
<tr>
<td>ICC-RCSI</td>
<td>Reinforced Concrete Special Inspector</td>
</tr>
</tbody>
</table>

National Institute for Certification in Engineering Technologies (NICET)

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICET-CT</td>
<td>Concrete Technician – Levels I, II, III &amp; IV</td>
</tr>
<tr>
<td>NICET-ST</td>
<td>Soils Technician - Levels I, II, III &amp; IV</td>
</tr>
<tr>
<td>NICET-GET</td>
<td>Geotechnical Engineering Technician - Levels I, II, III &amp; IV</td>
</tr>
</tbody>
</table>

Exterior Design Institute (EDI) Certification

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDI-EIFS</td>
<td>EIFS Third Party Inspector</td>
</tr>
</tbody>
</table>

16105 / Tru Hotel- El Paso
# Soils and Foundations

<table>
<thead>
<tr>
<th>Item</th>
<th>Agency # (Qualif.)</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shallow Foundations</td>
<td>PE/GE</td>
<td>Inspect soils below footings for adequate bearing capacity and consistency with geotechnical report.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspect removal of unsuitable material and preparation of subgrade prior to placement of controlled fill.</td>
</tr>
<tr>
<td>2. Controlled Structural Fill</td>
<td>PE/GE</td>
<td>Perform sieve tests (ASTM D422 &amp; D1140) and modified Proctor tests (ASTM D1557) of each source of fill material.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspect placement, lift thickness and compaction of controlled fill.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test density of each lift of fill by nuclear methods (ASTM D2922)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify extent and slope of fill placement.</td>
</tr>
<tr>
<td>3. Deep Foundations</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>4. Load Testing</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>4. Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Cast-in-Place Concrete

<table>
<thead>
<tr>
<th>Item</th>
<th>Agency # (Qualif.)</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mix Design</td>
<td>ACI-CCI / ICC-RCSI</td>
<td>Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design.</td>
</tr>
<tr>
<td>2. Material Certification</td>
<td>SER</td>
<td>Submit material certifications with mix designs for approval</td>
</tr>
<tr>
<td>3. Reinforcement Installation</td>
<td>ACI-CCI / ICC-RCSI</td>
<td>Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters</td>
</tr>
<tr>
<td>4. Post-Tensioning Operations</td>
<td>ICC-PCSI</td>
<td>N/A</td>
</tr>
<tr>
<td>7. Concrete Placement</td>
<td>ACI-CCI / ICC-RCSI</td>
<td>Inspect placement of concrete. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.</td>
</tr>
</tbody>
</table>
## Schedule of Special Inspection Services

**MASONRY**  
Required Inspection Level: ☑ 1  ☐ 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection Agent</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Material Certification</td>
<td>SER</td>
<td>Continuous</td>
</tr>
<tr>
<td>2. Mixing of Mortar and Grout</td>
<td>Special Inspector</td>
<td>Inspect proportioning, mixing and retempering of mortar and grout. Periodic</td>
</tr>
<tr>
<td>3. Installation of Masonry</td>
<td>Special Inspector</td>
<td>Inspect size, layout, bonding and placement of masonry units. Periodic</td>
</tr>
<tr>
<td>4. Mortar Joints</td>
<td>Special Inspector</td>
<td>Inspect construction of mortar joints including tooling and filling of head joints. Periodic</td>
</tr>
</tbody>
</table>
| 5. Reinforcement Installation | Special Inspector | Inspect placement, positioning and lapping of reinforcing steel. Periodic  
Inspect welding of reinforcing steel. Continuous |
| 7. Weather Protection    | Special Inspector | Inspect cold weather protection and hot weather protection procedures. Verify that wall cavities are protected against precipitation. Periodic |
| 8. Anchors and Ties      | Special Inspector | Inspect size, location, spacing and embedment of dowels, anchors and ties. Periodic |
## Structural Steel

<table>
<thead>
<tr>
<th>Item</th>
<th>Inspection Agent</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fabricator Certification / Quality</td>
<td>SER</td>
<td>Fabricator shall submit statement of AISC certification or detailed</td>
</tr>
<tr>
<td>Control Procedures</td>
<td></td>
<td>fabrication and quality control procedures to certify compliance with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>code requirements to SER for approval prior to beginning fabrication.</td>
</tr>
<tr>
<td>2. Material Certification</td>
<td>SER</td>
<td>Fabricator shall provide documentation to Structural Engineer of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record to certify compliance with referenced standards. See 05120,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASTM and AISC</td>
</tr>
<tr>
<td>3. Open Web Steel Joists</td>
<td>Special Inspector Testing Agency</td>
<td>Fabricator shall submit documentation to Structural Engineer of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record. Fabricator complies with Steel Joist Institute</td>
</tr>
<tr>
<td>4. Bolting</td>
<td>SER</td>
<td>Periodic</td>
</tr>
<tr>
<td></td>
<td>Testing Agency</td>
<td></td>
</tr>
<tr>
<td>5. Welding</td>
<td>Special Inspector Testing Agency</td>
<td>Continuous complete and partial penetration, multi-pass fillet, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fillet greater than 5/16 welding.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periodic single pass fillet welds.</td>
</tr>
<tr>
<td>6. Shear Connectors</td>
<td>Special Inspector Testing Agency</td>
<td>Periodic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Structural Details</td>
<td>Special Inspector Testing Agency</td>
<td>Periodic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Metal Deck</td>
<td>Special Inspector Testing Agency</td>
<td>Periodic, installation and welding prior to roof application.</td>
</tr>
</tbody>
</table>
# Wood Construction

<table>
<thead>
<tr>
<th>Item</th>
<th>Agency # (Qualif.)</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fabricator Certification/Quality Control Procedures</td>
<td>SER</td>
<td>Inspect shop fabrication and quality control procedures for wood truss plant.</td>
</tr>
<tr>
<td>□ Fabricator Exempt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Material Grading</td>
<td>SER</td>
<td>Verify load bearing, exterior and shear wall lumber grades.</td>
</tr>
<tr>
<td>3. Connections</td>
<td>Testing Agency Special Inspector</td>
<td>Verify all framing connections</td>
</tr>
<tr>
<td>4. Framing and Details</td>
<td>Testing Agency Special Inspector</td>
<td>Verify wall framing sections are per the drawings.</td>
</tr>
<tr>
<td>5. Diaphragms and Shear Walls</td>
<td>SER</td>
<td>Inspect size, configuration, blocking and fastening of shear walls and diaphragms. Verify panel grade and thickness. Verify chord trusses and connections. Verify the rod holdown system is installed per the supplier shop drawings. Verify holdown rod anchorage to the foundations.</td>
</tr>
<tr>
<td>6. Prefabricated Wood Trusses</td>
<td>Testing Agency Special Inspector</td>
<td>Inspect the fabrication of wood trusses. Verify parapet connections to roof framing.</td>
</tr>
<tr>
<td>7. Permanent Truss Bracing</td>
<td>Testing Agency Special Inspector</td>
<td>Verify truss bracing complies with shop drawings.</td>
</tr>
<tr>
<td>8. Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FINAL REPORT OF SPECIAL INSPECTIONS

Project:  Tru Hotel
Location:  El Paso, TX
Owner:  Kana Hotel Group
Owner’s Address:  308 N Peters Road, Knoxville, TN
Architect of Record:   Terry Barker, Architect
Structural Engineer of Record:  Rebecca L. Brooks, PE

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the State of Special Inspections submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections).

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

Licensed Professional Seal

Signature    Date
FINAL REPORT OF SPECIAL INSPECTIONS

AGENT'S FINAL REPORT

Project: Tru Hotel

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the Statement of Special Inspections submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections).

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,

Agent of the Special Inspector

Licensed Professional Seal

Signature __________________________ Date __________________________
CONTRACTOR’S STATEMENT OF RESPONSIBILITY

Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan must submit a Statement of Responsibility.

Project: Tru Hotel
Contractor's Name:
Address:
License No.:
Description of designated building systems and components included in the Statement of Responsibility:

Contractor’s Acknowledgment of Special Requirements

I hereby acknowledge that I have received, read, and understand the Quality Assurance Plan and Special Inspection program.

I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.

_____________________________ _______________
Signature                                                                 Date

Contractor’s Provisions for Quality Control

Procedures for exercising control within the contractor’s organization, the method and frequency of reporting and the distribution of reports is attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.
FABRICATOR’S CERTIFICATE OF COMPLIANCE

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a Fabricator’s Certificate of Compliance at the completion of fabrication.

Project: Tru Hotel

Fabricator’s Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

________________________________   _______________
Signature                                                           Date

________________________________
Title

Attach copies of fabricator’s certification or building code evaluation service report and fabricator’s quality control manual.
PART 1 GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract.

1.02 TESTING
   A. Mix Design:
      1. The verification and control of concrete mixes shall be by an independent testing laboratory.
      2. The mix design is to be submitted for approval by the project engineer.
   B. Laboratory Services:
      1. Test aggregates, cement and water for specification compliance. During construction, the Engineer may require field inspection, sampling and testing of cement, aggregates, etc. at the testing laboratory in order to determine if the requirements of this specification section are being satisfied.
      2. Verify design mixes to be used in each concrete class.
      3. Make, cure, store and break test cylinders conforming to requirements of ASTM Standards C31-62T, "Method of Making and Curing Concrete Compressive and Flexure Test Specimens in the Field"; ASTM Standard C143-58, "Method of Test for Slump of Portland Cement Concrete"; ASTM Standard C172-54, "Method of Sampling Fresh Concrete". Test cylinders and slump tests shall be made at job site and under no circumstances shall they be taken at a central mixing plant.
      4. Reports on all tests conducted by the laboratory shall be rendered promptly and distributed as follows:
         a. Architect: One (1) copy
         b. Contractor: Two (2) copies
         c. Structural Engineer: One (1) copy
      5. Report of control cylinders for job placed concrete shall contain the following:
         a. Time of Batching.
         b. Time of sampling.
         c. Concrete and air temperatures.
         d. Slump.
         e. Other information furnished by the general contractor.
   C. Comply with Section: Testing Laboratory Services. The Sub-Contractor shall pay the costs of retesting.
   D. Testing Laboratory shall perform sampling and testing to ascertain compliance with Contract Documents (including flatness and levelness tolerances by ASTM E-1155, slump tests, air entrainment tests, casting cylinders, transporting cylinders and receiving and breaking cylinders), notify the Contractor and the Architect by telephone at once if the 7-day and 28-day strengths are less than specified, and furnish a written report of the results of tests to the Architect (one copy), Owner (one copy) and Contractor. Test reports shall show the following:
      1. Compressive strength at 7 days and 28 days
      2. Slump tests
      3. Air content tests
      4. Flatness and levelness F-numbers and note compliance or non-compliance
   E. Testing Laboratory shall prepare a "set" of cylinders from all pours of concrete. Where a pour exceeds 50 cubic yards, prepare two sets of cylinders and an additional set for each additional 50 cubic yards, or portion thereof of each class of concrete placed each day. Each test set shall be 4 cylinders. Laboratory cure 4 cylinders; test 1 cylinder at 7 days for information and 1 at 28 days for acceptance; hold the remaining 2 cylinders at the Lab.
PART 2 PRODUCTS
2.01 NOT USED

PART 3 EXECUTION
3.01 CONTRACTOR’S FUNCTION
   A. Deliver samples of aggregate and cement in quantities established by the laboratory for tests of aggregate and design mixes.
   B. Follow instructions of the laboratory in proportioning mixes.
   C. Coordinate the laboratory’s services with building operations. He shall supply barrows, shovels, mixing boards, shaded work space for molding cylinders, and similar equipment required by the laboratory representative for molding test cylinders. He shall observe procedures of laboratory personnel molding and handling test specimens and if he observes any irregularities of procedures, he shall report them in writing to the Engineer within 48 hours. He shall keep the slump cone and accessories available for use on the job at all times.
   D. Keep a daily log recording quantities of each class of concrete used, the area location of each quantity of concrete relating to its controlling cylinder and the slump of this concrete, and general weather conditions. The Contractor shall furnish this information to the laboratory for inclusion in the test report. The Contractor shall obtain delivery tickets showing the class and strength of concrete, the size of coarse aggregate and the slump order. The Contractor shall identify these tickets relative to the area of placement of the concrete and shall retain them on file. He shall produce the tickets should the Engineer so request.

END OF SECTION
SECTION 03 1000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.
   B. Form accessories.
   C. Form stripping.

1.02 RELATED REQUIREMENTS
   A. Section 03 2000 - Concrete Reinforcing.
   B. Section 03 3000 - Cast-in-Place Concrete.
   C. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.
   D. Section 05 3100 - Steel Decking: Placement of steel anchors in composite decking.

1.03 REFERENCE STANDARDS
   B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
   C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
   D. ACI 347R - Guide to Formwork for Concrete; 2014.

1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE
   A. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in the State of Texas.

PART 2 PRODUCTS
2.01 FORMWORK - GENERAL
   A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
   B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.
   C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.
   D. Comply with Highways standards of the State of Texas.

2.02 WOOD FORM MATERIALS
   A. Form Materials: At the discretion of the General Contractor.

2.03 FORMWORK ACCESSORIES
   A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, _____ inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface. Provide ________ manufactured by ____________.
   B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
   C. Flashing Reglets: Galvanized steel, at least 22 gage, 0.0299 inch thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork. Provide ________ manufactured by ____________.
D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

E. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS
A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK
A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Obtain approval before framing openings in structural members that are not indicated on drawings.
E. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
F. Coordinate this section with other sections of work that require attachment of components to formwork.
G. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from River Street Architecture, LLC before proceeding.

3.04 APPLICATION - FORM RELEASE AGENT
A. Apply form release agent on formwork in accordance with manufacturer’s recommendations.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS
A. Locate and set in place items that will be cast directly into concrete.
B. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
C. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

3.06 FORM CLEANING
A. Clean forms as erection proceeds, to remove foreign matter within forms.
B. Clean formed cavities of debris prior to placing concrete.

3.07 FORMWORK TOLERANCES
A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.
B. Camber slabs and beams in accordance with ACI 301.

3.08 FIELD QUALITY CONTROL
A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

END OF SECTION
SECTION 03 2000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Reinforcing steel for cast-in-place concrete.
   B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS
   A. Section 03 3000 - Cast-in-Place Concrete.
   B. Section 03 3713 - Shotcrete: Reinforcement for shotcrete.
   C. Section 03 4500 - Precast Architectural Concrete: Reinforcement for precast concrete panels.
   D. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

1.03 PRICE AND PAYMENT PROCEDURES
   A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS
   A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
   E. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2014.
   I. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
   D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.06 QUALITY ASSURANCE
   A. Perform work of this section in accordance with ACI 301.
   1. Maintain one copy of each document on project site.
   B. Provide River Street Architecture, LLC with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

PART 2 PRODUCTS

2.01 REINFORCEMENT
   A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Plain billet-steel bars.
B. Reinforcing Steel: Deformed bars, ASTM A996/A996M Grade 40 (280), Type A.
C. Stirrup Steel: ASTM A1064/A1064M steel wire, unfinished.
D. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
E. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.02 FABRICATION
A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

PART 3 EXECUTION

3.01 PLACEMENT
A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
B. Do not displace or damage vapor barrier.
C. Accommodate placement of formed openings.
D. Conform to applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL
A. An independent testing agency, as specified in Section 01 4000, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION
SECTION 03 3713
SHOTCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Pneumatically applied concrete.

1.02 RELATED REQUIREMENTS
A. Section 31 2316 - Excavation: Forming earth to achieve contours and surfaces required.
B. Section 03 1000 - Concrete Forming and Accessories: Prepared forms to achieve configuration, contours, and tolerances required.
C. Section 03 2000 - Concrete Reinforcing.
D. Section 03 3000 - Cast-in-Place Concrete: Reinforcement.
E. Section 07 9005 - Joint Sealers.

1.03 REFERENCE STANDARDS

1.04 ADMINISTRATIVE REQUIREMENTS
A. Coordinate all work with installation of pool equipment by pool sub-contractor.
B. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.06 QUALITY ASSURANCE
A. Perform Work in accordance with ACI 506.2.

1.07 PROJECT CONDITIONS
A. Coordinate the Work with associated items that are placed within shotcrete work.

PART 2 PRODUCTS

2.01 MATERIALS
A. Cement: ASTM C150/C150M, Type I - Normal; white color.
C. Aggregate: Lightweight, ASTM C330/C330M.
E. Admixtures: Chemical type conforming to ASTM C494/C494M (wet mix only).
F. Air-Entraining Admixture: Conforming to ASTM C260/C260M (wet mix only).
G. Reinforcing Bars: Type _____, size _____, as specified in Sections 03 2000 or 03 3000.
H. Reinforcing Mesh: ASTM A1064/A1064M steel welded wire reinforcement, plain type; 2 x 2, W 0.5/W 0.5, galvanized.
1. Water: Clean, potable, and not detrimental to shotcrete.
   J. Curing Compound: _________ type; Type not detrimental to application of subsequent surface finish materials.

2.02 SHOTCRETE MIX
   A. Provide wet or dry mix design that gives good compaction and low percentage of rebound, is stiff enough not to sag.
   B. Conform to following requirements:
      1. Compressive Strength (28 day minimum): 3,000 psi.
   C. Maintain quality control records during production of shotcrete; make records available.

2.03 EQUIPMENT
   A. Mixing Equipment: Capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous placement.
   B. Water Supply: Uniform water pressure at discharge nozzle sufficiently greater than operating air pressure to ensure intimate mixing with aggregate-cement mix; provide water pump to system if line water pressure is inadequate.

2.04 SOURCE QUALITY CONTROL AND TESTS
   A. An independent testing agency will provide inspection and testing services, as specified in Section 01 4000 - Quality Requirements.
   B. Prior to start of work, testing agency will review mix proportions, gradation, and quality of aggregate.
   C. Test samples in accordance with ACI 506.2.
   D. Modify mix design as required based on results of testing.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify that conditions are acceptable and are ready to receive work.
   C. Verify that field measurements are as shown on drawings.
   D. Verify fabricated forms are:
      1. True to line and dimension.
      2. Adequately braced against vibration during placement.
      3. Constructed to permit escape of trapped air during gunning operations.
      4. Constructed to minimize rebound during gunning operations.
   E. Verify correct placement of reinforcement with sufficient clearances to permit complete encasement.
   F. Ensure easy access to shotcrete surfaces for screeding and finishing, and to permit uninterrupted application.

3.02 PREPARATION
   A. Remove existing unsound concrete from substrate surfaces.
      1. Minimize abrupt changes in depth of area to be repaired.
      2. Remove square external corners from substrate by radiusing the edges.
   B. Determine operating procedures for placement in close quarters, extended distances, or around unusual obstructions where placement velocities and mix consistency may be adjusted during application.
   C. Clean and wet cementitious or absorptive substrate surfaces prior to receiving shotcrete. Keep porous surfaces damp for several hours prior to placement of shotcrete.
   D. Apply bonding agent.
E. Protect adjacent surfaces not receiving shotcrete.

3.03 ALIGNMENT CONTROL
   A. Provide alignment wire to establish thickness and plane of required surfaces.
   B. Install alignment wire at corners and offsets not established by forms.
   C. Tighten alignment wire true to line. Position adjustment devices to permit additional tightening.

3.04 APPLICATION
   A. Place reinforcement in accordance with ACI 506.2.
   B. Use mixing and delivery equipment capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous and uniform placement.
   C. Do not apply shotcrete more than 45 minutes after adding Portland cement to the mix.
   D. Do not place shotcrete on surfaces that are frozen, spongy, or where there is free water.
   E. Achieve maximum compaction with minimum rebound.
   F. Build-up to required thickness in multiple passes to achieve layering. Encase reinforcement with the first pass.
   G. Allow each layer to take initial set before applying succeeding layers.
   H. Do not permit applied shotcrete to sag, slough, or displace.
   I. After initial set of final layer, remove excess material outside of forms and alignment lines.
   J. Sandblast to remove laitance. Clean with air/water pressure jet.
   K. Finish surface of final layer with natural gun finish.
   L. Remove rebound at construction and expansion joints.
   M. Remove rebound material that does not fall clear of work; discard salvaged rebound.
   N. Maintain shotcrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of shotcrete.
   O. Immediately after placement, protect shotcrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   P. Apply curing compound to exposed surfaces according to manufacturer's instructions.
   Q. Sound test the applied material with hammer for voids. Expose voids and replace with new shotcrete ensuring full bond with adjacent work.

3.05 FIELD QUALITY CONTROL
   A. Provide additional test panels, as specified for mock-up, during the course of the work as may be requested by the testing agency.

3.06 PROTECTION
   A. Do not permit applied work to damage adjacent surfaces.

3.07 SCHEDULES
   A. Swimming Pool Shell: 5 inch (127 mm) thick shotcrete, reinforced, wood float finish, to receive ceramic tile finish.

END OF SECTION
SECTION 9 03390
CONCRETE CURING

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Initial and final curing of horizontal and vertical concrete surfaces.

1.02 RELATED REQUIREMENTS
   A. Section 03 3000 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS
   A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2005.
   B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (errata 2007).
   C. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).

1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on curing compounds and moisture-retaining sheet, including compatibility of different products and limitations.

1.05 QUALITY ASSURANCE
   A. Perform Work in accordance with ACI 301 and ACI 302.1R.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Deliver curing materials in manufacturer's sealed packaging, including application instructions.

PART 2 PRODUCTS
2.01 MATERIALS
   A. Membrane Curing Compound: ASTM C309 Type 1 - Clear or translucent, Class A.
   B. Moisture-Retaining Sheet: ASTM C171.
   C. Water: Potable, not detrimental to concrete.

2.02 CURING COMPOUNDS AND MATERIALS
   A. Provide one of the following methods of retaining moisture already in the mix:
      1. In areas not receiving tile use a liquid membrane forming compound for curing concrete which shall be clear type compound conforming to Fed Spec TT-C-800A and shall not permanently alter the material color of the concrete but will impart sufficient color at the time of application to indicate readily the area covered. Keep traffic to a minimum during the curing period.
         a. Exterior Clear BondGuardian Chemical
         b. Interior Wet cure
      2. In areas to receive hard tile, concrete shall receive a water cure only. Concrete shall be kept continuously wet for a period of 7 days.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that substrate surfaces are ready to be cured.
3.02 EXECUTION - HORIZONTAL SURFACES
   A. Cure floor surfaces in accordance with ACI 308R.
   B. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
   C. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in one coat.

3.03 CONCRETE FLOORS (ALL FLOORS, SUSPENDED SLABS, AND SLABS ON GRADE)
   A. The surface of all concrete shall be worked with a wood float or by machine in a manner which will compact the concrete and produce a surface free of depressions or inequalities of any kind. Test for grade (or level) and correct as necessary by removing excess or adding and compacting additional concrete. After the concrete has hardened sufficiently to prevent fine material from working to the top (when the sheen or shiny film of water on the surface has disappeared), the surface shall be finished in accordance with the applicable following paragraphs, but excessive working shall be avoided. Final finishing shall not be started until all surface water has disappeared. The drying of the surface moisture must proceed naturally and must not be hastened by sacking or dusting-on of dry sand and/or cement.
   B. Tolerance for level or grade shall not be greater than the following:
      1. Floors and exterior areas, 1/8 inch in 10 feet from the designed elevations, level or sloped. Difference between high and low points shall not exceed 1/8 inch in any 5 foot line.
      2. Slab surfaces to receive topping or setting bed, 1/4 inch in 10 feet.
   C. Monolithic Finish for Slabs: All interior floor slabs shall have a steel trowel finish (except for floor slabs to receive ceramic tile). The steel trowelling shall produce a smooth finish surface free of pin holes and other imperfections.
   D. Other areas shall receive a light broom finish.

3.04 FINISHES ON FORMED CONCRETE SURFACES
   A. Common finish shall be confined to concrete surfaces which will be covered by other construction and which will not be visible. This finish shall be produced by filling smoothly all tie holes, honeycomb and other depressions, knocking off and evening-up burrs and form marks.

3.05 CURING AND SEALING COMPOUND APPLICATION
   A. Curing and sealing compound shall be applied as soon as the concrete has set sufficiently so as not to be marred by the application. Preparation of surfaces, quantities used, application procedures and installation precautions shall be followed in strict compliance with the manufacturer's stated recommendations and directions as set forth on the package.

3.06 EXECUTION - VERTICAL SURFACES
   A. Cure surfaces in accordance with ACI 308R.
   B. Cure surfaces in accordance with ACI 308.

3.07 PROTECTION
   A. Do not permit traffic over unprotected floor surface.

END OF SECTION
SECTION 03 5400
CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Liquid-applied self-leveling floor underlayment.
   1. Use gypsum-based type at areas to comply with warranty requirements of specified flooring.
   2. Use cementitious type at areas to comply with warranty requirements of specified flooring.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation.
C. Manufacturer's Instructions: Indicate mix instructions.
D. Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE
A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.07 REGULATORY REQUIREMENTS
A. Conform to applicable code for combustibility or flame spread requirements.
B. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.

1.08 WARRANTY
A. THE TYPES OF MATERIALS WILL BE COMPLIANT WITH WARRANTY GUIDELINES FOR CARPET AND TILE, NO VINYL PRODUCTS. THE REQUIRED INSTALLATION METHOD TO BE COMPLIANT WITH WARRANTY IS INDICATED IN APPENDIX C: TCNA (Tile Council of North America) 2007 TCA HANBOOK for Ceramic Tile Installation.

1.09 FIELD CONDITIONS
A. Do not install underlayment until floor penetrations and peripheral work are complete.
B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
C. During the curing process, ventilate spaces to remove excess moisture.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gypsum Underlayment:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Cementitious Underlayment:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 MATERIALS

A. Cast Underlayments, General:
   1. Conform to applicable code for combustibility or flame spread requirements.

B. Gypsum-Based Underlayment: THIS TYPE OF MATERIAL WILL BE COMPLIANT WITH WARRANTY GUIDELINES FOR CARPET AND TILE, NO VINYL PRODUCTS. THE REQUIRED INSTALLATION METHOD FOR INSTALLATION TO BE COMPLIANT WITH WARRANTY IS INDICATED IN APPENDIX C: TCNA (Tile Council of North America) 2007 TCA HANBOOK for Ceramic Tile Installation METHOD F200-07. Gypsum based mix, that when mixed with water in accordance with manufacturer’s directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 2500 psi, tested per ASTM C472.
   2. Density: Maximum 115 lb/cu ft.
   3. Final Set Time: 1 to 2 hours, maximum.
   4. Thickness: 3/4 inch to maximum 3-1/2 inch.
   5. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

C. Cementitious Underlayment: THIS TYPE OF MATERIAL WILL BE COMPLIANT WITH WARRANTY GUIDELINES FOR CARPET AND TILE, NO VINYL PRODUCTS. THE REQUIRED INSTALLATION METHOD FOR INSTALLATION TO BE COMPLIANT WITH WARRANTY IS INDICATED IN APPENDIX C: TCNA (Tile Council of North America) 2007 TCA HANBOOK for Ceramic Tile Installation METHOD F205-07. Blended cement mix, that when mixed with water in accordance with manufacturer’s directions will produce self-leveling underlayment with the following properties:
   1. Compressive Strength: Minimum 4000 psi after 28 days, tested per ASTM C109/C109M.
   2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
   4. Final Set Time: 1-1/2 to 2 hours, maximum.
   5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.

D. Water: Potable and not detrimental to underlayment mix materials.

E. Primer: Manufacturer's recommended type.

F. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

A. Site mix materials in accordance with manufacturer's instructions.

B. Mix to achieve following characteristics:
1. Density: 100 lb/cu ft minimum dry density.
2. Compressive Strength: 1,000 psi minimum.
3. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E 84.
   C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION
   A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
   B. Wood: Install metal lath for reinforcement of underlayment.
   D. Vacuum clean surfaces.
   E. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
   F. Close floor openings.

3.03 APPLICATION
   A. Install underlayment in accordance with manufacturer's instructions.
   B. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
   C. Place to thickness indicated.

3.04 CURING
   A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
   B. Air cure in accordance with manufacturer's instructions.

3.05 APPLICATION TOLERANCE
   A. Top Surface: Level to 1/8 inch in 10 ft.

3.06 FIELD QUALITY CONTROL
   A. An independent testing agency will perform field inspection and testing, as specified in Section 01 4000 - Quality Requirements.
   B. Placed Material: Agency will inspect and test for conformance to specification requirements.
   C. Slump Test: If slump testing is recommended in writing by manufacturer, test underlayment for slump as it is placed for compliance with manufacturer's written recommendations.
   D. Field Samples: Take at least three molded-cube samples from each underlayment batch. Test samples according to ASTM C 109/ C 109M for compliance with compressive strength requirements and ASTM C472 using split brass molds. When requested, provide test results to Architect.

3.07 PROTECTION
   A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
   B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION
SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Slabs-on-grade.

B. Related Sections:
   1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
   2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   1. Location of construction joints is subject to approval of the Architect.
E. Qualification Data: For Installer and manufacturer.

F. Welding certificates.

G. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Steel reinforcement and accessories.
   4. Curing compounds.
   5. Bonding agents.
   6. Adhesives.
   7. Vapor retarders.
   8. Semirigid joint filler.

H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

I. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

J. Field quality-control reports.

K. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
   b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

G. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


2.5 ADMIXTURES


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

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

   1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Axiim Italcementi Group, Inc.; CATEXOL CN-CI.
      b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
      c. Euclid Chemical Company (The), an RPM company; ARRMATECT, EUCON BCN, or EUCON CIA.
      d. Grace Construction Products, W. R. Grace & Co.; DCI.
      e. Sika Corporation; Sika CNI.

D. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.

   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Euclid Chemical Company (The), an RPM company; Tuf-Strand SF.
      b. FORTA Corporation; FORTA FERRO.
      d. Nycon, Inc.; XL.
      e. Propex Concrete Systems Corp.; Fibermesh 650.
      f. Sika Corporation; Sika Fiber MS.

2.6 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
      b. CETCO; Volclay Waterstop-RX.
      c. Concrete Sealants Inc.; Conseal CS-231.
      d. Greenstreak; Swellstop.
      e. Henry Company, Sealants Division; Hydro-Flex.
      f. JP Specialties, Inc.; Earth Shield Type 20.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer’s recommended adhesive or pressure-sensitive tape.

   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. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
b. Fortifiber Building Systems Group; Moistop Ultra 15.
d. Insulation Solutions, Inc.; Viper VaporCheck II
e. Meadows, W. R., Inc.; Perminator 15 mil.
f. Raven Industries Inc.; Vapor Block 15.
g. Reef Industries, Inc.; Griffolyn 15 mil Green.
h. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2. Provide manufacturer's compatible sealer system for penetrations.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.8 CURING MATERIALS

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

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. BASF Construction Chemicals - Building Systems; Confilm
   b. ChemMasters; SprayFilm
   c. Conspec by Dayton Superior; Aquafilm
   d. Dayton Superior Corporation; Sure Film (J-74)
   e. Euclid Chemical Company (The), an RPM company; Eucobar
   f. L&M Construction Chemicals, Inc.; E-CON
   g. Meadows, W. R., Inc.; EVAPRE
   h. Sika Corporation; SikaFilm
   i. Symons by Dayton Superior; Finishing Aid
   j. Unitex; PRO-FILM

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
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. Anti-Hydro International, Inc.; AH Clear Cure WB
b. BASF Construction Chemicals - Building Systems; Kure-N-Seal WB
c. ChemMasters; Safe-Cure & Seal 20
d. Conspec by Dayton Superior; Cure and Seal WB
e. Cresset Chemical Company; Crete-Trete 309-VOC Cure & Seal
f. Dayton Superior Corporation; Safe Cure and Seal (J-18)
g. Euclid Chemical Company (The), an RPM company; Aqua Cure VOX; Clearseal WB 150
h. L&M Construction Chemicals, Inc.; Dress & Seal WB
i. Meadows, W. R., Inc.; Vocomp-20
j. Symons by Dayton Superior; Cure & Seal 18 Percent E

### 2.9 RELATED MATERIALS

A. **Expansion- and Isolation-Joint-Filler Strips:** ASTM D 1751, asphalt-saturated cellulosic fiber.

B. **Semirigid Joint Filler:** Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. **Bonding Agent:** ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. **Epoxy Bonding Adhesive:** ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

### 2.10 REPAIR MATERIALS

A. **Repair Underlayment:** Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   
   1. **Cement Binder:** ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. **Primer:** Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. **Aggregate:** Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   4. **Compressive Strength:** Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. **Repair Overlayment:** Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   2. Maximum Water-Cementitious Materials Ratio: 0.50.
   3. Slump Limit: 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: 3000 psi at 28 days.
   3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size. For exterior broom finished concrete.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
   1. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and
securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

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

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3. Install dovetail anchor slots in concrete structures as indicated.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

2. Seal around all penetrations with manufacturer's recommended system.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
   1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

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

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
3.9  FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
   1. Apply scratch finish to surfaces indicated and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces indicated to receive trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
      a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10  MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

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

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoil areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
B. Inspections:
   1. Steel reinforcement placement.
   2. Steel reinforcement welding.
   3. Headed bolts and studs.
   4. Verification of use of required design mixture.
   5. Concrete placement, including conveying and depositing.
   6. Curing procedures and maintenance of curing temperature.
   7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
      b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
   8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
   9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
   10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete
placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

13. Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION 033000
SECTION 04 0511
MORTAR AND MASONRY GROUT

PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Mortar for masonry.
   B. Grout for masonry.

1.02  RELATED REQUIREMENTS
   A. Section 04 2000 - Unit Masonry: Installation of mortar and grout.
   B. Section 08 1113 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03  REFERENCE STANDARDS

1.04  SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
   C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
1.05 QUALITY ASSURANCE
   A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS
   A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
   B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS
   A. Mortar Color: Natural gray unless otherwise indicated.
      1. Masonry below grade and in contact with earth: Type S.
      2. Exterior Masonry Veneer: Type N.
      3. Engineered Masonry: Type M.
      4. Exterior, Loadbearing Masonry: Type N.
      5. Exterior, Non-loadbearing Masonry: Type N.
      6. Interior, Loadbearing Masonry: Type N.
      7. Interior, Non-loadbearing Masonry: Type O.
   C. Grout Mix Designs:
      1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
      2. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.

2.02 MATERIALS
   A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   B. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
      1. Type: Fine.
   C. Portland Cement: ASTM C150/C150M.
      1. Type: Type I - Normal; ASTM C150/C150M.
   D. Masonry Cement: ASTM C91/C91M.
      1. Type: Type N; ASTM C91/C91M.
   E. Masonry Cement: ASTM C91, Type N.
      1. Colored mortar: Premixed cement as required to match River Street Architecture, LLC's color sample.
      2. Substitutions: See Section 01 6000 - Product Requirements.
   F. Portland Cement: ASTM C150, Type I - Normal; color as required to produce approved color sample.
   G. Blended Cement: ASTM C 595, Type S; color as required to produce approved color sample.
I. Hydrated Lime: ASTM C207, Type S.
J. Quicklime: ASTM C5, non-hydraulic type.
K. Mortar Aggregate: ASTM C144.
L. Grout Aggregate: ASTM C404.
M. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
N. Water: Clean and potable.
O. Accelerating Admixture: Nonchloride type for use in cold weather.
P. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
Q. Bonding Agent: Latex type.

2.03 MORTAR MIXES
A. Ready Mixed Mortar: ASTM C1142, Type RM.
C. Stain Resistant Pointing Mortar: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.
D. Pointing Mortar For Glass Unit Masonry: ASTM C270, Type M, using the Proportion Specification.
E. Colored Mortar: Proportion selected pigments and other ingredients to match River Street Architecture, LLC’s sample, without exceeding manufacturer’s recommended pigment-to-cement ratio.

2.04 MORTAR MIXING
A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
B. Maintain sand uniformly damp immediately before the mixing process.
C. Add mortar color in accordance with manufacturer’s instructions. Provide uniformity of mix and coloration.
D. Do not use anti-freeze compounds to lower the freezing point of mortar.
E. If water is lost by evaporation, re-temper only within two hours of mixing.
F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.05 GROUT MIXES
A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
B. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.

2.06 GROUT MIXING
A. Mix grout in accordance with ASTM C94/C94M.
B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
C. Add admixtures in accordance with manufacturer’s instructions; mix uniformly.
D. Do not use anti-freeze compounds to lower the freezing point of grout.
2.07 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at General Contractor's option, subject to other limitations of contract documents.

B. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.

C. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Provide daily field tests for mortar per IBC standards.
   2. Grout slump per ASTM C143 for each set of compressive strength test specimens.
   3. Compression Test Specimens: Obtain and test grout samples per ASTM C119 on a daily basis during grouting operation. When volume of grout utilized exceeds 25 cubic yards in one day increase test frequency to provide tests for every 25 cubic yards of fraction thereof.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Provide daily field tests for mortar per IBC standards.
   2. Grout slump per ASTM C143 for each set of compressive strength test specimens.
   3. Compression Test Specimens: Obtain and test grout samples per ASTM C119 on a daily basis during grouting operation. When volume of grout utilized exceeds 25 cubic yards in
one day increase test frequency to provide tests for every 25 cubic yards of fraction thereof.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION
SECTION 9 04090
MASONRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Stone cavity wall insulation with integral drainage mat.
   B. Masonry cavity wall drainage mat.
   C. Stone cavity wall drainage mat.
   D. Cavity wall weeps vents.

1.02 RELATED SECTIONS
   A. Section 04050 - Mortar and Masonry Grout
   B. Section 04700 - Manufactured Masonry: Stone installation and coordination requirements.
   C. Section 04810 - Unit Masonry Assemblies: Additional masonry assembly requirements.
   D. Section 07212 - Thermal Protection: Board and Batt Insulation, Building Insulation.
   E. Section 07620 - Flashing and Sheet Metal: Metal counter flashing installation and coordination requirements.

1.03 REFERENCES

1.04 SUBMITTALS
   A. Submit under provisions of Section 01300.
   B. Product Data: Manufacturer's data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Storage and handling requirements and recommendations.
      3. Installation methods.
   C. Selection Samples: For each finish product specified, two complete sets of product representing manufacturer's full range of available colors and patterns.
   D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and configuration.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Not less than 5 years experience in the actual production of specified products.
   B. Installer Qualifications: Firm with 1 year experience in installation or application of systems similar in complexity to those required for this Project, and who has been trained in proper installation techniques by the manufacturer.
   C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
      1. Install in areas designated by Architect.
      2. Do not proceed with remaining work until workmanship and installation are approved by Architect.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer's unopened packaging until ready for installation.
   B. Protect packaging from direct prolonged exposure to sun.
   C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
1.07 PROJECT CONDITIONS
A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturer: CavClear, which is located at: Archovations, Inc. P. O. Box 241; Hudson, WI 54016-0241; Toll Free Tel: 888-436-2620; Tel: 715-381-5773; Fax: 715-381-9883; Email: ; Web: www.cavclear.com

B. Mortar Net as alternate to CavClear
C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 PRODUCTS
A. Cavity Insulation at Stone Construction: CavClear Stone Mat as manufactured by Archovations, Inc.
   1. Airspace Maintenance and Drainage Material with Integral Cavity Board Insulation: Stone mat to create a continuous drainage space behind stone masonry factory bonded to rigid, cellular, thermal insulation. Stone mat shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100 percent recycled plastic with binder. Mat shall be a non-woven textile product in random pattern and shall have voids no greater than 1/8 inch (3 mm) in diameter. Suitable for substantially continuous installation behind the full-height of stone.
      a. Rigid insulation to comply with ASTM C 1289, Type I, Class 2; polyisocyanurate.
   2. Size: 16 inches (406 mm) by 8 feet (2438 mm).
   3. Stone mat thickness: Manufacturer’s standard thickness of 1" (25 mm) to allow no tolerance between stone mat and stone masonry wythe.
   4. Insulation Thickness: 1.5 inches (38 mm).

B. Cavity Drainage Mat at Masonry Construction: CavClear Masonry Mat as manufactured by Archovations, Inc.
   1. Size: 16 inches (406 mm) by 8 feet (2438 mm).
   2. Thickness: Masonry mat thickness shall allow no more than 3/8 inch tolerance between the masonry mat and masonry wythe.
   3. Drainage Mat Thickness: 1-1/4 inches (32 mm).

C. Cavity Drainage Mat at Stone Construction: CavClear Stone Mat as manufactured by Archovations, Inc.
   1. Full-height Airspace Maintenance and Cavity Drainage Mat: Designed for stone masonry cavities to create a continuous area behind stone for water management. The stone mat shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100 percent recycled plastic with binder. Stone mat shall be non-woven textile product in random pattern and have voids no greater than 1/8 inch (3 mm) in diameter. Suitable for substantially continuous installation behind the full-height of stone construction.
   2. Size: 16 inches (406 mm) by 8 feet (2438 mm).
   3. Drainage Mat Thickness: 1 inch (25 mm).

D. Masonry Weep Vents: CavClear Weep Vents as manufactured by Archovations, Inc.
   1. Type: Non-woven mesh with M-notched bottom.
   2. Color: Color to match mortar as acceptable to Architect.
   3. Size: 3/8 inch (19 mm) by 2-1/2 inches (64 mm) high by 3-1/2 inches (89 mm) wide.

PART 3 EXECUTION

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

3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Stone Cavity Wall Insulation And With Integral Drainage Mat: Install insulation system continuously in the full-height of exterior masonry cavities during construction of exterior wythe. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Butt adjacent pieces to moderate contact. Use insulation sealant on all insulation joints. Fit to perimeter construction and penetrations without voids. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
C. Masonry cavity wall drainage mat: Install masonry mat continuously throughout full-height of all exterior masonry cavities during construction of exterior wythe; follow manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch (10 mm) greater than masonry mat thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Use multiple layers at bottom of wall and above through-wall flashings when airspace depth exceeds masonry mat thickness by more than 3/8 inch (10 mm). Butt adjacent pieces to moderate contact. Fit to perimeter construction and penetrations without voids.
D. Masonry Cavity Weep Vents: Place weep vents in head joints at exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24 inches (610 mm) on center, unless otherwise shown. Leave the side of the masonry units forming the vent space unbuttered and clear of mortar. Install with notched side down. Slide vent material into joint once the two masonry units forming the weep vent are in place.

3.04 PROTECTION
A. Protect installed products until completion of project.
B. Repair or replace damaged products before covering with construction.

END OF SECTION
SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Concrete Block.
B. Reinforcement and Anchorage.
C. Flashings.
D. Lintels.
E. Accessories.

1.02 RELATED REQUIREMENTS
A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
B. Section 04 0511 - Mortar and Masonry Grout.
C. Section 05 5000 - Metal Fabrications: Loose steel lintels.
D. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.
E. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.
F. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
G. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.
H. Section 07 9005 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 REFERENCE STANDARDS
B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2008.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
H. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.
L. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.

P. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.


V. BIA Technical Notes No. 7 - Water Penetration Resistance - Design and Detailing; 2005.


1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Maintenance Materials: Furnish the following for Kana Hotel Group’s use in maintenance of project.
   1. See Section 01 6000 - PRODUCT REQUIREMENTS, for additional provisions.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

B. Fire Rated Assemblies: Conform to applicable code for UL (FRD) Assembly No. ____.

1.06 DELIVERY, STORAGE, AND HANDLING

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

1.07 ENVIRONMENTAL REQUIREMENTS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
   2. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
   3. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer’s standard color and texture where indicated.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:

B. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; galvanized finish.

C. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

D. Multiple Wythe Joint Reinforcement: Truss type; fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

E. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
   1. Vertical adjustment: Not less than 2 inches.
   2. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.

F. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.

G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
   1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

H. Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.05 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.

I. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

J. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, stainless steel.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.

2.04 FLASHINGS

A. Plastic Flashings: Sheet polyolefin laminated to polypropylene; 40 mil thick.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Copper/Kraft Paper Flashings: 3 oz/sq ft sheet copper bonded to fiber reinforced asphalt treated Kraft paper.
   1. Manufacturers:
b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Copper/Polyethylene Flashing: Polyethylene film laminated to a 2 oz/sq ft copper sheet through a fiberglass scrim.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Copper/Polymer Fabric Flashing: 3 oz/sq ft copper sheet laminated between two sheets of polymer or fiberglass fabric.

E. Copper/Polymer Fabric Drainage Plane Flashing System: 3 oz/sq ft copper sheet bonded with rubber-based adhesive between one sheet of polymer fabric and one sheet of non-woven drainage material, and manufacturer’s standard butt joint tape sealant.

F. Polymer Coated Copper Flashing: Polymer coating bonded to a 2 oz/sq ft copper sheet through a fiberglass scrim.

G. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch thick.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

H. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) minimum total thickness; with cross laminated polyethylene top and bottom surfaces.
   1. Manufacturers:
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

I. Plastic Flashings: Sheet polyvinyl chloride; 10 mil thick.


K. Plastic/Kraft Paper Flashings: 3 mil thick sheet polyethylene bonded to layer of fiber reinforced asphalt and backed with Kraft paper.

L. EPDM Flashing: ASTM D4637, Type I, 0.040 inch thick.

M. Rubberized Asphalt Flashing: Self-adhering polymer-modified asphalt sheet; 0.030 inch total thickness; with cross-linked polyethylene top and bottom surfaces.

N. Copper Flashing: ASTM B370, 060 soft annealed; 20 oz/sq ft thick; natural finish.

O. Pre-Coated Galvanized Steel Flashing: ASTM A653/A653M, with G90/Z275 coating, 24 gage, 0.0239 inch base metal thickness, shop precoated with fluoropolymer coating in color matching masonry.

P. Galvanized Steel Flashing: ASTM A653/A653M, with G90/Z275 coating, 26 gage, 0.0179 inch base metal thickness.

Q. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
   1. Manufacturers, Synthetic Rubber Products:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2. Manufacturers, Modified Polyether Products:
   c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

R. Lap Sealant: Butyl type as specified in Section 07 9005.
2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 6 inches wide x by maximum lengths available.
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels, fitted between masonry ties.
      a. Manufacturers:
         2) Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   2. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.


E. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.

F. Termination Bars: Stainless steel; compatible with membrane and adhesives.

G. Type: Polyester mesh.
   1. Manufacturers:
      d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

H. Type: Polyethylene tubing.
   1. Manufacturers:
      f. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

I. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.
B. Verify that related items provided under other sections are properly sized and located.
C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
3.02 PREPARATION
   A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
   B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS
   A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.04 COURSING
   A. Establish lines, levels, and coursing indicated. Protect from displacement.
   B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
   C. Concrete Masonry Units:
      1. Bond: Running.
      2. Coursing: One unit and one mortar joint to equal 8 inches.

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

3.06 WEEPS/CAVITY VENTS
   A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
   B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL
   A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
   B. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.
   C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.
3.08 REINFORCEMENT AND ANCHORAGE - GENERAL
   A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
   B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
   C. Place continuous joint reinforcement in first and second joint below top of walls.
   D. Lap joint reinforcement ends minimum 6 inches.
   E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
   F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.09 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY
   A. Install horizontal joint reinforcement 8 inches on center.
   B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
   C. Place continuous joint reinforcement in first and second joint below top of walls.
   D. Lap joint reinforcement ends minimum 6 inches.

3.10 MASONRY FLASHINGS
   A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
      1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 8 inches, minimum, to form watertight pan at non-masonry construction.
      2. Seal lapped ends and penetrations of flashing before covering with mortar.
   B. Extend metal flashings through exterior face of masonry and turn down to form drip. Install joint sealer below drip edge to prevent moisture migration under flashing.
   C. Extend plastic, laminated, EPDM, and ______ flashings to within 1/4 inch of exterior face of masonry.

3.11 LINTELS
   A. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
      1. Do not splice reinforcing bars.
      2. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
      3. Place and consolidate grout fill without displacing reinforcing.

3.12 GROUTED COMPONENTS
   A. Lap splices minimum 24 bar diameters.
   B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
   C. Place and consolidate grout fill without displacing reinforcing.
   D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 CONTROL AND EXPANSION JOINTS
   A. Do not continue horizontal joint reinforcement through control or expansion joints.
B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer’s instructions.

D. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.

3.14 BUILT-IN WORK
A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

3.15 CUTTING AND FITTING
A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired. Use finished ends where required or indicated on the drawings.

3.16 PARGING
A. Dampen masonry walls prior to parging.

B. Scarify each parging coat to ensure full bond to subsequent coat.

C. Parge masonry walls in two uniform coats of mortar to a total thickness of 3/4 inch.

D. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

E. Strike top edge of parging at 45 degrees.

3.17 FIELD QUALITY CONTROL
A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.

C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.18 CLEANING
A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

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

END OF SECTION
SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
C. Section 04 2001 - Masonry Veneer: Placement of metal fabrications in masonry.
D. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.
E. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
F. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
G. Section 05 5100 - Metal Stairs.
H. Section 05 5213 - Pipe and Tube Railings.
I. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS
I. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric); 2014.
O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
R. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
S. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
C. Welders’ Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
D. Fabricator’s Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL
A. Steel Sections: ASTM A36/A36M.
B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
C. Plates: ASTM A283/A283M.
E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, plain.
F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM
A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
C. Bolts, Nuts, and Washers: Steel, galvanized to ASTM A 153/A 153M.
D. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

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

2.04 FABRICATED ITEMS
A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
1. Side Rails: 3/8x2 1/2 inches members spaced at 18 inches.
2. Rungs: 7/8 inch diameter solid round bar spaced 12 inches on center.
3. Space rungs 7 inches from wall surface.
4. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
5. Support each ladder at top and bottom and at intermediate points space not more than 5'-0" on center with welded of lolted steel straps.

B. Bumper Posts and Guard Rails: As detailed; prime paint finish.
C. Bollards: Steel pipe, concrete filled, crowned cap, as detailed (IN CIVIL DRAWINGS); prime paint finish.
D. Joist Hangers: Strap anchors, fabricated with sheet steel, 18 gage, 0.0478 inch minimum base metal thickness; galvanized finish.
E. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, joists, and masonry; prime paint finish.
F. Lintels: As detailed (IN STRUCTURAL DRAWINGS); prime paint finish.
G. Sill Angles for Tempered Glass Railing Assemblies: ASTM A36/A36M steel angles with anchoring devices and sizes as indicated in shop drawings for railing assembly, drilled and tapped for fastener types, sizes, and spacing indicated, prime paint finish.
H. Door Frames for Wall Openings: Channel sections; prime paint finish.
I. Toilet Partition Suspension Members: Steel channel sections; prime paint finish.
J. Laundry Trench:
   1. Manufacturers:
      a. See Construction Drawings for Details

2.05 FINISHES - STEEL
A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete, items to be imbedded in masonry, and items specified for _______ finish.
   2. Exceptions: Galvanize items to be embedded in concrete or masonry.
   3. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
B. Prepare surfaces to be primed in accordance with SSPC-SP2.
C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
D. Prime Painting: One coat.
E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.
F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM
A. Exterior Aluminum Surfaces: Class I color anodized.
B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick; light bronze.
C. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

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

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
C. Obtain approval prior to site cutting or making adjustments not scheduled.
D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

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

END OF SECTION
SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Wall mounted handrails.
B. Stair railings and guardrails.
C. Free-standing railings at steps.

1.02 RELATED REQUIREMENTS
A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.
B. Section 04 2000 - Unit Masonry: Placement of anchors in masonry.
C. Section 06 2000 - Finish Carpentry: Wood handrail.
D. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS
C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
F. ASTM B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric); 2012.
L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS
A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.
C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.

E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

F. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 ALUMINUM MATERIALS

A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

B. Aluminum Tube: Minimum wall thickness of 0.127 inch; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.


D. Non-Weld Mechanical Fittings: Slip-on cast aluminum, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

E. Exposed Fasteners: No exposed bolts or screws.

2.03 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, galvanized finish.

C. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

D. Exposed Fasteners: No exposed bolts or screws.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

2.05 ALUMINUM FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.
3.03 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
C. Anchor railings securely to structure.
D. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

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

END OF SECTION
SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Grout.

B. Related Sections:
   1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame and other metal items not defined as structural steel.
   3. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using schematic details indicated and AISC 360.
   2. Use ASD; data are given at service-load level.

B. Construction: Shear walls.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: Show fabrication of structural-steel components.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
   5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.

D. Qualification Data: For qualified Installer and fabricator.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

G. Mill test reports for structural steel, including chemical and physical properties.

H. Product Test Reports: For the following:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength bolt-nut-washer assemblies.
   4. Shear stud connectors.
   5. Shop primers.

I. Source quality-control reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 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.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.
PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Weight Class: Standard.
   2. Finish: Black.

H. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

I. Steel Forgings: ASTM A 668/A 668M.

J. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   4. Washers: ASTM F 436, Type 1, hardened carbon steel.
   5. Finish: Plain.

C. Threaded Rods: ASTM A 36/A 36M.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
2.3 PRIMER

A. Primer: Comply with Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings."

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop 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.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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.
   2. Surfaces to be field welded.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to one of the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
   5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
   6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
   8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
   9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency’s option:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

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.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. 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 structural steel 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.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.


1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
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.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
3.6 REPAIRS AND PROTECTION

A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051200
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Finish carpentry items.
   B. Wood door frames, glazed frames.
   C. Wood casings and moldings.

1.02 RELATED REQUIREMENTS
   A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
   B. Section 06 4100 - Architectural Wood Casework: Shop fabricated custom cabinet work.
   C. Section 08 1416 - Flush Wood Doors.
   D. Section _________: Cabinet hardware.
   E. Section 08 8000 - Glazing: Glass and glazing of wood partitions and screens.
   F. Section 09 9113 - Exterior Painting: Painting and finishing of finish carpentry items.
   G. Section 09 9123 - Interior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS
   B. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
   F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
   J. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
   L. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
   N. PS 1 - Structural Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements for submittal procedures.
   B. Product Data:
      1. Provide instructions for attachment hardware and finish hardware.
C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
   2. Include certification program label.

D. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

1.06 QUALITY ASSURANCE
A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
   1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. This AWI (QCP) project is registered as project number ____________.
   3. Provide designated labels on shop drawings as required by certification program.
   4. Provide designated labels on installed products as required by certification program.
   5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   6. Arrange and pay for inspections required for certification.
   7. Replace, repair, or rework all work for which certification is refused.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Protect work from moisture damage.

PART 2 PRODUCTS
2.01 FINISH CARPENTRY ITEMS
A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Interior Woodwork Items:
   1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

2.02 LUMBER MATERIALS
A. Softwood Lumber: ________ species, ________ sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

B. Hardwood Lumber: ________ species, ________ sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.03 SHEET MATERIALS
A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

C. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

2.04 PLASTIC LAMINATE MATERIALS
A. Plastic Laminate: NEMA LD 3, HGS; color as selected by Architect; textured, low gloss finish; ________ manufactured by ____________.

B. Low Pressure Laminate: Melamine; ________ color, _____ pattern and gloss surface texture.

C. Solid Laminate: ________ color, ________ pattern, and gloss surface texture.
D. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate; ________ manufactured by ____________.

E. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.05 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application; ________ finish in concealed locations and ________ finish in exposed locations.

C. Concealed Joint Fasteners: Threaded steel.

2.06 ACCESSORIES

A. Lumber for Shimming, Blocking, and _____: Softwood lumber of _____ species.

B. Plastic Edge Trim: Extruded convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness; ________ color.

C. Glass: Type ____ as specified in Section 08 8000.

D. Primer: Alkyd primer sealer.

E. Wood Filler: Solvent base, tinted to match surface finish color.

2.07 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Wood Preservative (Surface Application): Clear, ____________ type, ________ manufactured by ______________.

C. Redry wood after pressure treatment to maximum ____ percent moisture content.

2.08 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Cap exposed plastic laminate finish edges with plastic trim.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

E. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.09 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
   a. System - 1, Lacquer, Nitrocellulose.
   b. Sheen: Flat.

2. Opaque:
   a. System - 1, Lacquer, Nitrocellulose.
   b. Color: As selected by River Street Architecture, LLC.
c. Sheen: Flat.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

**3.02 INSTALLATION**

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install hardware in accordance with manufacturer's written instructions.

**3.03 SITE APPLIED WOOD TREATMENT**

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

**3.04 PREPARATION FOR SITE FINISHING**

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9113 and 09 9123.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

**3.05 TOLERANCES**

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.
B. Countertops.
C. Cabinet hardware.
D. Factory finishing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
B. Section 06 6110 - Cultured Marble
C. Section 09 9123 - Interior Painting: Site finishing of cabinet exterior.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.
E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
G. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
I. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
K. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
L. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
C. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
D. Product Data: Provide data for hardware accessories.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.
B. Perform cabinet construction in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.

1.06 MOCK-UP

A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
1.07 DELIVERY, STORAGE, AND HANDLING
   A. Protect units from moisture damage.

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

PART 2 PRODUCTS

2.01 CABINETS
   A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
   B. Refer to the architectural details and Tru prototypical drawings and Brand Standards for typical dimensions and details.
   C. Wood Veneer Faced Cabinet:
      1. Exposed Surfaces: HPVA Grade A, wood species per brand standards, plain sliced, random-matched.
   D. Plastic Laminate Faced Cabinets: Custom grade.

2.02 WOOD-BASED COMPONENTS
   A. Wood fabricated from old growth timber is not permitted.

2.03 PANEL MATERIALS
   A. Exposed Surfaces: PS 1; APA A-A Grade, plain-sliced birch face veneer, Interior rated adhesives, core of particleboard, medium density fiberboard, or engineered combination, thickness as indicated. Refer to Tru by Hilton, Brand Standards
      1. Semi-Exposed Surfaces: PS 1; APA A-B Grade, rotary cut birch face veneer, Interior rated adhesives, core of particleboard, medium density fiberboard, or engineered combination, thickness as indicated.
      2. Concealed Surfaces: PS 1; APA B-B Grade, rotary cut birch face veneer, Interior rated adhesives, core of fire-retardant treated particleboard, thickness as required.
   B. Veneer Faced Plywood Finish: HPVA HP-1; graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, core of particleboard, medium density fiberboard, strawboard, or engineered combination of core materials listed; type of glue recommended for specific application; thickness as required; face veneer as follows:
      1. Exposed Surfaces: Grade AA, Birch, plain sliced, slip-matched.
   C. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.

2.04 LAMINATE MATERIALS
   A. Manufacturers:
      2. Nevamar Corp.; www.nevamar.com
      3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
C. Provide specific types as scheduled.
   1. Horizontal Surfaces: HGL, 0.039 inch nominal thickness, through color, colors as
      scheduled, finish as scheduled.
   2. Vertical Surfaces: HGL, 0.039 inch nominal thickness, None - N/A colors as scheduled,
      Nevamar Metallage Phenolic Backed Metal Laminates.
   3. Vertical Surfaces: VG, 0.028 inch nominal thickness, colors as scheduled, Nevamar
      Laminated Plastic Vertical Forming Grade VF-3 (VG).
   4. Horizontal General Surfaces: HGS, 0.048 inch nominal thickness, colors as scheduled,
      Nevamar Laminated Plastic Horizontal general purpose Grade H-5 (HGS).
   5. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to
      concealed backside of panels faced with high pressure decorative laminate.

2.05 COUNTERTOPS
   A. Cultured Marble: specified in Section 06 6110.
   B. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL,
      conventionally fabricated and self-edge banded.

2.06 ACCESSORIES
   A. Adhesive: Type recommended by fabricator to suit application.
      1. Manufacturers:
         b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated
      tongue; of width to match component thickness, color as selected from manufacturer's
      standards.
      1. Use 3mm PVC Edgeband, Color to be selected.
   C. Fasteners: Size and type to suit application.
   D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized
      or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in
      exposed locations.
   E. Concealed Joint Fasteners: Threaded steel.
   F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match
      adjacent surface.

2.07 HARDWARE
   A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
   B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf
      standards or multiple holes for pin supports and coordinated self rests, polished chrome finish,
      for nominal 1 inch spacing adjustments.
   C. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf
      standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch
      spacing adjustments.
   D. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.
   E. Sliding Door Pulls: Circular shape for recessed installation, steel with satin finish.
   F. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish steel
      with satin finish.
   G. Catches: Magnetic.
   H. Drawer Slides:
      1. Type: Extension types as required.
      2. Static Load Capacity: Commercial grade.
      4. Stops: Integral type.
I. Hinges: European style concealed self-closing type, steel with polished finish.
J. Sliding Door Track Assemblies: Upper and lower track of satiny anodized aluminum, with matching shoe equipped with nylon rollers.

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

2.09 FACTORY FINISHING
A. Sand work smooth and set exposed nails and screws.
B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. Sheen: Flat.
   2. Opaque:
      a. Color: As selected by River Street Architecture, LLC.
      b. Sheen: Flat.
E. Finish work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1500, As scheduled.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify adequacy of backing and support framing.

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

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

3.04 CLEANING
A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION
SECTION 9 06611
CULTURED MARBLE FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

1.02 CULTURED MARBLE COUNTERTOPS
   A. Section Includes:
      1. Cast Polymer
         a. Countertops and Backsplashes

1.03 RELATED SECTIONS
   A. Section 06 10 00 (06100) - Rough Carpentry
   B. Section 06 20 00 (06200) - Finish Carpentry
   C. Section 12 30 00 (06400) - Architectural Woodwork
   D. Division 22 (15) for Plumbing Fixtures

1.04 REFERENCES
   A. FS MMM-A-130 - Adhesive, Contact
   B. Architectural Woodwork Institute (AWI): "Architectural Woodwork Quality Standards"

1.05 SUBMITTALS
   A. Submit “Letter of Conformance” in accordance with Section 01 33 00 (01330) with the following
      supporting data:
      1. Submit Shop Drawings and product data. Include materials, component profiles, fastening
         methods, assembly methods, joint details, accessory listings, and schedule of finishes.
         a. Include data for fire-retardant treatment from chemical treatment manufacturer and
            certification by treating plant that treated materials comply with requirements.

1.06 QUALITY ASSURANCE
   A. Countertops shall be supplied by one manufacturer. Where shown to be the same color, the
      color of the components shall match for all items. Refer to Tru by Hilton Interior Finish Index for
      colors.
   B. Allowable Tolerances:
      1. Variation in component size: +/- 1/8 inch.
      2. Location of openings: +/- 1/8 inch from indicated location.
   C. Perform work to (custom) quality in accordance with "Quality Standards" of the Architectural
      Woodwork Institute (AWI).
   D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated,
      provide materials and products with specified fire-test-response characteristics as determined
      by testing identical products per test method indicated by UL, ITS, or another testing and
      inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate
      markings of applicable testing and inspecting agency in the form of separable paper label or,
      where required by authorities having jurisdiction, imprint on surfaces of materials that will be
      concealed from view after installation.

1.07 DELIVERY, STORAGE, AND HANDLING
   A. Do not deliver cast polymer materials until painting and similar operations that could damage
      synthetic marble have been completed in installation areas. If cast polymer materials must be
      stored in other than installation areas, store only in areas where environmental conditions
      comply with requirements specified in "Project Conditions" Article.
   B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to
      prevent physical damage or staining following installation for duration of project.
1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cast polymer materials 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.

B. Field Measurements: Where cast polymer materials are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support cast polymer materials work by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.09 SPECIAL WARRANTY

A. Cast polymer materials:
   1. Provide one (1) year Warranty against manufacturing defects.

PART 2 PRODUCTS

2.01 CAST POLYMER:

A. Classified in accordance local codes and ordinances, ASTM E84 and the following:
   1. Class [A] [I] [C] [III]
   2. Flame Spread: [Class A: 0 - 25] [Class I: 0 - 25] [Class C: 76 - 200] [Class C: 76 - 200]
   3. Smoke Developed: 0-450
      a. Subject to compliance with requirements, all products shall be permanently marked on the back side and provided with a temporary removable label on the front side with language clearly certifying compliance with ASTM E84 and identifying the required Flame Spread Class Rating.

B. Countertops:

A. Homogeneous minimum 1/2" thick molded panels. Installed as indicated on Drawings.
   1. Refer to Interiors Finish Index by Hilton for color and pattern.

2.02 INSTALLATION MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Adhesive and Sealant (Installer to verify products are approved by Cast polymer materials Manufacturer):
   1. Avendra, LLC Preferred Manufacturers:
      a. None
      b. Approved Manufacturers:
      1) Or as recommended by cast polymer manufacturer.
2.03 FABRICATION

A. General:
1. Shop assemble cast polymer materials for delivery to site in units easily handled and to permit passage through building openings.
2. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.
   a. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.
   b. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.
   c. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings.
   d. Provide for mounting of soap dishes, grab rails, etc., as indicated on the Drawings.

PART 3 EXECUTION
3.01 INSPECTION
   A. Verify adequacy of backing and support framing.

3.02 PREPARATION
   A. Condition cast polymer materials to average prevailing humidity conditions in installation areas before installation.

3.03 INSTALLATION
   A. All countertops shall be installed as shown on Drawings and as specified by manufacturer.
   B. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

3.04 ADJUSTING AND CLEANING
   A. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.
   B. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work which cannot be repaired to Owner's Representative's satisfaction.

END OF SECTION
SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Framing with dimension lumber.
   2. Framing with timber.
   3. Framing with engineered wood products.
   4. Rooftop equipment bases and support curbs.
   5. Wood blocking, cant, and nailers.
   6. Wood furring and grounds.
   7. Wood sleepers.
   8. Utility shelving.

B. Related Sections include the following:
   1. Division 06 Section "Heavy Timber Construction."
   2. Division 06 Section "Sheathing."
   3. Division 06 Section "Shop-Fabricated Wood Trusses."
   4. Division 31 Section "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

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

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   2. NLGA: National Lumber Grades Authority.
   3. RIS: Redwood Inspection Service.
5. WCLIB: West Coast Lumber Inspection Bureau.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

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

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Engineered wood products.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-
writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspace or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade and any of the following species:
   1. Mixed southern pine; SPIB.
   2. Spruce-pine-fir; NLGA.
   3. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
   4. Northern species; NLGA.
   5. Eastern softwoods; NeLMA.
   6. Western woods; WCLIB or WWPA.

C. Exterior and Load-Bearing Walls: No. 2 or better grade and any of the following species:
   1. Southern pine; SPIB.
   2. Mixed southern pine; SPIB.
   3. Spruce-pine-fir; NLGA.
   4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
   5. Northern species; NLGA.
   6. Eastern softwoods; NeLMA.
   7. Western woods; WCLIB or WWPA.

D. Ceiling Joists (Non-Load-Bearing): Construction or No. 2 grade and any of the following species:
   1. Southern pine; SPIB.
   2. Mixed southern pine; SPIB.
   3. Spruce-pine-fir; NLGA.
   4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
   5. Northern species; NLGA.
   6. Eastern softwoods; NeLMA.
   7. Western woods; WCLIB or WWPA.

E. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade and the following species:
   1. Southern pine; SPIB.

F. Exposed Exterior Framing Indicated to Receive a Stained or Natural Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
   1. Species and Grade: As indicated above for load-bearing construction of same type.
2.4 TIMBER FRAMING

A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 20 percent.
3. Additional Restriction: Free of heart centers.

2.5 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   b. Finnforest USA.
   c. Georgia-Pacific.
   d. Louisiana-Pacific Corporation.
   e. Pacific Woodtech Corporation.
   f. Roseburg Forest Products Co.
   g. Weldwood of Canada Limited; Subsidiary of International Paper Corporation.
   h. Weyerhaeuser Company.

4. Modulus of Elasticity, Edgewise: 2,000,000 psi.

B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.

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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Weyerhaeuser Company.
4. Modulus of Elasticity, Edgewise: 2,200,000 psi.

C. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anthony-Domtar Inc.
   b. Boise Cascade Corporation.
   c. Georgia-Pacific.
   d. J. M. Huber Corporation.
   e. International Beams Inc.
   f. International Paper Corporation.
   g. Jager Building Systems Inc.
   h. Louisiana-Pacific Corporation.
   i. Nascor Incorporated.
   j. Pacific Woodtech Corporation.
   k. Roseburg Forest Products Co.
   l. Standard Structures Inc.
   m. Stark Truss Company, Inc.
   n. Superior Wood Systems.
   o. Weyerhaeuser Company.

2. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
3. Structural Properties: Provide units with depths and design values not less than those indicated.
4. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.

D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.

1. Manufacturer: Provide products by same manufacturer as I-joists.
2. Material: All-veneer product, glued-laminated wood or product made from any combination solid lumber, wood strands, and veneers.
4. Provide performance-rated product complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

2.6 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.
1. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
2. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
3. Adhesive shall not contain urea-formaldehyde resins.

B. Species and Grades for Beams and Purlins:
   1. Species and Beam Stress Classification: Southern pine, 24F-1.9E.
   2. Lay-up: Balanced.
   3. Basis of Design is Anthony 1.9E Power Rated Glulam.

C. Species and Grades for Columns and Truss Members:

D. Appearance Grade: Framing, complying with AITC 110.

2.7 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Rooftop equipment bases and support curbs.
   5. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
   1. Mixed southern pine, No. 2 grade; SPIB.
   2. Hem-fir or hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common; NeLMA, NLGA, WCLIB, or WWPA.

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

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

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


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.


2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.10 METAL FRAMING ANCHORS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cleveland Steel Specialty Co.
3. Harlen Metal Products, Inc.
4. KC Metals Products, Inc.
5. Simpson Strong-Tie Co., Inc.
7. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

   1. Use for interior locations where stainless steel is not indicated.

F. Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges at least 85 percent of joist depth.
   1. Thickness: 0.062 inch.

G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
   1. Strap Width: 2 inches.
   2. Thickness: 0.062 inch.

H. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

I. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

J. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
   2. Thickness: 0.050 inch.
   3. Length: 16 inches.

K. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
L. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

M. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
   1. Bolt Diameter: As required by specified holdown.
   2. Width: As required by specified holdown.2-1/2 inches.
   4. Base Reinforcement Thickness: As required by specified holdown.

N. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.

2.11 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

C. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
   1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

E. Do not splice structural members between supports, unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
   3. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.

K. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable.
2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

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

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

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction, unless otherwise indicated.

1. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c., unless otherwise indicated.
2. For interior partitions and walls, provide 2-by-4-inch nominal size wood studs spaced 16 inches o.c., unless otherwise indicated.
3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs. See plans and schedules for header support requirements.

1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for
openings 72 to 120 inches in width, and not less than 10-inch nominal depth for
openings 10 to 12 feet in width.
2. For load-bearing walls see plans and schedules.

3.4 FLOOR JOIST FRAMING INSTALLATION

A. General: Install floor joists with crown edge up and support ends of each member with
not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry.
Attach floor joists as follows:

1. Where supported on wood members, by using metal framing anchors.
2. Where framed into wood supporting members, by using wood ledgers as
indicated or, if not indicated, by using metal joist hangers.

B. Frame openings with headers and trimmers supported by metal joist hangers; double
headers and trimmers where span of header exceeds 48 inches.

C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third
at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2
inches from top or bottom.

D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists
unless nailed to header or band.

E. Lap members framing from opposite sides of beams, girders, or partitions not less than
4 inches or securely tie opposing members together. Provide solid blocking of 2-inch
nominal thickness by depth of joist over supports.

F. Provide solid blocking between joists under jamb studs for openings.

G. Under non-load-bearing partitions, provide double joists separated by solid blocking
equal to depth of studs above.

H. Provide bridging of either type indicated below, at intervals of 96 inches o.c., between
joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal size lumber,
double-crossed and nailed at both ends to joists.
2. Steel bridging installed to comply with bridging manufacturer’s written
instructions.

3.5 CEILING JOIST AND Rafter FRAMING INSTALLATION

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with
requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists
parallel to rafters from wall plate to first joist; nail to ends of rafters and to top
plate and nail to first joist or anchor with framing anchors or metal straps.
Provide 1-by-8-inch nominal size or 2-by-4-inch nominal size stringers spaced 48 inches o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

1. At valleys, provide size indicated. Bevel ends of jack rafters for full bearing against valley rafters.
2. At hips, provide hip rafter of size indicated. Bevel ends of jack rafters for full bearing against hip rafter.

C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.6 TIMBER FRAMING INSTALLATION

A. Install timber with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.

B. Install wood posts using metal anchors indicated.

C. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 STAIR FRAMING INSTALLATION

A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:

1. Stringer Size: 2-by-12-inch nominal size, minimum.
2. Stringer Material: Laminated-veneer lumber or solid lumber.
3. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
4. Stringer Spacing: At least 3 stringers for each 36-inch clear width of stair.

B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.
3.8 PROTECTION

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

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

END OF SECTION 061000
SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Wall sheathing.
   2. Roof sheathing.
   3. Combination subfloor-underlayment.
   4. Weather-resistant sheathing paper, including flexible flashings at openings in sheathing.

B. Related Sections include the following:
   1. Section 061000 "Rough Carpentry" for plywood backing panels.
   2. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. For building wrap, include data on air- and moisture-infiltration protection based on testing according to referenced standards.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
A. Building Wrap: #15 pound building felt.

B. Flashings:
   1. Opening/Penetration Flashing: Manufacturer’s recommended system.
   2. Window/Door Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
         2) MFM Building Products Corp.; Window Wrap.
         3) Polyguard Products, Inc.; Polyguard 300.
         4) Protecto Wrap Company; PW100/40.
      b. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
   3. Partially Exposed Flashing: Stainless steel, minimum 0.016 inch thick.

C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

PART 2 - EXECUTION

2.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. Table 2304.10.1, "Fastening Schedule," in ICC’s "International Building Code."

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.
2.2 WOOD SHEATHING INSTALLATION


B. Wall and Roof Sheathing: Nail or screw to wood framing.
   1. Space panels 1/8 inch apart at edges and ends.

C. Combination Subfloor-Underlayment: Nail and glue to wood framing.
   1. Space panels 1/8 inch apart at edges and ends.

2.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

A. General: Cover sheathing with weather-resistant sheathing paper as follows:
   1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
   2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.

B. Apply flexible flashings in compliance with manufacturer's written instructions.
   1. Prime substrates as recommended by flashing manufacturer.
   2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
   3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
   4. Lap weather-resistant building paper over flashing at heads of openings.
   5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600
SECTION 06175 - SHOP-Fabricated Wood Trusses

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood parapet trusses.
2. Wood truss bracing.
3. Metal truss accessories.

B. Related Sections include the following:

1. Division 06 Section "Sheathing" for roof sheathing and subflooring.
2. Division 31 Section "Termite Control" for site application of borate treatment to wood trusses.

C. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Division 01 Section "Allowances."

1.3 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

B. TPI: Truss Plate Institute, Inc.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

2. NLGA: National Lumber Grades Authority.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.
1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

1. Design Loads: As indicated on Sheet S1.1.
2. Maximum Deflection Under Design Loads:
   a. Parapet Trusses: Horizontal deflection of 1/120 of span.

1.5 SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer. Show fabrication and installation details for trusses.

   1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
   2. Indicate sizes, stress grades, and species of lumber.
   3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
   4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
   5. Show splice details and bearing details.
   6. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss fabricating firm.

D. Qualification Data: For metal-plate manufacturer professional engineer fabricator and Installer.

1.6 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

   1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
C. Source Limitations for Connector Plates: Obtain metal connector plates from a single manufacturer.

D. Comply with applicable requirements and recommendations of the following publications:
   1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
   2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
   3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."

E. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations of TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
   1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
   2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
   3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 COORDINATION

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

C. Grade and Species: Provide visually graded dimension lumber for truss chord and web members, of not less than the following grade and any of the following species:
   1. Grade for Chord Members: No. 2 minimum or as required.
   2. Grade for Web Members: Construction or No. 2 minimum or as required.
   3. Species: Mixed southern pine; SPIB.
   4. Species: Spruce-pine-fir; NLGA.
   5. Species: Douglas fir-south; WWPA.
   6. Species: Hem-fir; WCLIB or WWPA.
   7. Species: Douglas fir-larch (north); NLGA.
   8. Species: Spruce-pine-fir (south); NELMA, WCLIB, or WWPA.

D. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded as follows and of the following minimum design values for size of member required according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
   2. Design Values: As indicated on Drawings.

E. Minimum Chord Size For Parapet Trusses: 2 by 4 inches nominal for both top and bottom chords.

F. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section Rough Carpentry.

G. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

H. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

2.2 METAL CONNECTOR PLATES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
3. CompuTrus, Inc.
4. Eagle Metal Products.
5. Jager Building Systems, Inc.
6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
7. Robbins Engineering, Inc.
8. TEE-LOK Corporation; a subsidiary of Berkshire Hathaway Inc.

C. General: Fabricate connector plates to comply with TPI 1.

D. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations where stainless steel is not indicated.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

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


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

2.4 METAL TRUSS ACCESSORIES

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

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

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:

   1. Cleveland Steel Specialty Co.
   2. Harlen Metal Products, Inc.
   3. KC Metals Products, Inc.
   4. Simpson Strong-Tie Co., Inc.
   5. Southeastern Metals Manufacturing Co., Inc.
   6. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer’s published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.


F. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/2 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

H. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with 1-3/4-inch-long seat; formed from metal strap 0.062 inch thick with tabs bent to extend over and be fastened to supporting member.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.6 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
   1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer’s fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.
   1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
   1. Install bracing to comply with Division 06 Section Rough Carpentry.
   2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
J. Install wood trusses within installation tolerances in TPI 1.

K. Do not cut or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.
   1. Do not alter trusses in field.

3.2 REPAIRS AND PROTECTION

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

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

C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

D. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
   1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

END OF SECTION 061753
SECTION 07 1400
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Fluid applied membrane waterproofing.
B. Above-grade waterproofing accessories.
C. Below-grade waterproofing accessories.

1.02 RELATED REQUIREMENTS
A. Section 07 2100 - Thermal Insulation: Insulation used for protective cover.
B. Section 07 6200 - Sheet Metal Flashing and Trim: Metal parapet covers, copings, and counterflashings.
C. Section 22 1006 - Plumbing Piping Specialties: Roof drain and plumbing vent flashing flanges.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for membrane.
C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Kana Hotel Group’s name and registered with manufacturer.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with three years experience.

1.06 FIELD CONDITIONS
A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.07 WARRANTY
A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
B. General Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no cost to Kana Hotel Group.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. MANUFACTURERS
1. W.R. MEADOWS; Product MEL-ROL® LM (ALL SEASON). Description: MEL-ROL LM (ALL SEASON) is a single component, polymer modified, cold-applied, liquid waterproofing membrane ideal for below-grade vertical applications.
3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
2.02 MEMBRANE AND FLASHING MATERIALS

A. Fluid-Applied Waterproofing - General: Cold-applied elastomeric fluid-applied membrane.
   1. Product: MEL-ROL® LM (ALL SEASON) manufactured by W.R. MEADOWS.

B. Sprayed Thin-Film Elastomeric Waterproofing: Elastomeric, UV-resistant coating capable of being applied to damp masonry and green concrete without adverse effect on adhesion; complying with requirements of ASTM C 836 except for minimum film thickness.
   1. Film Dry Thickness: 45 mils, minimum.
   2. Hydrostatic Pressure Resistance: 20 psi, minimum, when tested in accordance with ASTM D 5385.
   3. Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E 96/E 96M.
   4. Adhesion: Not less than 350 pounds-force per square inch when tested in accordance with ASTM D 4541.
   6. Application Temperature: From minus 10 degrees F to 100 degrees F.
   7. VOC Content: Less than 600 g/L when tested in accordance with 40 CFR 59 Subpart D (EPA Method 24).
   8. Suitable for use on concrete, masonry, and gypsum sheathing.
   9. Acceptable Products:
      b. Substitutions: See Section 01 6000 - Product Requirements.

C. Flexible Flashings: Type recommended by membrane manufacturer.

2.03 ACCESSORIES

A. Separation Sheet: Sheet polyethylene, 6 mil thick.

B. Protection Board: Rigid insulation specified in Section 07 2100.

C. Drainage Panel: 1/4 inch thick formed plastic, hollowed sandwich.

D. Cant Strips: Premolded composition material; ________ manufactured by ____________.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

B. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.

C. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

D. Seal cracks and joints with sealant using methods recommended by sealant manufacturer.

E. Install cant strips at inside corners.

3.03 INSTALLATION

A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.

B. Apply primer or surface conditioner at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.
C. At joints and cracks less than 1/2 inch in width including joints between horizontal and vertical surfaces, apply 12 inch wide strip of joint cover sheet.

D. At joints from 1/2 to 1 inch in width, loop joint cover sheet down into joint between 1-1/4 and 1-3/4 inch. Extend sheet 6 inches on either side of expansion joint.

E. Center joint cover sheet over joints. Roll sheet into 1/8 inch coating of waterproofing material. Apply second coat over sheet extending minimum of 6 inches beyond sheet edges.

F. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.

G. Apply extra thickness of waterproofing material at corners, intersections, and angles.

H. Install flexible flashings and seal into waterproofing material. Seal items penetrating through membrane with flexible flashings.

I. Extend waterproofing material and flexible flashing into drain clamp flange, apply adequate coating of liquid membrane to assure clamp ring seal. Coordinate with drain installation in Section 22 1006.

J. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges. Install counter flashing over all exposed edges.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.

B. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.

3.05 FIELD QUALITY CONTROL

A. On completion of horizontal membrane installation, dam installation area in preparation for flood testing.

B. Flood to minimum depth of 1 inch with clean water. After 48 hours, inspect for leaks.

C. If leaking is found, remove water, repair leaking areas with new waterproofing materials as directed by River Street Architecture, LLC; repeat flood test. Repair damage to building.

D. When area is proven watertight, drain water and remove dam.

3.06 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION
SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, and underside of floor slabs.
B. Batt insulation and vapor retarder in exterior wall and ceiling construction.
C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS
A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
B. Section 05 4000 - Cold-Formed Metal Framing: Board insulation as wall sheathing.
C. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
D. Section 07 2400 - Exterior Insulation and Finish Systems: Board insulation on exterior side of walls, finished with weatherproof coating.
E. Section 07240 - EIFS: Rigid insulation board as part of exterior insulation and finish system.
F. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
G. Section 07 5400 - Thermoplastic Membrane Roofing: Installation requirements for board insulation over low slope roof deck specified in this section.
H. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
I. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

1.06 SEQUENCING
A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

1.07 COORDINATION
A. Coordinate the work with Section 07 2500 for installation of vapor retarder.
PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
4. R-value; 1 inch of material at 72 degrees F: 5, minimum.
5. Board Size: 48 x 96 inch.
8. Total R-Value: 7.5
9. Manufacturers:

B. Polyisocyanurate Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289; Type I, aluminum foil both faces; Class 1, non-reinforced foam core.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
4. Compressive Strength: 16 psi
5. Board Size: 48 by 96 inch.
6. Board Thickness: 1 inch.
8. Manufacturers:
   a. Carlisle Coatings & Waterproofing, Inc; R2+ Matte: www.carlisleccw.com/sle.
   d. GAF; EnergyGuard Polyiso Insulation: www.gaf.com/sle.
9. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at General Contractor's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
5. Facing: Unfaced.
6. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
2. Manufacturers:
c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Acoustical Batt Insulation
1. Inorganic glass fiber batts with stapling flanges; 3-1/2" thickness with R-Value of 11; equal to products of CertainTeed, Owens Corning or other manufacturer meeting ASTM C665, Type II, Class C. Width of batts shall be as recommended by manufacturer for use with stud spacing shown on the Drawings.
2. Provide sound attenuation batt insulation at all walls surrounding toilet rooms, conference rooms, private offices and other areas indicated on the Drawings. Install same material over top of ceiling for a distance of 24" out from each face of the walls containing sound attenuation batts.

E. Thermal Batt Insulation
1. Inorganic glass fiber batts with Kraft facing and stapling flanges; 3-1/2" thickness with R-Value of 13, 6-1/4" thickness with R-Value of 19, 10" thickness with R-Value of 30 and other required thickness to be as close as possible to stud or joist depth; equal to products of CertainTeed, Owens Corning or other manufacturer meeting ASTM C665, Type II, Class C. Width of batts shall be as recommended by manufacturer for use with type of studs or joists and at stud or joist spacing shown on the Drawings.
2. Provide insulation at perimeter of windows and aluminum framing of the same material used in walls, stuffed in to fill the void between window or framing and the adjacent building construction.

2.03 ACCESSORIES
A. Sheet Vapor Retarder: Specified in Section 07 2500.
B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
C. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER
A. Install boards horizontally on foundation perimeter.
B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS
A. Install boards horizontally on walls.
B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION AT CAVITY WALLS
A. Install boards to fit snugly between wall ties.
B. Install boards horizontally on walls.
C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS
A. Place insulation under slabs on grade after base for slab has been compacted.
B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK
A. Installation of board insulation over low slope roof deck is specified in Section 07 5400.

3.07 BATT INSTALLATION
A. Install insulation in accordance with manufacturer's instructions.
B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

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

3.09 SCHEDULES
A. Perimeter Insulation: Extruded polystyrene, bead adhesive application, 1/2 inch thick protection board.
B. Cavity Wall Insulation: Semi-rigid glass fiber board, full bed vapor retarder adhesive, secured with impaling fasteners.
C. Metal Framed Wall Insulation: 4-inch fiberglass batts with integral vapor barrier, taped to metal studs.
D. Provide sound attenuation batt insulation at all walls surrounding toilet rooms, conference rooms, private offices and other areas indicated on the Drawings. Install same material over top of ceiling for a distance of 24" out from each face of the walls containing sound attenuation batts.
E. Provide Thermal Batt Insulation at perimeter of windows and aluminum framing of the same material used in walls, stuffed in to fill the void between window or framing and the adjacent building construction.

END OF SECTION
SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Foamed-in-place insulation.
   1. In masonry cavity walls.
   2. In exterior wall crevices.
   3. At junctions of dissimilar wall and roof materials.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.04 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.

1.05 FIELD CONDITIONS
A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Foamed-In-Place Insulation:
   5. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 MATERIALS
A. Foamed-In-Place Insulation: Low-density, flexible, open celled, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Aged Thermal Resistance: R-value of 3 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
   2. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf.
   3. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
B. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.

1. Aged Thermal Resistance: R-value of 5 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.

2. Water Vapor Permeance: Vapor retarder; 2 perm, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.

3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.

4. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf.

5. Closed Cell Content: At least 90 percent.

6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Patch damaged areas.

3.04 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite wall and soffit cladding of rigid insulation and reinforced finish coating ("Class PB").
B. Drainage and water-resistant barriers behind insulation board.
C. Incidental uses of same finish coating applied directly to concrete and masonry.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Sheathing on wood framing.
B. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
C. Section 07 6200 - Sheet Metal Flashing and Trim: Perimeter flashings.
D. Section 07 9200 - Joint Sealants: Sealing joints between EIFS and adjacent construction and penetrations through EIFS.
E. Section 07 9005 - Joint Sealers: Perimeter and penetration sealants.

1.03 REFERENCE STANDARDS

F. ASTM D1784 - Standard specification for rigid poly (vinyl chloride) (PVC) Compounds and chlorinated poly (vinyl chloride) (CPVC) compounds.
I. ASTM D2898 Method B - Weathering; UV Exposure.
L. ASTM E96 - Procedure B - Vapor permeable.
P. ASTM E1233 Procedure A - Structural performance.
Q. ASTM E2178 - Air Permeance
R. ASTM E 2568 - Standard specification for PB exterior and insulation and finish system.
S. ASTM E 2570 - Permeability of water resistant barriers.
1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
C. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.
D. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.
E. Affidavits:
   1. Where mandated by code, provide affidavits from EFIS and sealant applicators confirming full compliance to all manufacturers application requirements.
F. Close Out Submittal Requirements: submit with warranty, copies of all "Field Inspection Reports" from EFIS manufacturing representative and letter from approved EFIS manufacturer confirming the following:
   1. The EFIS as installed has been tested per Code requirements and does not effect the fire rating of the exterior wall assemble.
   2. The EFIS application and installation had been inspected by the manufacturing representative and are confirmed to be in full compliance with manufacturers minimum application requirements.
   3. The specific brand and type of sealants used on this project are compatible with the correctly installed in conjunction with the approved EFIS. Document to also list the approved sealant manufacturer.

1.05 QUALITY ASSURANCE
A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.
B. EIFS installation shall meet the applicable requirements of 1408.4.1, 1403.6, 1404.2 of the Florida Building Code.

C. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
   1. Member in good standing of EIMA (EIFS Industry Members Association).
   2. Manufacturer of EIFS products for not less than 5 years.

D. The applicator, fabricator and insulation Board Manufacturer shall be approved by the manufacturer in writing on company letter head. Attach letter to warranty.

E. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

F. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience ______.

1.06 MOCK-UP

A. Construct mock-up of typical EIFS application on specified substrate, size as indicated on drawings, and including flashings, joints, and edge conditions.

B. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

B. Storage: Store materials as directed by manufacturer's written instructions.

1.08 FIELD CONDITIONS

A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.

B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.

C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.

D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty as follows:
   1. Provide a 10 year limited warranty on the labor and materials associated with the EFIS System. This warranty is exclusive of flasings.
      a. This warranty is assignable.
      b. This install shall provide an 2 year warranty for all workmanship related to EFIS application.
   2. Work is warranted against:
      a. Material defects, including, but not limited to, peeling, cracking, delamination, flaking, or similar problems.
      b. Seepage and leakage of water or excessive moisture into the building or wall cavities through the system. EFIS to EFIS and EFIS to disimilar sealer joints.
   3. Inspection:
      a. The manufacturer shall provide a final inspection at the completion of application of the system including all contiguous sealant joints in writing for compliance with all manufacturers requirements and shall be attached to warranty.

C. Provide separate warranty from installer covering labor for repairs or replacement for a period of not less than 5 years.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Other Acceptable Manufacturers:
   2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. Exterior Insulation and Finish System: DRAINAGE type; reinforced finish coating on flat-backed insulation board adhesive-applied directly to water-resistive coating over substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate(s) in tested samples.

B. See Current ICC Evaluation Service Report or contact EIFS manufacturer's technical department for design wind loads.

C. Fire Characteristics:
   1. Flammability: Pass, when tested in accordance with NFPA 285.
   2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
   3. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.

D. Adhesion of Water-Resistive Coating to Substrate: For each combination of coating and substrate, minimum flatwise tensile bond strength of 15 psi, when tested in accordance with ASTM C297/C297M.

E. Acceptable Substrates: Exterior grade gypsum sheathing meeting ASTM C1396, exterior grade gypsum sheathing with water resistive core and fiberglass matt facing meeting ASTM C1177, exterior fiber reinforced cement boards, APA exterior or exposure 1 fire-retardent treated (FRT) plywood, Grade C-D or better, nominal 1/2" minimum thickness, unglazed brick, concrete or masonry. All substrates to meet the requirements of Chapter 16 of the Florida Building Code.

F. Deflection of substrate system shall not exceed 1/240 times the span.

G. The slope of inclined surfaces shall not be less than 6:12, and the length shall not exceed 12”.

H. All areas requiring impact resistance classification higher than "standard", as defined by ASTM E2486, shall be as detailed in the manufacturer's standard detail drawings, and described in the contract documents.

I. Expansion Joints: Design and location of expansion joints in the Dryvit Outsulation Plus MD System; expansion joints shall be located where structural expansion joints occur, where expansion joints occur in the substrate, at floor lines in wood frame construction, at floor lines in other types of construction where significant movement is expected. where the EIFS system abuts dissimilar materials, where the substrate changes, and in continuous elevations not to exceed 75 feet apart.

J. Terminations: Wall openings shall be treated with Dryvit Aquaflash System or flashing tape. Refer to Dryvit standard details

K. Dryvit Outsulation Plus MD system shall be held a minimum of 8" above finished grade.

L. Sealants: sealants shall be as approved by the EIFS manufacturer, and shall be compatible with Outsulation Plus materials. Sealant backer rods shall be made of closed cell foam.

M. Flashing: Shall be provided at all roof/wall intersections, windows, doors, chimneys, decks, balconies, and other areas as required to prevent water penetration of the EIFS system.

N. Adhesion to Water-Resistive Coating: For each combination of insulation board and substrate, when tested in accordance with ASTM C297/C297M, maximum adhesive failure of 25 percent unless flatwise tensile bond strength exceeds 15 psi in all samples.
O. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 2.86 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.

P. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E2273 for 75 minutes.

Q. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.

R. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.

S. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 60 cycles, when tested in accordance with EIMA 101.01.

T. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycle 1, 5, or 9.

U. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.

V. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.

W. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

X. Impact Resistance: No cracking or denting when tested in accordance with ASTM E695 with a 30 pound impact mass.

2.03 MATERIALS

A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Texture: Medium.
   2. Color: As indicated on drawings.

B. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh.

C. Air / water resistive barrier components; dryvit Backstop NT; flexible polymer based noncementitious water resistive and air barrier coating.

D. Grid tape; open weave fiberglass mesh tape with pressure sensitive adhesive strips.

E. Dryvit AP adhesive; moisture cure, urethane based adhesive used to adhere drainage strips and drainage track.

F. Drainage Track; UV treated PVC "J" track perforated with weep holes, complying with ASTM D1784.

G. Drainage Strip; Corrugated plastic sheet that allows drainage.

H. Adhesives; Used to adhere EPS to the air-water barrier, shall be compatible with the water resistive barrier and the EPS foam board. Cementitious: liquid polymer based, field mixed. Ready mixed: dry-blend cementitious, co-polymer based product.
I. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.

J. Insulation Board: Molded expanded polystyrene (EPS) board insulation, ASTM C578, Type XI, with the following characteristics:
   1. Grooved Board: Back side of board adjacent to sheathing grooved with vertical channels designed to allow moisture to drain; at drainage points provide board configuration that permits drainage to the exterior.
   2. Board Thickness: minimum of 1 inches.
   4. Thermal Resistance (R factor per 1 inch (25.4 mm)) at 75 degrees F: 3.60.
   5. Manufacturer: as approved by Dryvit, Inc..

K. Water-Resistive Barrier Coating: Dryvit Backstop NT, spray applied, polymer based coating.

2.04 ACCESSORY MATERIALS
   A. Insulation Adhesive: Type required by EIFS manufacturer for project substrate.
   B. Metal Flashings: As specified in Section 07 6200.
   C. Trim: EIFS manufacturer's standard PVC or galvanized steel trim accessories, as required for a complete project and including starter track and drainage accessories.
   D. Dryvit Drainage track and Drainage Strip.
   E. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer.

PART 3 EXECUTION
3.01 GENERAL
   A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
   B. Where different requirements appear in either document, comply with the most stringent.
   C. Neither of these documents supercedes the provisions of the Contract Documents that define the contractual relationships between the parties or the scope of work.

3.02 EXAMINATION
   A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.
   B. If paper-faced gypsum sheathing has been exposed to weather for more than 30 days, check for integrity of surface using method specified in ASTM C1397 Annex A2, at minimum of two locations or once every 5000 sq ft, whichever is greater; if any test fails, notify River Street Architecture, LLC and do not begin installation.
   C. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.
   D. Verify that all required flashings and waterproofing have been installed in the appropriate locations, and per the EIFS manufacturer's requirements.

3.03 PREPARATION
   A. Apply primer to substrate as recommended by EIFS manufacturer for project conditions.
   B. Outsulation Plus MD materials shall be protected by permanent or temporary means from inclement weather and other sources of damage.
   C. Protect adjoining work and property during installation.
3.04 INSTALLATION - WATER-RESISTIVE BARRIER
   A. The system shall be installed per Dryvit Outsulation Plus MD, system application instructions DS218.
   B. Seal substrate transitions and intersections with other materials to form continuous water-resistive barrier on exterior of sheathing, using method recommended by manufacturer.
   C. The overall minimum base coat thickness shall be sufficient to fully imbed the mesh. Apply the base coat in two (2) passes.
   D. Sealant shall not be applied directly to textured finishes or base coat surfaces.
   E. High Impact meshes shall be installed as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage.
   F. At door and window rough openings and other wall penetrations, seal water-resistive barrier and flexible flashings to rough opening before installation of metal flashings, sills, or frames, using method recommended by manufacturer.
   G. At moving expansion joints, apply flexible flashing or flashing tape across and recessed into joint with U-loop forming continuous barrier but allowing movement.
   H. Lap flexible flashing or flashing tape at least 2 inches on each side of joint or transition.

3.05 INSTALLATION - GENERAL
   A. Install in accordance with manufacturer’s instructions and requirements and recommendations of EIMA Guideline Specification For Exterior Insulation and Finish Systems, Class PB.
   B. Install vent assemblies as recommended by EIFS manufacturer.
   C. Accessories: Install starter track, back-wrap mesh or edge-wrap mesh at system terminations and other accessories as recommended by EIFS manufacturer, assuring that track is level and securely fastened.

3.06 INSTALLATION - INSULATION
   A. Install in accordance with manufacturer’s instructions.
   B. Prior to installation of boards, install starter track and other trim level and plumb and securely fastened. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.
   C. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.
   D. On wall surfaces, install boards horizontally. On horizontal surfaces, install boards _______.
   E. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.
   F. Fill gaps greater than 1/16 inch with strips or shims cut from the same insulation material.
   G. Rasp irregularities off surface of installed insulation board.
   H. Adhesive Attachment: Use method recommended by EIFS manufacturer.

3.07 INSTALLATION - CLASS PB FINISH
   A. Install trim as indicated. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.
   B. Install expansion joints at floor lines as recommended by EIFS manufacturer.
   C. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.
   D. Finish Coat Thickness: As recommended by manufacturer.
   E. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.
F. Apply sealant at finish perimeter and expansion joints in accordance with Section 07 9005.

3.08 FINAL INSPECTION
A. EIFS manufacturer shall make final inspection of installed product and advise the general contractor that the system has been installed in conformance with the manufacturers specifications and provide letter of compliance to be attached to warranty.

3.09 CLEANING
A. Do not permit finish surface to become soiled or damaged.
B. Remove excess and waste EIFS materials from project site.
C. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.10 PROTECTION
A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION
SECTION 07 25 00
WEATHER BARRIER

1.1 SUMMARY
A. Section Includes

1. Wall sheathing with integral water-resistive barrier and air barrier.

1.2 REFERENCES
A. American Society of Mechanical Engineers (ASME): www.asme.org

1. ASME B18.6.1 - Wood Screws (Inch Series)


1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials
5. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies


1. DOC PS 2 - Performance Standard for Wood-Based Structural Panels

D. International Code Council (ICC): www.iccsafe.org

1. ICC IBC - International Building Code
2. ICC IRC - International Residential Code for One- and Two-Family Dwellings


1. ICC-ES AC38 - Acceptance Criteria for Weather-Resistive Barriers
2. ICC-ES AC116 - Acceptance Criteria for Nails and Spikes
3. ICC-ES AC148 - Acceptance Criteria For Flexible Flashing Materials
4. ICC-ES AC201 - Acceptance Criteria for Staples
5. ICC-ES AC310 - Acceptance Criteria for Water-Resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-Resistive Barriers
6. ICC-ES ESR-1539 - Power Driven Staples and Nails for Use in Engineered and Non-Engineered Connections
7. ICC-ES NER-272 - Power Driven Staples and Nails for Use in All Types of Building Construction

F. International Association of Plumbing and Mechanical Officials (IAPMO)

1. IAPMO ER365 (ZIP System Stretch Tape)

G. Sustainable Forestry Initiative (SFI): www.sfiprogram.org/
1. SFI 2010 - 2014 Standard

1.3 ACTION SUBMITTALS

A. Product Data: For each type of sheathing product specified.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: From ICC-ES, for wood sheathing and seam tape.

B. Product Certifications: From manufacturer, indicating that sheathing products comply with ICC-ES AC310.

C. Certified Wood Certificates: Certificates indicating that manufacturer is currently certified by an SFI- or FSC- accredited certification body, and chain-of-custody certificates indicating that sheathing products comply with forest certification requirements.

D. Florida Building Code Supplement: Submit documentation indicating that products comply with requirements of Florida Building Code.

1.5 CLOSEOUT SUBMITTALS

A. Warranty: Executed copy of manufacturer special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide wood products from manufacturer certified by SFI, FSC, or comparable sustainable forestry program acceptable to Architect.

B. Provide wall sheathing products meeting requirements for water-resistive barrier in accordance with ICC-ES AC310.

C. Florida Building Code Compliance: Provide sheathing complying with Florida Building Code product and installation requirements for locations outside of high velocity wind zone.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for protection of sheathing products from weather prior to installation.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which sheathing manufacturer agrees to repair or replace sheathing products that demonstrate deterioration or failure under normal use due to manufacturing defects within warranty period specified, when installed according to manufacturer's instructions.

1. Warranty Period for Sheathing Products: [30] years following date of Substantial Completion.
2. Warranty Conditions: Special warranties exclude deterioration or failure due to structural movement resulting in stresses on sheathing products exceeding manufacturer's written specifications, or due to air or moisture infiltration resulting from cladding failure or mechanical damage.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Provide weather barrier sheathing products manufactured by Huber Engineered Woods LLC, Charlotte NC; Phone: (800) 933-9220; Website: www.huberwood.com;

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. Fire-Resistance Ratings: Where indicated, provide assemblies tested for fire resistance per ASTM E119.

B. Air-Barrier Assembly Air Leakage: Less than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 Pa), per ASTM E2357.

C. Air-Barrier Material: Less than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 Pa), per ASTM E2178.

D. Water-Vapor Permeance, Facer: Minimum 12 perms (689 ng/Pa x s x sq. m), ASTM E96/E96M.

E. Weather Exposure: Manufacturer warranty applies for maximum allowable exposure period of 180 days.

2.3 WOOD PANEL PRODUCTS

A. Single Source Limitations: Provide wall sheathing/weather barrier by a single manufacturer.

B. Oriented Strand Board: DOC PS 2, made with binder containing no added urea formaldehyde.

2.4 WALL SHEATHING WITH INTEGRAL WATER-RESISTIVE BARRIER AND AIR BARRIER

A. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing with factory-laminated water-resistive barrier facer with printed fastener location symbols.

   2. Span Rating, Panel Grade and Performance Category: Not less than [24/16; Rated Sheathing; 7/16 Performance Category] [24/16; Structural 1; 7/16 Performance Category] [32/16; Structural 1; 1/2 Performance Category] [40/20; Structural 1; 5/8 Performance Category].
   3. Edge Profile: [Square edge] [Self-spacing].
   4. Weather Barrier Facer: Medium-density, phenolic-impregnated sheet material qualifying as a Grade D weather-resistive barrier in accordance with ICC-ES AC38.
      a. Provide fastener spacing symbols on facer for 16-inch (406 mm) and 24-inch (610 mm) on center spacing.

2.5 FASTENERS

A. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
1. Corrosion Resistance: [Hot-dip zinc coating, ASTM A153/A153M] [or] [Type 304 stainless steel].


2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIAL

A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting ICC-ES AC148, and tested as part of an assembly meeting performance requirements.

2. Thickness: 0.012 inch (0.3 mm).

B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polyether (STPE) liquid flashing membrane compatible with sheathing/weather barrier and self-adhering seam and flashing tape, and tested as part of an assembly meeting performance requirements. Follow manufacturer’s recommendation for integration with ZIP System Tape.


C. Self-Adhering Flexible Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting ICC-ES AC148, and tested as part of an assembly meeting performance requirements.

2. Thickness: 0.042 inch (1.067 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing spacing and alignment to determine if work is ready to receive sheathing. Proceed with sheathing work once conditions meet requirements.

3.2 SHEATHING INSTALLATION

A. Install sheathing panels in accordance with manufacturer’s written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.

B. Air and Moisture Barrier: Coordinate sheathing installation with flashing and joint sealant sequencing and installation and with adjacent building air and moisture barrier components to provide complete, continuous air- and moisture- barrier.

C. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports.

D. Install panels with laminated facer to exterior. Stagger end joints of adjacent panel runs. Support all panel edges.
1. Space square-edged panels 0.125 inch (3 mm).
2. Butt edges of self-spacing edge panels.

E. Attach sheathing panels securely to substrate with manufacturer-approved fasteners in compliance with the following:

1. ICC-ES ESR-1539 or ICC-NES NER-272 for power-driven fasteners.
2. IBC: Table 2304.9.1 Fastening Schedule.

F. Apply ZIP System tape at all panel seams, penetrations, and facer defects or cracks to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.

G. Apply liquid-applied flashing membrane at penetrations, gaps, and cracks to form continuous weathertight surface. Apply liquid membrane according to manufacturer's written instructions. Follow manufacturer's recommendation for integration with ZIP System Tape.

G.H. Apply ZIP System Stretch Tape around window and window frames, door frames, radius fenestrations and wall penetrations to form continuous weathertight surface. Apply tape according to manufacturer’s written instructions and requirements of IAPMO ER365 applicable to tape application.

END OF SECTION
PART 1 · GENERAL

1.1 SECTION INCLUDES

A. Exterior solid phenolic cladding panel system and accessories as required for a complete drained and back-ventilated rainscreen system.
   1. Wall panels.
   2. Fascia.
   3. Horizontal soffits.
   4. Storefront panels.

B. Interior solid phenolic cladding panel system and accessories.

1.2 RELATED SECTIONS

A. Section 05 50 00 - Metal Fabrications; additional sub framing, Z girts to accommodate exterior insulation is not in the scope of Section 07 42 33.

B. Section 07 20 00 - Insulation; exterior insulation, if required for NFPA 285 compliance, is not included in the scope of Section 07 42 33.

C. Section 08 41 00 - Entrances and Storefronts.

D. Section 08 44 12 - Metal Framed Curtain Wall*.

E. Section 09 29 00 - Gypsum Board.

1.3 REFERENCES

A. ASTM International (ASTM):

B. European Standards (EN):
   1. EN 438-2 - Decorative High Pressure Laminate (HPL) Sheets Based on Thermosetting Resins - Determination of Properties.

C. International Organization for Standardization (ISO):
   2. ISO 178 - Determination of Flexural Properties.
   3. ISO 527-3 - Determination of Tensile Properties.

D. National Fire Protection Association (NFPA):

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.
B. Product Data: Manufacturer’s data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Submit plan, section, elevation and perspective drawings necessary to describe and convey the layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colors, patterns and textures.

D. Code Compliance: Documents showing product compliance with local building code shall be submitted prior to the bid. These documents shall include, but not be limited to, appropriate Evaluation Reports and/or test reports supporting the use of the product. Alternate materials must be approved by the architect of record prior to the bid date.

E. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachments system meets the wind load requirements for the project.

F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer’s full range of available colors and patterns. Please note that samples are only representative for color and pattern and not for thickness or edge finish. Metallic colors may also show a slight fluctuation in appearance due to the metal flake orientation from batch to batch.

G. Verification Samples: For each finish product specified, two samples a minimum of 3.5 inches by 3.5 inches (89 mm by 89 mm) representing actual product, color, and patterns. Sample edges may vary from field panel edges.

H. Operation and Maintenance Data: Submit operation, maintenance, and cleaning information for products covered under this section.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary panel products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
   1. Products covered under the Work listed in this section are to be manufactured in an ISO 9001 certified facility.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained and approved by the manufacturer or representative.

C. Manufacturer’s Field Services: Upon Owner’s request, provide manufacturer’s field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer’s instructions.

D. Mock-Up: Provide a mock-up for evaluation of the product and application workmanship.
   1. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

E. Pre-installation Meetings: Conduct pre-installation conference to verify project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. During transportation, use stable, flat pallets that are at least the same dimension as the sheets.
   2. Materials shall be packaged to minimize or eliminate the possibility of damage during shipping. Items such as wooden side boards, wooden lid, and spacers or protective sheeting between panels shall be used to protect the panels from surface and/or edge damage.

B. Storage:
   1. Store products in an enclosed area protected from direct sunlight, moisture and heat. Maintain a consistent temperature and humidity.
   2. Store products in manufacturer’s unopened packaging until ready for installation.
   3. Stack panels using protective dividers to avoid damage to decorative surface.
   4. For horizontal storage, store sheets on pallets of equal or greater size as the sheets with a protective layer between the pallet and sheet and on top of the uppermost sheet.
   5. Do not store sheets, or fabricated panels vertically.

C. Handling:
   1. Remove protective film within 24 hours of the panels being removed from the pallet.
   2. When moving sheets, lift evenly to avoid dragging panels across each other and scratching the decorative surface.
   3. Remove all labels and stickers immediately after installation.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s absolute limits.

B. Field Measurements: Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. Recorded measurements to be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
1.8 WARRANTY

A. Warranty: At project closeout, provide manufacturer’s limited ten year warranty covering defects in materials. Warranty only available when material installed by an installation contractor trained and approved by the manufacturer’s representative.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Trespa International B.V.; P.O. Box 110, 6000 AC Weert Wetering 20, 6002 SM Weert The Netherlands; www.trespa.com.

B. Acceptable Manufacturer’s Representative: Trespa North America, Ltd.; 12267 Crosthwaite Cir, Poway, CA 92064. ASD. Toll Free Tel: (800) 4-TRESPA. Tel: (888) 679-2090. Fax: (858) 679-9568. Email: info.northamerica@trespa.com. Web: http://www.trespa.com/na.

C. Substitutions: Not permitted.

D. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 WALL PANELS

A. Solid Phenolic Wall Panels: Trespa Meteon by Trespa International as represented by Trespa North America, LTD.
1. Material: Solid panel manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogeneously reinforced with wood-based fibers and an integrated decorative surface or printed décor.
2. Color on Primary Face: _____ color with black reverse.
3. Color on Primary Face: _____ color with white reverse.
4. Color on Primary and Reverse Faces: _____ color on primary face and _____ color on reverse face.
5. Color: As selected by the Architect from manufacturer’s standard color palette.
11. Panel Thickness: 3/8 inch (10 mm).
12. Panel Thickness: 1/2 inch (13 mm).
13. Panel Thickness: As indicated on the Drawings.

14. Physical Properties:
   a. Modulus of Elasticity: 1,300,000 psi (9000 N/mm2) minimum, ISO 178.
   b. Tensile Strength: 10,100 psi (70 N/mm2) minimum, ISO 527-2.
   c. Flexural Strength: 14,500psi (120 N/mm2) minimum, ISO 178.
   d. Thermal Conductivity: 2.1 BTU/inch/ft2/hr•°F, EN 12524.
   e. Structural Performance (ASTM E330):
      1) Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 15 pounds per square foot (psf). Wind load testing shall be done in accordance with this standard to obtain the following results:
      2) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/175
      3) Normal to the plane of the wall between supports, deflection of the aluminum sub-framing members shall not exceed L/175 or 3/4 inch, whichever is less
         a) At 1-1/2 times design pressure, permanent deflection of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion.
         b) If system tests are not available, mock ups shall be constructed and tests performed under the direction of an independent third party laboratory which show compliance to the minimum standards listed above.
   f. Fire Performance:
      a. Flame Spread: Class A, ASTM E 84.
      b. Smoke Development: Less than 450, ASTM E 84.
      c. Ignition Temperature: Greater than 650 degree F (350 degree C) above ambient, ASTM D1929.
      d. Burning Classification: CC1 or CC2, ASTM D635.
      e. When required for compliance with local building codes, the wall cladding assembly shall show no degradation of the rating of Fire Resistant Assemblies, ASTM E119.
      f. When required for compliance with local building codes, the wall cladding assembly including cladding and non-cladding elements such as, but not limited to, specific weather resistive barriers and/or exterior insulation materials, shall meet the performance requirements of NFPA 285. Performance shall be determined by actual testing in accordance with NFPA 285 or through an equivalency analysis provided by a recognized fire protection expert.
      g. When required for compliance with local building codes, the wall cladding assembly shall not ignite when exposed to a radiant heat energy source, NFPA 268.
   g. Finish Performance: Electron Beam Cure resin in conformance with the following general requirements:
      a. Color: As selected by the architect/engineer from manufacturer’s standard colors or a custom color to be matched by the panel supplier.
      b. Humidity Resistance: No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100 degree F (38 degree C) for 3000 hours, ASTM D 2247.
      c. Salt Spray Resistance: Corrosion creepage from scribe line (1/16 inch (1.6 mm) max.) and minimum blister rating of 8 within the test specimen field, ASTM B117.
2.3 FABRICATION

A. Panels: Solid phenolic impregnated kraft paper wall panels with no voids, air spaces or foamed insulation in the core material. Accessory items in accordance with manufacturer’s recommendations and approved submittals

B. Panel Weight: 8 mm (2.4 lb/ft²), 10 mm (3 lb/ft²), 13 mm (3.8 lb/ft²).

C. Panel Bow: = 2 mm / m (= 0.079 inch/39.38 inches).

D. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.

E. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Surfaces to receive panels shall be even, smooth, dry, and free from defects detrimental to the installation of the panel system. Notify Contractor in writing of conditions detrimental to proper and timely completion of the work.

C. Confirm exterior sheathing is plumb and level, with no deflection greater than 1/4 inch (6 mm) in 20 feet (6096 mm).

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
3.3 INSTALLATION
A. Install solid phenolic wall panels and sub-frame system in accordance with manufacturer’s instructions.
B. Install solid phenolic wall panels plumb and level and accurately spaced in accordance with manufacturer’s recommendations and approved submittals and drawings.
C. Anchor panels and sub-framing securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary movement and structural support.
D. Fasten solid phenolic wall panels with fasteners approved for use with supporting substrate.
E. Do not install panels or component parts which are observed to be defective or damaged including, but not limited to: warped, bowed, abraded, scratched, and broken members.
F. Do not cut or trim component parts during installation in a manner that would damage the finish, decrease the strength, or result in visual imperfection or a failure in performance. Return component parts with require alteration to the shop for re-fabrication or replacement.
G. Install corner profiles and trim with fasteners appropriate for use with adjoining construction as indicated on the Contract Drawings and as recommended by manufacturer.

3.4 ADJUSTING AND CLEANING
A. Remove masking or panel protection as soon as possible after installation. Any masking intentionally left in place after panel installation on an elevation, shall become the responsibility of the General Contractor to remove.
B. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.
C. Repair panels with minor damage. Remove and replace panels damaged beyond repair as a direct result of the panel installation.
D. Clean finished surfaces as recommended by panel manufacturer. After installation cleaning, cleaning during construction shall become the responsibility of the General Contractor.

END OF SECTION
SECTION 07 5400
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered system with thermoplastic roofing membrane.
B. Insulation, flat and tapered.
C. Vapor retarder.
D. Recovery Board
E. Roofing cant strips, stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood nailers and curbs.
B. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings, reglets and ________.
C. Section 07 7200 - Roof Accessories: Roof-mounted units; prefabricated curbs.
D. Section 22 1006 - Plumbing Piping Specialties: Roof drains.

1.03 REFERENCE STANDARDS

F. ASTM G152, G153, G154, G155
G. ASTM D3746, D4272
H. CGSB 37-GP-52M
I. FM 4450, 4454 (Insulation)
J. UL 263, UL1256 (Insulation)
K. ASTM E 119 (Insulation)
L. ASTM C 1289 (Insulation)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.
1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, fasteners, and adhesives.
   C. Specimen Warranty: For approval.
   D. Warranty:
      1. Submit manufacturer warranty and ensure that forms have been completed in Kana Hotel Group's name and registered with manufacturer.
      2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

1.06 QUALITY ASSURANCE
   A. Perform work in accordance with NRCA ML104.
   B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING
   A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
   B. Store products in weather protected environment, clear of ground and moisture.
   C. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS
   A. Do not apply roofing membrane during unsuitable weather.
   B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
   C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY
   A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
   B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 5 years after installation.
   C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
      1. Warranty Term: 20 years.
      2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Thermoplastic Polyolefin (TPO) Membrane Materials:
      2. Flex Membrane International Corporation; Flex TPO Plus: www.flexroofingsystems.com/sle.
      6. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   B. Insulation:
      2. GAF; _____: www.gaf.com/sle.
5. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 ROOFING - UNBALLASTED APPLICATIONS
A. Thermoplastic Membrane Roofing: One ply membrane, mechanically fastened, over insulation.
B. Roofing Assembly Requirements:
   1. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value.
      b. Field applied coating may not be used to achieve specified SRI.
   2. Insulation Thermal Value (R), minimum: 20; provide insulation of thickness required.
C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
   1. Minimum 2 layers of polyisocyanurate or extruded polystyrene board.
   2. Bottom layer of polyisocyanurate or extruded polystyrene board covered with single layer of cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, or composite board.
D. Acceptable Insulation Types - Tapered Application: ____
   1. Tapered polyisocyanurate or extruded polystyrene board.
   2. Tapered polyisocyanurate or extruded polystyrene board covered with uniform thickness cellulose, perlite, molded polystyrene, polyisocyanurate, glass fiber, extruded polystyrene, or composite board.
   3. Uniform thickness polyisocyanurate or extruded polystyrene board covered with tapered polyisocyanurate or extruded polystyrene board.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS
A. Membrane:
   1. Material: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M.
   3. Thickness: 0.045 inch, minimum.
   4. Sheet Width: Factory fabricated into largest sheets possible.
   5. Solar Reflectance: 0.75, minimum, initial, and 0.65, minimum, 3-year, certified by Cool Roof Rating Council.
B. Seaming Materials: As recommended by membrane manufacturer.
C. Membrane Fasteners: As recommended and approved by membrane manufacturer.
D. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.
   1. Fire-retardant adhesive.
E. Vapor Retarder: Reinforced Kraft paper laminate complying with requirements of fire rating classification; compatible with roofing and insulation materials.
   1. Fire-retardant adhesive.
F. Flexible Flashing Material: Same material as membrane.

2.04 DECK SHEATHING AND COVER BOARDS
A. Deck Sheathing and Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/2 inch thick.
   1. Manufacturers:
c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.05 INSULATION

A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type I, aluminum foil both faces; Class 1, non-reinforced foam core and with the following characteristics:
   1. Compressive Strength: 16 psi.
   2. Board Thickness: 1.5 inch.
   3. Tapered Board: Slope as indicated; minimum thickness ____ inch; fabricate of fewest layers possible.
   4. Manufacturers:
      b. GAF; EnergyGuard Ultra PolyIso Tapered Insulation: www.gaf.com/sle.
      c. Versico, a division of Carlisle Construction Materials, Inc; SecurShield Insulation: www.versico.com/sle.
   5. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.06 ACCESSORIES

A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed-cell foam backing seamed to galvanized steel flanges.
B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
C. Cant Strips: Wood; pressure preservative treated.
D. Sheathing Adhesive: Non-combustible type, for adhering gypsum sheathing to metal deck.
E. Sheathing Joint Tape: Paper type, ____ inch wide, self adhering.
F. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
G. Membrane Adhesive: As recommended by membrane manufacturer.
H. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
I. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
J. Sealants: As recommended by membrane manufacturer.
K. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
   2. Size: 18 by 18 inch.
   3. Surface Color: White or yellow.
   4. Manufacturers:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Perform work in accordance with NRCA ML104 and manufacturer's instructions.
B. Do not apply roofing membrane during unsuitable weather.
C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

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

3.03 WOOD DECK PREPARATION
A. Verify flatness and tightness of joints of wood decking. Fill knot holes with latex filler.
B. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.04 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE
A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
   1. Extend vapor retarder under cant strips and blocking to deck edge.
   2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.
C. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
E. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
F. Do not apply more insulation than can be covered with membrane in same day.

3.05 MEMBRANE APPLICATION
A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
B. Shingle joints on sloped substrate in direction of drainage.
C. Fully Adhered Application: Apply adhesive to substrate at rate of ____ gal/square. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
D. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strips.
E. Around roof penetrations, seal flanges and flashings with flexible flashing.
F. Install roofing expansion joints where indicated. Make joints watertight.
   1. Install prefabricated joint components in accordance with manufacturer's instructions.
G. Coordinate installation of roof drains and sumps and related flashings.

3.06 CLEANING
A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
B. Remove bituminous markings from finished surfaces.
C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
D. Repair or replace defaced or damaged finishes caused by work of this section.

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

END OF SECTION
SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Fabricated sheet metal items, including flashings and counterflashings.
B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS
A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
B. Section 06 1054 - Wood Blocking and Curbing: Wood blocking and battens for metal roofing substrate profiles.
C. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs.
D. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.
E. Section 07 7234 - Roof Hatches and Smoke Vents: Metal curbs.
F. Section 07 9005 - Joint Sealers.
G. Section 09 9000 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE
A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS
2.01 SHEET MATERIALS
A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage (0.0239 inch) thick base metal.
B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

C. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.032 inch thick; plain finish shop pre-coated with fluoropolymer coating of color as selected.
   1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

D. Terne Coated Steel: 28 gage (0.0149 inch) thick copper bearing carbon steel core material with 0.092 lb/sq ft terne alloy coating on both sides of core metal.

E. Lead Coated Copper: ASTM B101, 24 (7320) ounce-weight of bare copper, HOO (cold-rolled) temper.

2.02 ACCESSORIES
A. Fasteners: Galvanized steel, with soft neoprene washers.
B. Underlayment: Polyethylene, 6 mils thick.
C. Primer: Zinc chromate type.
D. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.
E. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.
F. Plastic Cement: ASTM D4586/D4586M, Type I.

2.03 FABRICATION
A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Form pieces in longest possible lengths.
C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION
A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
B. Apply plastic cement compound between metal flashings and felt flashings.
C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
3.03 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for field inspection requirements.

END OF SECTION
PART 1  GENERAL

1.01 SECTION INCLUDES
A. Manufactured curbs, equipment rails, and pedestals.
B. Roof hatches.

1.02 RELATED REQUIREMENTS
A. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
B. Section 07 7100 - Roof Specialties: Other manufactured roof items.

1.03 REFERENCE STANDARDS
A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.
C. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Kana Hotel Group's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store products under cover and elevated above grade.

1.06 WARRANTY
A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.

PART 2  PRODUCTS

2.01 MANUFACTURED CURBS
A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
   Factory-assembled hollow sheet metal construction with fully mitered and welded corners, internal reinforcing, and top side and edges formed to shed water.
   1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 : G60 coating designation; 18 gage, 0.048 inch thick.
   2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches.
   3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
   4. Provide the layouts and configurations shown on the drawings.
C. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches square unless otherwise indicated.
   1. Height Above Finished Roof Surface: 6 inches, minimum.
   2. Height Above Roof Deck: 14 inches, minimum.

2.02 ROOF HATCHES
A. Manufacturers - Roof Hatches:
   1. Bilco Co.: www.bilco.com
4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Roof Hatches and Smoke Vents, General: Factory-assembled steel frame and cover, complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting on flat roof deck.
   5. For Stair Access: Single leaf; 30 by 96 inches.

C. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
   1. Material: Galvanized steel, 14 gage, 0.0747 inch thick.
   3. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
   4. Curb Height: 12 inches from finished surface of roof, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
   1. Capable of supporting 40 psf live load.
   2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
   4. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
   5. Gasket: Neoprene, continuous around cover perimeter.

E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
   1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
   2. Hinges: Heavy duty pintle type.
   3. Hold open arm with vinyl-coated handle for manual release.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Do not begin installation until substrates have been properly prepared.
   B. If substrate preparation is the responsibility of another installer, notify River Street Architecture, LLC of unsatisfactory preparation before proceeding.

3.02 PREPARATION
   A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
   A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

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

3.05 PROTECTION
   A. Clean installed work to like-new condition.
   B. Protect installed products until completion of project.
C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION
SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Firestopping systems.
   B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS
   A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.
   B. Section 07 8100 - Applied Fireproofing.
   C. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS
   C. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014.
   E. ITS (DIR) - Directory of Listed Products; current edition.
   H. FA (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.

1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on product characteristics.
   C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

1.05 QUALITY ASSURANCE
   A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
      1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
   C. Installer Qualifications: Company specializing in performing the work of this section and:
      1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
      2. With minimum 3 years documented experience installing work of this type.
      3. Approved by firestopping manufacturer.

1.06 FIELD CONDITIONS
   A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
   B. Provide ventilation in areas where solvent-cured materials are being installed.
PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

A. Manufacturers:
   2. 3M Fire Protection Products: www.3m.com/firestop.
   5. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Firestopping: Any material meeting requirements.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

D. Fire Ratings: Refer to drawings for required systems and ratings.

2.02 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use any system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814 or ASTM E119 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

B. Temporary Firestopping: Reusable intumescent shapes; UL Design No. _____, F Rating 1-1/2 hour; provide at locations indicated on drawings.

2.03 MATERIALS

A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Color: Black, dark gray, or red.
   3. Manufacturers:
      b. 3M Fire Protection Products: www.3m.com/firestop.
      d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Foam Firestopping: Single component silicone foam compound; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Color: Dark grey.
   3. Manufacturers:
      a. 3M Fire Protection Products: www.3m.com/firestop.
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Manufacturers:
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
   1. Durability and Longevity: Permanent.
   2. Manufacturers:
d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

E. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
   1. Durability and Longevity: Permanent; suitable for pedestrian traffic.
   2. Manufacturers:
      a. 3M Fire Protection Products: www.3m.com/firestop.
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

F. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
   1. Potential Expansion: Minimum 1000 percent.
   2. Manufacturers:
      a. 3M Fire Protection Products; Product Fire Barrier Caulk CP25WB+: www.3m.com/firestop.
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

G. Reusable Firestopping: Removable intumescent compressible shapes, pillows, or blocks specifically tested in removable configuration; conforming to the following:
   1. Manufacturers:
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

H. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

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

3.02 PREPARATION
   A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
   B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION
   A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
   B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 FIELD QUALITY CONTROL
   B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING
   A. Clean adjacent surfaces of firestopping materials.
3.06 PROTECTION
   A. Clean adjacent surfaces of firestopping materials.
   B. Protect adjacent surfaces from damage by material installation.

END OF SECTION
SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Nonsag gunnable joint sealants.
B. Self-leveling pourable joint sealants.
C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS
A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
B. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
C. Section 07 8400 - Firestopping: Firestopping sealants.
D. Section 08 7100 - Door Hardware: Setting exterior door thresholds in sealant.
E. Section 08 8000 - Glazing: Glazing sealants and accessories.
F. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
G. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

E. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

F. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

1.05 QUALITY ASSURANCE

A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver to manufacturer sufficient samples for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

B. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
   1. Identification of testing agency.
   2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
      a. Test date.
      b. Copy of test method documents.
      c. Age of sealant upon date of testing.
      d. Test results, modeled after the sample form in the test method document.
      e. Indicate use of photographic record of test.

C. Field Adhesion Test Procedures:
   1. Allow sealants to fully cure as recommended by manufacturer before testing.
   2. Have a copy of the test method document available during tests.
   3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
   4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
   5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Kana Hotel Group.
   6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to River Street Architecture, LLC.

D. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
   1. Sample: At least 18 inch long.
   2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
B. Correct defective work within a five year period after Date of Substantial Completion.
C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
9. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
8. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, Type _____, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing; Type _____.
2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane “traffic-grade” sealant; Type ____.

C. Interior Joints: Use non-sag polyurethane sealant, Type _____, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant; Type ____.
2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion; Type ____.
3. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant; Type ____.
4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white; Type ____.
5. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant; Type ____.

2.03 JOINT SEALANTS - GENERAL
A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

2.04 NONSAG JOINT SEALANTS
A. Type 1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
5. Manufacturers:
   k. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Type 2 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
2. Manufacturers:
c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Type 3 - Tamper-Resistant, Silyl-Terminated Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 12-1/2 percent, minimum
2. Hardness Range: 50 to 60, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Manufacturers:
   c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Type 4 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
2. Color: Match adjacent finished surfaces.
3. Manufacturers:
   g. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com.
   i. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

E. Type 5 - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
1. Movement Capability: Plus and minus 35 percent, minimum.
2. Color: Match adjacent finished surfaces.
3. Manufacturers:
   c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

F. Type 6 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: Standard colors matching finished surfaces, Type OP (opaque).
2. Manufacturers:


k. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

G. Type 7 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING SEALANTS

A. Type 8 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.


2. Color: Color as selected.

3. Manufacturers:
   g. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Type 9 - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Composition: Multi-component, 100 percent solids by weight.

2. Hardness: Minimum of 85 (Shore A) or 35 (Shore D), when tested in accordance with ASTM D2240 after 7 days.

3. Color: To be selected by River Street Architecture, LLC from manufacturer's standard colors.


5. Manufacturers:
   d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.

2. Open Cell: 40 to 50 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
PART 3  EXECUTION

3.01  EXAMINATION

A. Verify that joints are ready to receive work.
B. Verify that backing materials are compatible with sealants.
C. Verify that backer rods are of the correct size.
D. Preinstallation Adhesion Testing: Install a sample for each test location shown in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify River Street Architecture, LLC of date and time that tests will be performed, at least 7 days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to River Street Architecture, LLC.
   5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02  PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.
B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03  INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
B. Perform installation in accordance with ASTM C1193.
C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
D. Install bond breaker backing tape where backer rod cannot be used.
E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04  FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION
SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Non-fire-rated hollow metal doors and frames.
B. Hollow metal frames for wood doors.
C. Fire-rated hollow metal doors and frames.
D. Thermally insulated hollow metal doors with frames.
E. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS
A. Section 08 7100 - Door Hardware.
B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
C. Section 09 9113 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS
D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
G. ITS (DIR) - Directory of Listed Products; current edition.
K. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.
L. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.
1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 DESIGN CRITERIA

A. Hollow Metal Panels: Same construction, performance, and finish as doors.
B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Type ____, Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   5. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer’s standard coating thickness.
   6. Weatherstripping: Refer to Section 08 7100.
B. Type ____, Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
C. Type ____, Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
b. Attach fire rating label to each fire rated unit.

3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures; with "S" label; if necessary, provide additional gasketing or edge sealing.

4. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, comply with air leakage requirements of UBC Std 7-2, Part II; with "S" label; if necessary, provide additional gasketing or edge sealing.

5. Core Material: Manufacturers standard core material/construction in compliance with requirements.


2.04 HOLLOW METAL FRAMES
A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. General:
1. Comply with the requirements of grade specified for corresponding door.
   a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.
   b. Frames for Sound-Rated Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.

2. Finish: Same as for door.

3. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

C. Exterior Door Frames: Knock-down type.
   1. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch, maximum, above floor at 45 degree angle.

E. Door Frames, Fire-Rated: Knock-down type.
   1. Fire Rating: Same as door, labeled.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

2.05 ACCESSORIES
A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.

B. Glazing: As specified in Section 08 8000, factory installed.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Astragals for Double Doors: Specified in Section 08 7100.

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

   1. Color: As indicated on drawings.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.
PART 3 EXECUTION

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

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

3.03 INSTALLATION
A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
B. Install fire rated units in accordance with NFPA 80.
C. Coordinate frame anchor placement with wall construction.
D. Coordinate installation of hardware.
E. Coordinate installation of glazing.
F. Coordinate installation of electrical connections to electrical hardware items.
G. Touch up damaged factory finishes.

3.04 ADJUSTING
A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE
A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION
SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Flush wood doors; flush configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS
A. Section 06 2000 - Finish Carpentry: Wood door frames.
B. Section 08 1113 - Hollow Metal Doors and Frames.
C. Section 08 7100 - Door Hardware.
D. Section 08 8000 - Glazing.
E. Section 09 9123 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS
B. ITS (DIR) - Directory of Listed Products; current edition.
C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
D. Specimen warranty.
E. Warranty, executed in Kana Hotel Group's name.

1.05 QUALITY ASSURANCE
A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Package, deliver and store doors in accordance with specified quality standard.
B. Accept doors on site in manufacturer's packaging. Inspect for damage.
C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.
1.07 PROJECT CONDITIONS
A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.08 WARRANTY
A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
C. Provide warranty for the following term:
   1. Interior Doors: Life of installation.
D. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Wood Veneer Faced Doors:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
B. High Pressure Decorative Laminate (HPDL) Faced Doors:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 DOORS
A. Doors: Refer to drawings for locations and additional requirements.
   1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
   2. Wood Veneer Faced Doors: 7-ply unless otherwise indicated.
   3. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.
B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire-Rated Doors: Tested to 20 minutes, 60 minutes, 90 minutes, and ratings as indicated on drawings in accordance with UL 10C - Positive Pressure; UL (DIR) or ITS (DIR) labeled without any visible seals when door is open.
   3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
   4. High pressure decorative laminate (HPDL) finish as indicated on drawings.

2.03 DOOR AND PANEL CORES
A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS
A. Veneer Facing for Transparent Finish: White birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
1. “Pair Match” each pair of doors; “Set Match” pairs of doors within 10 feet of each other when doors are closed.

B. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.

C. High Pressure Decorative Laminate (HPDL) Facing for Fire Doors: NEMA LD 3, SGF; _____ color; textured, low gloss finish.

D. Facing Adhesive: Type I - waterproof.

2.05 ACCESSORIES
A. Metal Louvers: _________ manufactured by ____________.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

D. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.06 DOOR CONSTRUCTION
A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:

C. Provide solid blocks at lock edge for hardware reinforcement.

D. Fit door edge trim to edge of stiles after applying veneer facing.

E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

1. Exception: Doors to be field finished.

G. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS
A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:

1. Transparent:
   a. System - TR-2, Catalyzed Lacquer.
   b. Stain: As selected by River Street Architecture, LLC.
   c. Sheen: Flat.

2. Opaque:
   a. System - OP-2, Catalyzed Lacquer.
   b. Color: As selected by River Street Architecture, LLC.
   c. Sheen: Flat.

B. Factory finish doors in accordance with approved sample.

2.08 ACCESSORIES
A. Hollow Metal Door Frames: As specified in Section 08 1113.

B. Metal Louvers: As specified in Section 08 1113.

C. Glazed Openings:


D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify that opening sizes and tolerances are acceptable.
   C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION
   A. Install doors in accordance with manufacturer's instructions and specified quality standard.
      1. Install fire-rated doors in accordance with NFPA 80 requirements.
   B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
   C. Use machine tools to cut or drill for hardware.
   D. Coordinate installation of doors with installation of frames and hardware.
   E. Coordinate installation of glazing.

3.03 ADJUSTING
   A. Adjust doors for smooth and balanced door movement.
   B. Adjust closers for full closure.

3.04 SCHEDULE
   A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Wall access door and frame units.
B. Ceiling access door and frame units.

1.02 RELATED REQUIREMENTS
A. Section 09 9113 - Exterior Painting: Field paint finish.

1.03 REFERENCE STANDARDS
B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
D. FM (AG) - FM Approval Guide; current edition.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES
A. Wall-Mounted Units:
   1. Location: as required for access to utilities, or as shown on drawings.
   4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
B. Wall-Mounted Units in Wet Areas:
   1. Location: as required for access to utilities, or as shown on drawings.
   2. Size: 12 inch by 12 inch.
   3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   4. Tool-operated spring or cam lock; no handle.
   5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
C. Fire-Rated Wall-Mounted Units:
   1. Wall Fire-Rating: As indicated on drawings.
   4. Insulated, double skin door panel.
   5. Tool-operated spring or cam lock; no handle.
D. Ceiling-Mounted Units:
   1. Location: as required for access to utilities, or as shown on drawings.
   3. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
   4. Size - Other Ceilings: 12 inch by 12 inch.
5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
6. Tool-operated spring or cam lock; no handle.

E. Fire-Rated Ceiling-Mounted Units:
2. Size: 12 inch by 12 inch.
3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
4. Tool-operated spring or cam lock; no handle.

F. Removable Access Units:
1. Size: 12 inch by 12 inch.
2. Tool-operated catches.

2.02 WALL & CEILING-MOUNTED UNITS

A. Manufacturers:
3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

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

END OF SECTION
SECTION 08 4229
AUTOMATIC ENTRANCES

PART 1  GENERAL

1.01  SECTION INCLUDES

A. Packaged power-operated door assemblies.
B. Automatic sliding doors, with frames.
C. Controllers, actuators and safety devices.
D. Maintenance.

1.02  REFERENCE STANDARDS

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
E. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.03  SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings:
   1. Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.
   2. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.
C. Product Data: Provide data on system components, sizes, features, and finishes.
D. Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.
E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Kana Hotel Group's name and registered with manufacturer.

1.04  QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.05  PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.06  WARRANTY

A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
B. Provide two year manufacturer warranty.
C. Correct defective Work within a five year period after Date of Substantial Completion.
D. Provide five year manufacturer warranty for operating unit.
A. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion.
A. Provide wrenches and tools required for maintenance of equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Automatic Entrance Doors:
   1. STANLEY; Product DURA-GLIDE 2000 Bi-Part Automatic Sliding Door.
   2. Record-USA; 5100 Series: www.record-usa.com
   3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 PACKAGED AUTOMATIC ENTRANCE DOOR ASSEMBLIES

A. Automatic Sliding Door Type A: Bi-parting double and Single leaf track-mounted, electric operation, extruded aluminum glazed door, with frame, and operator concealed overhead.
   1. Operation: Power open, spring close operation.
   2. Actuator(s): As indicated on drawings.
   5. Door and Frame Finish: Same as adjacent framing system.

2.03 DOOR OPERATORS

A. Door Operators - General Requirements: Comply with BHMA A156.10, BHMA A156.19, and UL 325, as applicable.
   1. Select equipment to accommodate light pedestrian traffic and weight of doors.
   2. Operating Temperature Range: Minus 20 to plus 140 degrees F ambient.
   3. Provide operators that are fully adjustable for opening and closing speeds, checking speeds, and hold-open time.
   4. Finish exposed components to match door and door hardware finish.

2.04 CONTROLLERS, ACTUATORS, AND SAFETIES

A. Controller: Provide microprocessor operated controller for each door.
B. Comply with BHMA A156.10 for actuator and safety types and zones.
C. Proximity Detector Actuator/Safety: Microwave; distance of control sensitivity adjustable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.
B. Verify that electric power is available and is of the correct characteristics.

3.02 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.
B. Provide for thermal expansion and contraction of door and frame units and live and dead loads that may be transmitted to operating equipment.
C. Coordinate installation of components with related and adjacent work; level and plumb.

3.03 ADJUSTING

A. Adjust door equipment for correct function and smooth operation.

3.04 CLEANING

A. Remove temporary protection, clean exposed surfaces.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate operation, operating components, adjustment features, and lubrication requirements.
3.06 MAINTENANCE

A. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion, at no extra charge to Kana Hotel Group.

END OF SECTION
SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Aluminum-framed storefront, with vision glass.
B. Infill panels of glass.
C. Aluminum doors and frames.
D. Weatherstripping.
E. Perimeter sealant.

1.02 RELATED REQUIREMENTS
A. Section 05 1200 - Structural Steel Framing: Steel attachment members.
B. Section 05 5000 - Metal Fabrications: Steel attachment devices.
C. Section 07 2500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
D. Section 07 8400 - Firestopping: Firestop at system junction with structure.
E. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.
F. Section 08 4229 - Automatic Entrances.
G. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.
H. Section 08 8000 - Glazing: Glass and glazing accessories.
I. Section 08 4413 - Glazed Aluminum Curtain Walls.
J. Section 09 9123 - Interior Painting: Field painting of interior surface of infill panels.

1.03 REFERENCE STANDARDS
A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
L. TAS 202
M. AAMA 1302.5, 1303.5
O. Miami (APD) - Approved Products Directory; Miami-Dade County; database at www.miamidade.gov/development/product-control.asp.

1.04 ADMINISTRATIVE REQUIREMENTS
A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 PERFORMANCE REQUIREMENTS
A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 6.00 lbf/sq ft.
E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

1.06 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
C. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Kana Hotel Group's name and registered with manufacturer.

1.07 QUALITY ASSURANCE
A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Texas.
B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

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

1.09 PROJECT CONDITIONS
A. Coordinate the work with installation of firestopping components or materials.
1.10 FIELD CONDITIONS
   A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY
   A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
   B. Correct defective Work within a five year period after Date of Substantial Completion.
   C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Aluminum-Framed Storefront and Doors:
      2. System 403 T", EFCO Corporation (800-221-4169):
      3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 STOREFRONT
   A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
      1. Glazing Position: Centered (front to back).
      2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
      5. Finish: Class I natural anodized.
         a. Factory finish all surfaces that will be exposed in completed assemblies.
      6. Finish Color: As selected by Architect from manufacturer's standard line.
      7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
      9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
     10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
     11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
     12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   B. Performance Requirements:
      1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
         a. Design Wind Loads: Comply with requirements of ASCE 7.
         b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
      2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
      3. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
4. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E283.

2.03 COMPONENTS
A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.
   3. Cross-Section: As indicated on drawings.
B. Glazing: As specified in Section 08 8000.
C. Infill Panels: 1.25 inch thick aluminum sheet.
   1. Finish: Same as storefront.
D. Swing Doors: Glazed aluminum.
   2. Top Rail: 4 inches wide.
   5. Finish: Same as storefront.

2.04 MATERIALS
C. Fasteners: Stainless steel.
D. Perimeter Sealant: Type A specified in Section 07 9005.
E. Glass: As specified in Section 08 8000.
F. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
G. Glazing Accessories: As specified in Section 08 8000.

2.05 FINISHES
A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 HARDWARE
A. For each door, include weatherstripping, sill sweep strip, and threshold.
B. Other Door Hardware: As specified in Section 08 7100.
C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

2.07 FABRICATION
A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
C. Prepare components to receive anchor devices. Fabricate anchors.
D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
E. Arrange fasteners and attachments to conceal from view.
F. Reinforce components internally for door hardware.
G. Reinforce framing members for imposed loads.
H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify dimensions, tolerances, and method of attachment with other work.
   B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION
   A. Install wall system in accordance with manufacturer's instructions.
   B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
   C. Provide alignment attachments and shims to permanently fasten system to building structure.
   D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
   E. Provide thermal isolation where components penetrate or disrupt building insulation.
   F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
   G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
   H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
   I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
   J. Set thresholds in bed of sealant and secure.
   K. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.
   L. Install perimeter sealant in accordance with Section 07 9005.
   M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.

3.04 ADJUSTING
   A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING
   A. Remove protective material from pre-finished aluminum surfaces.
   B. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION
   A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION
SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum single hung and fixed pane windows with integral PTAC opening. fixed sash.
B. Factory glazing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Rough opening framing.
B. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.
C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

C. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
G. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
H. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
1.04 PERFORMANCE REQUIREMENTS
A. Design and size windows to withstand the following load requirements, when tested in accordance with ASTM E 330 using test loads equal to _____ the design wind loads with 10 second duration of maximum load:
   1. Design Wind Loads: Comply with requirements of ASCE 7.
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
B. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
C. Air Infiltration: Limit air infiltration through assembly to 0.3 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 2.86 lbf/sq ft.
E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly.
F. AAMA Rating: HC-50

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, _____, and installation requirements.
D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
   1. Evidence of AAMA Certification.
   2. Evidence of WDMA Certification.
   3. Evidence of CSA Certification.
   4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

1.06 QUALITY ASSURANCE
A. Comply with requirements of AAMA 101 Designation _____.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Comply with requirements of AAMA CW-10.
B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.08 FIELD CONDITIONS
A. Do not install sealants when ambient temperature is less than 40 degrees F.
B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.09 WARRANTY
A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.

PART 2 PRODUCTS
2.01 MANUFACTURERS
A. Basis of Design: __________.
B. Aluminum Windows:
   1. Fixed unit, thermally broken in aluminum frame Window size as shown on drawings;
2. Glazing: 7/8" thick insulating unit. Solarban 60, Low-E insulating glazing by PPG.
3. Finish: Natural Anodized

2.02 WINDOWS
A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 3-1/2 inches.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   6. Air Infiltration: Limit air infiltration through assembly to 0.37 cu ft/min/sq ft of wall area, measured at a specified differential pressure across assembly in accordance with ASTM E283.
   7. Water Infiltration Test Pressure Differential: 60 pounds per square foot.
   8. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
10. Acoustical Performance: ASTM E90 and E 1332; STC 31 and OITC 31 (fixed).
B. Performance Requirements: Provide products that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
      a. Performance Class (PC): R.
C. Performance Requirements:
D. Fixed, Non-Operable Type:
   2. Glazing: Double; 1" insulated glass unit; see 08805.
   4. Interior Finish: Class I natural anodized.
E. Horizontal Sliding Type:
   2. Glazing: 1"; insulated glass unit; see 08800.
   4. Interior Finish: Class I natural anodized.

2.03 MATERIALS
A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5005 alloy, H12 or H14 temper.
C. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.04 HARDWARE
A. Sash lock: Lever handle with cam lock; provide pole handle ____ feet long.
B. Pulls: Manufacturer's standard type.
C. Bottom Rollers: Stainless steel, adjustable.
D. Limit Stops: Resilient rubber.

2.05 FABRICATION
A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.
B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
C. Prepare components to receive anchor devices.
D. Arrange fasteners and attachments to ensure concealment from view.
E. Prepare components with internal reinforcement for operating hardware.
F. Provide steel internal reinforcement in mullions as required to meet loading requirements.
G. Provide internal drainage of glazing spaces to exterior through weep holes.
H. Factory glaze window units.

2.06 FINISHES
A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
B. Apply 1 coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION
A. Install windows in accordance with manufacturer's instructions.
B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
D. Install sill and sill end angles.
E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
G. Install operating hardware not pre-installed by manufacturer.

3.03 FIELD QUALITY CONTROL
A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.
   1. If any window fails, test additional windows at General Contractor's expense.
B. Replace windows that have failed field testing and retest until performance is satisfactory.

3.04 ADJUSTING
A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING
A. Remove protective material from factory finished aluminum surfaces.
B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.
C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION
SECTION 08 7100
FINISH HARDWARE

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnishing hardware for interior and exterior doors.

B. Furnishing and installing access control systems.

1.2 RELATED WORK

A. Aluminum Doors and Frames

B. Wood Doors

C. Metal Doors and Frames

1.3 QUALITY ASSURANCE

A. The company furnishing hardware under this Section shall be regularly engaged in the sale and distribution of Finish Hardware for commercial projects.

B. The person responsible for scheduling, detailing, ordering and coordinating hardware for this project shall be an experienced hardware consultant. Consultant membership in the Door and Hardware Institute is acceptable as indication of required experience.

C. Hardware furnished shall comply with the requirements of the Standards and Codes listed in 1.04 of this Section.

D. The access control system and related equipment shall be installed by qualified, skilled technicians experienced in the installation of such systems, in accordance with the manufacturer's recommendations and all applicable codes and standards.

1.4 REFERENCES

A. Standards:
   1. BHMA 1301-1982 – Materials and Finishes.
   2. ADA Standards for Accessible Design, 2010 Edition

B. Codes:

1.5 SUBMITTALS

A. Within 30 days of award of purchase order, submit to the Architect for review a complete vertical format hardware specification in accordance with these Specifications. Furnish six copies of complete submittal.
B. Submittal shall include manufacturer's name, type, finish and location for each item. Title page shall indicate Project, Architect, Owner, and Contractor and shall include address and phone number of each. There shall also be included a table of contents, glossary of terms, abbreviations, and symbols used in the Hardware Schedule. Also include a cross reference of all product numbers used within the Schedule that deviate from those specified. Column 1 shall state specified item and manufacturer and Column 2 shall state prior approved substitute item and its manufacturer.

C. Schedule and detail each floor separately. On doors of different sizes or where hinges, closers, or locks are different, a separate heading shall be used. No labeled openings shall be combined with non-labeled openings. Note each Specification hardware set in each schedule heading.

D. Submit a sample of each item of hardware that differs from the Specification. If requested, supply a sample of each hardware item required, to be retained by the Architect for comparison with the hardware furnished on the project. Samples will be returned in time for identification.

E. Furnish as part of the submittal six copies of catalog cuts of all products.

F. Submittals for the access control system shall also include complete electrical information, wiring diagrams, and operating and maintenance instructions.

G. After approval of hardware schedule, furnish templates to other trades who have hardware applied to their products. All templates shall be clearly marked as to their respective heading number and shall give full information with regard to installation, fasteners, dimensions and other pertinent details affecting their installation and operation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Hardware shall be delivered to the job site in the manufacturers' original packages. Each item shall be clearly marked with the opening number and hardware heading to identify correct location.

B. Locked storage space complete with shelving, for unpacked crates and sorting out hardware shall be furnished. The space shall be maintained clean and dry for protection of hardware.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate hardware with related trades such as entrance, steel and wood doors, frames, millwork, electrical, etc.

B. Hardware shall be ordered so that it will be available on time for job requirements.

1.8 WARRANTY

A. All hardware items shall be guaranteed for a period of one year from final acceptance, with exception of door closers and locksets which shall carry a twenty-five year warranty, and exit devices which shall carry a ten year warranty and hinges which shall carry a lifetime warranty.
PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. A Specified Manufacturer is shown for each hardware item to establish a standard of quality and minimum functional requirements. The product numbers of these manufacturers are found in the Hardware Sets.

B. Approved Manufacturers designate manufacturers whose products may be acceptable on the Project if in the opinion of the Architect the products meet the intent of the specification in terms of design, function, material, and quality of workmanship.

C. All items of a particular hardware category i.e. locksets, closers, hinges, shall be of the same manufacturer.

D. Hinges
   2. Specified manufacturer – PBB*
   3. Approved manufacturers – Bommer, McKinney
   4. All ball bearing hinges shall be equipped with non-rising pins. Furnish non-removable pins on all out-swing exterior doors and where noted "NRP" in the Hardware Sets. Size hinges in accordance with specified manufacturer's published recommendations.

E. Continuous Hinges
   2. Specified manufacturer – Select Products*
   3. Approved manufacturers – PBB, Zero
   4. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish (painted finish gear cap only).
   5. All hinges are to be manufactured to template. Uncut hinges shall be non-handed and shall be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.

F. Locksets, latches, deadbolts
   2. Specified manufacturer – PDQ, GT Series and GP Series as specified, MEM lever*
   3. Approved manufacturers – Best, Schlage
      a. Chassis: cylindrical design, heavy duty zinc diecast.
      b. Latchbolts: 9/16-inch throw and 1/2-inch throw as specified.
      c. Lever Trim: accessible design, solid zinc diecast.
      d. Strikes: stainless steel or wrought brass; ASA Standard.
      e. Certifications:
         1) ANSI A156.2, Grade 1 and Grade 2 as specified.
         2) UL Listed for A label single doors up 4 ft x 8 ft.

G. Exit Devices
   2. Specified manufacturer – PDQ*
   3. Approved manufacturers – Precision, Von Duprin
   4. Exit devices: as scheduled.
   5. Exit devices shall be UL listed for life safety. All exit devices for fire-rated openings shall have UL labels for "Fire Exit Hardware".
   6. Exit devices shall be made of brass, bronze, stainless steel or aluminum material plated to the standard architectural finishes to match the balance of the door hardware.
   7. Exit devices to be non-handed. Touchpad shall extend a minimum of ½ of the door width. All latchbolts to be the deadlocking type.
H. Door closers
2. Specified manufacturer – PDQ*
3. Approved manufacturers – LCN, Corbin-Russwin
4. Door closers shall be fully adjustable for accessibility requirements.
5. Door closers shall be overhead type and have fully hydraulic, full rack and pinion action with a high strength cast cylinder.
6. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment.

I. Pushes, pulls, stops, trim, flush bolts
2. Specified manufacturer – Burns*
3. Approved manufacturers – Hiawatha, Trimco
4. Kick plates, mop plates, and armor plates shall be furnished 10", 4", and 36" high respectively, and 2" less than door width when applied to the push side of the door and 1" less than door width when applied to the pull side of the door or to pairs of doors.

J. Weatherstrip, thresholds, soundseal, fingersguards
2. Specified manufacturer - National Guard Products*
3. Approved manufacturers – Reese, KN Crowder

K. Silencers
2. Specified manufacturer – Burns*
3. Approved manufacturers - Deutscher, Ives
4. Supply three silencers for single opening and two silencers for double openings.

L. Key Cabinet
2. Specified manufacturer – Lund*
3. Approved manufacturers - Telkee.

2.2 KEYING

A. Review the keying with the Owner and establish new system. Stamp all keys and key blanks with "Do Not Duplicate".

B. All locksets shall be subject to a Construction Master key System during the construction period. A total of six (6) construction master keys shall be furnished. Construction Master key System shall be voided at the project completion at the direction of the architect.

C. Supply key requirements as follows: Three (3) Master keys and (2) Change keys for each lock cylinder.

D. Final keying requirements shall be coordinated with the Owner and Architect.

2.3 MATERIAL AND FINISHES

A. Unless otherwise shown in the Hardware Sets finishes shall be as follows:
2. Hinges-On wood doors - 626 (US26D) or 652 (US26D) as specified
3. Exterior metal doors - 630 (US32D) Satin Stainless
5. Locksets - 626 (US26D) Satin Chrome
6. Exit devices - match adjacent hardware
7. Door closers - match adjacent hardware
8. Door trim - 630 (US32D) or 626 (US26D) Satin Stainless or Satin Chrome
3.1 INSPECTION

A. Condition of opening size shall be verified as door frames being plumb and of correct tolerance to receive doors and hardware.

3.2 INSTALLATION

A. All Hardware shall be installed by carpenter mechanics, skilled in the application of institutional grade hardware.

B. A schedule of mounting heights for all items of hardware shall be included in hardware schedule for approval.

C. Degree of opening for doors with overhead holders, closers, etc. shall be included in hardware schedule for approval.

D. The hands of doors shall be shown in the hardware schedule.

3.3 ADJUSTING

A. Hardware shall be adjusted for correct operation.

B. Coordinate with "Contract Closeout" Section.

C. After installation of hardware and before the building is accepted, inspect the installation and certify that the hardware is correctly installed in accordance with the manufacturers' recommendations.

D. If doors are field painted or finished, hardware shall be protected.

E. After installation of all hardware and before acceptance of the building, check each locked door against key schedule to make certain that correct locks and cylinders are on proper doors. For any incorrectly located cylinder, tag and have relocated to proper location.
3.4 HARDWARE SETS

HEADING #1

DOORS #: 1000, 1001

1 CYLINDER TO MATCH NEW SYSTEM
1 ACCESS CONTROL CARD READER BY SECURITY SYSTEM PROVIDER

NOTE: BALANCE OF HARDWARE BY DOOR SUPPLIER. COORDINATE SECURITY HARDWARE WITH SECURITY AND ELECTRICAL SYSTEMS.

HEADING #2

DOORS #: 1004, 1007

EACH DOOR TO HAVE:

3 HINGES 4B81
1 LOCKSET GT116
1 CLOSER 5501 X DS
1 SET DOOR SEALS 5075

HEADING #3

DOORS #: 1005

EACH DOOR TO HAVE:

1 CONTINUOUS HINGE SL11HD
1 EXIT DEVICE 6202R
1 CLOSER 5500 X DS X BRACKETS AS REQ.
1 THRESHOLD 513BR
1 SET DOOR SEALS BY DOOR MANUFACTURER
1 DOOR BOTTOM SEAL 200SDKB

NOTE: FINISH TO MATCH DOOR/FRAME.
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DOORS #: 1006, 1007C

EACH DOOR TO HAVE:

1 CONTINUOUS HINGE  SL11HD X CTW-8
1 EXIT DEVICE  6202R X MLR X 03 X 6GN
1 CYLINDER  TO MATCH NEW SYSTEM
1 CLOSER  5501T X DS X BRACKETS AS REQ.
1 THRESHOLD  513BR
1 SET DOOR SEALS  BY DOOR MANUFACTURER
1 DOOR BOTTOM SEAL  200SDKB

NOTE:  FINISH TO MATCH DOOR/FRAME.  COORDINATE SECURITY HARDWARE WITH SECURITY AND ELECTRICAL SYSTEMS.

HEADING #5

DOORS #: 1007A

EACH PAIR TO HAVE:

6 HINGES  4B81
1 SET AUTO FLUSHBOLTS’  7962 (INACTIVE)
1 COORDINATOR  7672
1 PASSAGE SET  GT126 (ACTIVE)
2 CLOSERS  5501T X RA
2 ELECTROMAGNETIC HOLDERS  EH20
1 SET DOOR SEALS  5075
1 DOOR EDGE SEAL  5070

NOTE:  COORDINATE INSTALLATION OF HOLDERS WITH FIRE AND ELECTRICAL SYSTEMS.

HEADING #6

DOORS #: 1007B

EACH PAIR TO HAVE:

6 HINGES  4B81
1 SET AUTO FLUSHBOLTS’  7962 (INACTIVE)
1 COORDINATOR  7672
1 LOCKSET  GT148 (ACTIVE)
2 CLOSERS  5501 X RA
2 ELECTROMAGNETIC HOLDERS  EH20
1 SET DOOR SEALS  5075
1 DOOR EDGE SEAL  5070

NOTE:  COORDINATE INSTALLATION OF HOLDERS WITH FIRE AND ELECTRICAL SYSTEMS.

HEADING #7

DOORS #: 1008

TRU by Hilton – El Paso, TX
Project No: 16105

FINISH HARDWARE
08710-7
EACH DOOR TO HAVE:

1  SET PIVOT  
1  LOCKSET  4910 X 4591 
1  CYLINDER  TO MATCH NEW SYSTEM 
1  ELECTRIC STRIKE  55-BH 
1  ACCESS CONTROL CARD READER  BY SECURITY SYSTEM PROVIDER 
1  CLOSER  5501 X DS X BRACKETS AS REQ. 

NOTE: FINISH TO MATCH DOOR/FRAME. COORDINATE SECURITY HARDWARE WITH SECURITY AND ELECTRICAL SYSTEMS.

HEADING #8

DOORS #: 1010, 1011

EACH DOOR TO HAVE:

3  HINGES  4B81 
1  PRIVACY SET  GT176 
1  CLOSER  7101 X RA 
1  DOOR STOP  565 
1  SET DOOR SEALS  5075 
1  COAT HOOK  604 

HEADING #9

DOORS #: 1013

EACH DOOR TO HAVE:

3  HINGES  BB81 
1  PASSAGE SET  GT126 
1  DOOR STOP/HOLDER  533 

HEADING #10

DOORS #: 1014, 1029

EACH DOOR TO HAVE:

3  HINGES  BB81 
1  LOCKSET  GT116 
1  DOOR STOP  565 
1  COAT HOOK  604 

HEADING #11

DOORS #: 1015, 1026

EACH DOOR TO HAVE:

TRU by Hilton – El Paso, TX
Project No: 16105
FINISH HARDWARE
Project No: 08710-8
1  CONTINUOUS HINGE    SL24HD
1  LOCKSET            GT115
1  CLOSER            5501 X PA (180 DEGREE SWING)
1  DOOR STOP         565
1  SET DOOR SEALS    5075

HEADING #12

DOORS #: 1016, 1020, 1028

EACH DOOR TO HAVE:

3  HINGES            BB81
1  PASSAGE SET       GT148
1  OVERHEAD STOP     4424 (@ 1020 ONLY)
1  DOOR STOP         565

HEADING #13

DOORS #: 1018

EACH DOOR TO HAVE:

1  CONTINUOUS HINGE    SL24HD
1  LOCKSET            GT115
1  CLOSER            5501 X PA (180 DEGREE SWING)
1  ELECTROMAGNETIC HOLDER EH20
1  SET DOOR SEALS    5075

NOTE:  COORDINATE INSTALLATION OF HOLDER WITH FIRE AND ELECTRICAL SYSTEMS.

HEADING #14

DOORS #: 1019

EACH DOOR TO HAVE:

3  HINGES            4B51 X NRP
1  LOCKSET          GT116
1  CLOSER            5501 DSHO X SCS-1
1  KICK PLATE       KP50 X B4E X CSK
1  THRESHOLD        425HD
1  SET DOOR SEALS   155S
1  DOOR BOTTOM SEAL 200S
1  LATCH GUARD      621
1  DRIP STRIP       17

HEADING #15

DOORS #: 1021

EACH PAIR TO HAVE:
### HEADING #16

**DOORS #: 1023**

**EACH PAIR TO HAVE:**

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<td>6</td>
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<td>Exit Device</td>
<td>1</td>
<td>4200RF X 09 X 4 EW</td>
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<td>Exit Device</td>
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<td>4200RF</td>
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<td>Removable Mullion</td>
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<td>Closers</td>
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<tr>
<td>Kick Plates</td>
<td>2</td>
<td>KP50 X B4E X CSK</td>
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<tr>
<td>Threshold</td>
<td>1</td>
<td>425</td>
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<tr>
<td>Door Seals</td>
<td>1</td>
<td>155S</td>
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<tr>
<td>Door Bottom Seals</td>
<td>2</td>
<td>200S</td>
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<td>Astragal Set</td>
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<td>9115</td>
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<td>Drip Strip</td>
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<td>17</td>
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### HEADING #17

**DOORS #: 1025**

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<td>Lockset</td>
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<td>GT115</td>
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<td>7101 X DSHO</td>
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<td>Kickplate</td>
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<td>KP50 X B4E X CSK</td>
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<tr>
<td>Threshold</td>
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<td>425</td>
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<tr>
<td>Door Seals</td>
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<td>621</td>
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<td>Drip Strip</td>
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### HEADING #18

**DOORS #: 1027**

**EACH DOOR TO HAVE:**

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HEADING #19

DOORS #: 2001, 3001, 4001

EACH PAIR TO HAVE:

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<td>1</td>
<td>SET AUTO FLUSHBOLTS’</td>
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<td>1</td>
<td>COORDINATOR</td>
<td>7672</td>
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<td>1</td>
<td>PASSAGE SET</td>
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<td>2</td>
<td>CLOSERS</td>
<td>5501T X RA</td>
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<tr>
<td>2</td>
<td>ELECTROMAGNETIC HOLDERS</td>
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<td>1</td>
<td>SET DOOR SEALS</td>
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<td>1</td>
<td>DOOR EDGE SEAL</td>
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NOTE: COORDINATE INSTALLATION OF HOLDERS WITH FIRE AND ELECTRICAL SYSTEMS.

HEADING #20

DOORS #: 2002, 2004, 3002, 3004, 4002, 4004

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<td>CONTINUOUS HINGE</td>
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<td>LOCKSET</td>
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<tr>
<td>1</td>
<td>CLOSER</td>
<td>5541 X RA (DELAYED ACTION)</td>
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<td>DOOR STOP</td>
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<td>SET DOOR SEALS</td>
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HEADING #21

DOORS #: 2003, 3003, 4003

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<td>HINGES</td>
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<tr>
<td>1</td>
<td>LOCKSET</td>
<td>GT115</td>
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<td>1</td>
<td>CLOSER</td>
<td>5501 X PA</td>
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<tr>
<td>1</td>
<td>DOOR STOP</td>
<td>565</td>
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HEADING #22

DOORS #: S101A

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<td>HINGES</td>
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<td>1</td>
<td>PASSAGE SET</td>
<td>GT126</td>
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</table>
HEADING #23

DOORS #: S101B, S102B

EACH DOOR TO HAVE:

3 HINGES 4B51 X NRP
1 EXIT DEVICE 6200R
1 CLOSER 5500 X DS
1 KICK PLATE KP50 X B4E X CSK
1 THRESHOLD 425
1 SET DOOR SEALS 155S
1 DOOR BOTTOM SEAL 200S
1 DRIP STRIP 17

HEADING #24

DOORS #: S102A, S201, S202, S301, S302, S401, S402

EACH DOOR TO HAVE:

3 HINGES 4B81
1 EXIT DEVICE 6200RF X 14 X 6EW
1 CLOSER 5500 X RA
1 DOOR STOP 565
1 SET DOOR SEALS 5075

HEADING #25

DOORS #: G1

EACH DOOR TO HAVE:

3 HINGES 4B81
1 ELECTRONIC LOCKSET BY HILTON WORLDWIDE APP. MAN.
1 CLOSER 3101 X RA
1 DOOR STOP 565
1 THRESHOLD 401
1 SET DOOR SEALS 5075
1 DOOR BOTTOM SEAL 344NF
1 DOOR VIEWER 852PC
1 SECURITY DOOR GUARD SDG

HEADING #26

DOORS #: G2

3 HINGES BB81
1 LOCKSET GP176
1 DOOR STOP 509
HEADING #27

DOORS #: G3

EACH DOOR TO HAVE:

<table>
<thead>
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<tr>
<td>2 HINGES</td>
<td>SP81</td>
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<tr>
<td>1 PASSAGE SET</td>
<td>GP126</td>
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<tr>
<td>1 DEADLOCK</td>
<td>KV125BK</td>
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<tr>
<td>1 THRESHOLD</td>
<td>402 X 400 X 402</td>
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<tr>
<td>1 SET DOOR SEALS</td>
<td>5075</td>
</tr>
<tr>
<td>1 DOOR BOTTOM SEAL</td>
<td>344</td>
</tr>
<tr>
<td>1 SECURITY DOOR GUARD</td>
<td>SDG</td>
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END OF SECTION 08710
SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.
B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework: Cabinets with requirements for glass shelves.
B. Section 07 2500 - Weather Barriers.
C. Section 07 9005 - Joint Sealers: Sealant and back-up material.
D. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
E. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.
F. Section 08 4013 - Protective Framed Glazing Assemblies: Glazing fire-tested as part of the wall assembly.
G. Section 08 4229 - Automatic Entrances: Glazing furnished as part of door assembly.
H. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.
I. Section 08 5113 - Aluminum Windows: Glazing furnished by window manufacturer.
J. Section 08 8300 - Mirrors.
K. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Mirrors.

1.03 REFERENCE STANDARDS


1.04 PERFORMANCE REQUIREMENTS

A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7. (section 13.5.9)
   1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
   2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   3. Thicknesses listed are minimum.

1.05 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
   C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
   D. Manufacturer's Certificate: Certify that exterior glass meets or exceeds specified requirements. (see Performance Requirements section 1.04)

1.06 QUALITY ASSURANCE
   B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 FIELD CONDITIONS
   A. Do not install glazing when ambient temperature is less than 50 degrees F.
   B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY
   A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.
   B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
   C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS
   A. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
      1. Application: All exterior glazing unless otherwise indicated.
      2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
         a. Tint: Clear.
         b. Coating: Low-E (passive type), on #2 surface.
      3. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
         a. Tint: Clear.
      4. Total Thickness: 1 inch.
      5. Total Visible Light Transmittance: ______ percent, nominal.

2.02 BASIS OF DESIGN - INSULATING GLASS UNITS
   A. Type IG-1 - Sealed Insulating Glass Units: Vision glazing, with Low-E coating.
      1. Application: All exterior glazing unless otherwise indicated.
      2. Between-lite space filled with air.
3. Thermal Resistance (U-Value): 0.28, nominal.
4. Total Solar Heat Gain Coefficient: 0.27, nominal.
6. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
   a. Low-E Coating: PPG Solarban 70XL on #2 surface.
   b. Tint: Starphire (ultra clear).
7. Inboard Lite: Annealed float glass, 1/4 inch thick.
   a. Tint: Starphire (ultra clear).
8. Total Thickness: 1 inch.
9. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another acceptable manufacturer.
10. Substitution Procedures: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.03 GLAZING UNITS

A. Type IG-2 - Sealed Insulating Glass Units: Safety glazing.
   1. Application: Provide this type of glazing in the following locations:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on the drawings.
   2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.
   3. Tint: Clear.

B. Type E-1 - Single Exterior Vision Glazing:
   1. Application: ________.
   2. Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.

C. Type S-1 - Single Vision Glazing:
   1. Application: All interior glazing unless otherwise indicated.
   2. Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.

D. Type S-2 - Fire-Protection-Rated Glazing:
   2. Safety Certification: 16 CFR 1201 Category II.
   3. Application: Provide this type of glazing in the following locations:
      a. Glazed lites in fire doors.
   4. Thickness: 1/4 inch.

E. Type S-3 - Single Safety Glazing: Non-fire-rated.
   1. Application: Provide this type of glazing in the following locations:
      a. Glazed lites in doors, except fire doors.
      b. Sliding glass doors.
      c. Shower and bathtub enclosures and doors.
      d. Glazed sidelights to doors, except in fire-rated walls and partitions.
      e. Glazed view windows and panels in partitions enclosing athletic activity rooms, except in fire-rated walls and partitions.
      f. Other locations required by applicable federal, state, and local codes and regulations.
      g. Other locations indicated on the drawings.
   2. Type: Fully tempered float glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.
2.04 EXTERIOR GLAZING ASSEMBLIES

A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes.
   2. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
   3. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   4. Glass thicknesses listed are minimum.

B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.05 GLASS MATERIALS

A. Float Glass Manufacturers:
   5. Substitutions: Refer to Section 01 6000 - PRODUCT REQUIREMENTS.

B. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

C. Laminated Glass: (Type ATL): Float glass laminated in accordance with ASTM C 1172.
   1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
   2. Plastic Interlayer:
   3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.
   4. Manufacturers:
      d. Substitutions: Refer to Section 01 6000 - PRODUCT REQUIREMENTS.

D. Fire Resistance-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
   1. See Section 08 4013 for glazing in fire-rated framing assemblies.
   3. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.

E. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
   1. IBC Fire Protection Rating: As indicated on drawings.
   2. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
   3. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.
F. Fire-Resistance-Rated Composite Glazing: (Type F1A): Multi-layer glazing UL- or WH-listed as fire-resistance-rated glazing and complying with 16 CFR 1201 test requirements for Category II without the use of a surface-applied film.
   1. Fire Rating: As indicated; tested as a wall, not as opening protection.
      a. Manufacturer: FireLite Plus® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-800-451-9857,
      b. Properties:
         1) Thickness: 5/16 inch [8 mm] overall.
         2) Weight: 4 lbs./sq. ft.
         3) Approximate Visible Transmission: 85 percent.
         4) Approximate Visible Reflection: 9 percent.
         5) Fire-rating: 20 minutes to 3 hours for doors; 20 minutes to 90 minutes for other applications.
         7) STC Rating: Approximately 35 dB.
         8) Surface Finish: Premium (polished).
         9) Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
      c. Maximum sheet sizes based on surface finish:
         1) Premium: 48 inches by 96 inches.
      d. Labeling: Permanently label each piece of FireLite Plus® with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
      e. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with [ASTM E2074-00 and ASTM E2010-01] [ULC Standards CAN4 S-104 and CAN4 S-106] [NPFA 252 and NFPA 257] [UL 9, UL 10B and UL 10C].

G. Clear Float Glass (Type A): annealed.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. Comply with ASTM C 1048.
   3. 6 mm minimum thick.

H. Tempered Glass (Type A-T): Clear; fully tempered with horizontal tempering.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select) and ASTM C 1048.
   2. Comply with 16 CFR 1201 test requirements for Category II.
   3. Where glazing is to be installed in fire-rated partition, provide glazing that is also fire-protection rated in accordance with applicable code.
   4. Provide this type of glazing in the locations required by code.
      a. Glazed lites in doors except fire doors.
      b. Sliding glass doors.
      c. Shower and bathtub enclosures and doors.
      d. Glazed sidelights to doors.
      e. Glazed view windows and panels in partitions enclosing athletic activity rooms.
   6. Product: PPG Clear Glass

I. Low E Glass (Type Low E): Float type, heat strengthened, clear. This coating is to be used on all exterior glazing.
   1. Color and Visible Light Transmittance to be selected by architect and approved by owner.
   2. Coating on inner surface.
   3. Comply with ASTM C 1036, Type I, transparent flat, Quality Q3 (glazing select).
   4. 6 mm minimum thick.

2.06 SEALED INSULATING GLASS UNITS

A. Manufacturers:
   1. Any of the manufacturers specified for float glass.
   2. Substitutions: Refer to Section 01 6000 - PRODUCT REQUIREMENTS.

B. Sealed Insulating Glass Units: Types as indicated.
   1. Application: Exterior, except as otherwise indicated.
   2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   3. Edge Spacers: Aluminum, bent and soldered corners.
   4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   5. Purge interpane space with dry hermetic air.

C. Insulated Glass Units (Type Exterior Unit): Double pane with glass to elastomer edge seal.
   1. See A8.1 & A8.2 For Glass Unit Configurations
   2. Place low E coating on no. 3 surface within the unit.
   3. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
   4. Comply with ASTM E 774 and E 773, Class CBA.
   5. Purge interpane space with dry hermetic air.
   6. Total unit thickness of 1 inch minimum.
   7. Product: PPG Solarban 60 Clear Over Clear

D. Insulated Glass Units (Type Interior Unit): Double pane with glass to elastomer edge seal.
   1. See A8.1 & A8.2 For Glass Unit Configurations
   2. Comply with ASTM E 774 and E 773, Class CBA.
   3. Purge interpane space with dry hermetic air.
   4. Total unit thickness of 1 inch minimum.
   5. Product: PPG Clear Glass

E. Edge Seal Construction: Aluminum, bent and soldered corners.

2.07 GLAZING COMPOUNDS

A. Manufacturers:
   5. Substitutions: Refer to Section 01 6000 - PRODUCT REQUIREMENTS.

B. Glazing Putty, Type ___: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.

C. Butyl Sealant, Type ___: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

D. Acrylic Sealant (Type C): Single component, solvent curing, non-bleeding; ASTM C 920, Type S, Grade NS, Class 12-1/2, Uses M and A; cured Shore A hardness of 15 to 25; color as selected.

E. Polysulfide Sealant, Type ___: Two component; chemical curing, non-sagging type; ASTM C920, Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

F. Polyurethane Sealant, Type ___: Single component, chemical curing, non-staining, non-bleeding; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; ________ color.

G. Silicone Sealant, Type ___: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; ________ color.
2.08 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; black color. 
   1. Manufacturers: 
      c. Substitutions: Refer to Section 01 6000 - PRODUCT REQUIREMENTS.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; ________ color.

E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.05 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.
B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

F. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.06 INSTALLATION - EXTERIOR WET METHOD (SEALANT AND SEALANT)

A. Place setting blocks at 1/4 points and install glazing pane or unit.

B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.

C. Fill gaps between glazing and stops with sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.

D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.07 INSTALLATION - EXTERIOR BUTT GLAZED METHOD (SEALANT ONLY)

A. Temporarily brace glass in position for duration of glazing process. Mask edges of glass at adjoining glass edges and between glass edges and framing members.

B. Temporarily secure a small diameter non-adhering foamed rod on back side of joint.

C. Apply sealant to open side of joint in continuous operation; thoroughly fill the joint without displacing the foam rod. Tool the sealant surface smooth to concave profile.

D. Permit sealant to cure then remove foam backer rod. Apply sealant to opposite side, tool smooth to concave profile.

E. Remove masking tape.

3.08 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

3.09 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
F. Trim protruding tape edge.

3.10 INSTALLATION - INTERIOR WET METHOD (COMPOUND AND COMPOUND)
A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch centers, kept 1/4 inch below sight line.
B. Locate and secure glazing pane using glazers' clips.
C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3.11 INSTALLATION - PLASTIC FILM
A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
B. Place without air bubbles, creases or visible distortion.
C. Fit tight to glass perimeter with razor cut edge.

3.12 CLEANING
A. Remove glazing materials from finish surfaces.
B. Remove labels after Work is complete.
C. Clean glass and adjacent surfaces.

3.13 PROTECTION
A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION
SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1  GENERAL
1.01  SECTION INCLUDES
A. Performance criteria for gypsum board assemblies.
B. Metal channel ceiling framing.
C. Fire rated area separation walls.
D. Gypsum sheathing.
E. Cementitious backing board.
F. Gypsum wallboard.
G. Glass mat faced gypsum board.
H. Joint treatment and accessories.
I. Textured finish system.
J. Acoustic (sound-dampening) wall and ceiling board.

1.02  RELATED REQUIREMENTS
A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
C. Section 06 1054 - Wood Blocking and Curbing: Wood blocking for support of wall-mounted equipment.
D. Section 07 2100 - Thermal Insulation: Acoustic insulation.
E. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
F. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls.
G. Section 07 9005 - Joint Sealers:
H. Section 09 3000 - Tiling: Tile backing board.

1.03  REFERENCE STANDARDS
A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
U. ASTM E413 - Classification for Rating Sound Insulation; 2010.

1.04 SYSTEM DESCRIPTION
A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: STC of 50-54 calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.
B. Shaft Wall: Configure and install components as required to achieve the following performance levels:
   1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
C. Samples: Submit two samples of predecorated gypsum board, 12 by 12 inches in size, illustrating finish color and texture.
D. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.06 QUALITY ASSURANCE
A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

1.07 REGULATORY REQUIREMENTS
A. Conform to applicable code for fire rated assemblies as follows:
   1. See LS2.1 for all UL Rated Assemblies.
PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Partitions: UL listed assembly No. ______; 1 hour rating.
   2. Head of Fire Rated Partitions: UL listed assembly No. ______; 1 hour rating.
   3. Fire Rated Ceilings and Soffits: One (1) hour fire rating.
   4. Fire Rated Structural Column Framing: UL listed assembly No. ______; 1 hour rating.
   5. Fire Rated Structural Beam Framing: UL listed assembly No. ______; 1 hour rating.
   7. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.

C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Runners: U shaped, sized to match studs.
   2. Ceiling Channels: C-shaped.
   3. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
   4. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
      a. Products:
         1) Same manufacturer as other framing materials.

D. Exterior Non-Loadbearing Studs and Furring for Application of Gypsum Board: As specified in Section 09 2216.

E. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

F. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

G. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
6. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Thickness:
      a. Vertical Surfaces: 1/2 inch.
      b. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
6. Mold Resistant Paper Faced Products:
   a. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
   b. American Gypsum; M-Bloc AR Type X.
   c. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
   d. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
   e. Temple-Inland Inc; ComfortGuard Mold Resistant Gypsum Board.
   f. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
   g. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
7. Glass Mat Faced Products:
   a. Georgia-Pacific Gypsum; DensArmor Plus.
   b. National Gypsum Company; Gold Bond eXP Interior Extreme Gypsum Panel.
   c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
8. Unfaced Products:
   a. USG Corporation; Fiberock Aqua-Tough Interior Panels.
   b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Backing Board For Wet Areas: One of the following products:
   1. Application: Surfaces behind tile in wet areas including tub and shower surrounds, shower ceilings, and ______.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
      a. Thickness: 1/2 inch.
      b. Products:
         1) USG Corporation; _____: www.usg.com.
         2) Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
      a. Thickness: 1/2 inch.
   5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
      a. Products:
         1) Georgia-Pacific Gypsum; DensShield Tile Backer.
         2) National Gypsum Company; Gold Bond eXP Tile Backer.
         3) Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. **Application:** Ceilings, unless otherwise indicated.
2. **Thickness:** 1/2 inch.
3. **Edges:** Tapered.
4. **Products:**
   a. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
   b. __________.

**E. Acoustical Sound Dampening Wall and Ceiling Board:** Two layers of heavy paper faced, high density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
1. **Thickness:** 1/2 inch.
2. **Long Edges:** Tapered.
3. **Mold Resistance:** Score of 10, when tested in accordance with ASTM D3273.
4. **Products:**
   c. **Substitutions:** See Section 01 6000 - PRODUCT REQUIREMENTS.

**F. Gypsum Wallboard:** ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.

1. **Regular Type:**
   a. **Application:** Use for vertical surfaces, unless otherwise indicated.
   b. **Thickness:** 1/2 inch, and 5/8 inch, as indicated.
   c. **Edges:** Tapered.

2. **Fire Resistant Type:** Complying with Type X requirements; UL or WH rated.
   a. **At Assemblies Indicated with Fire-Rating:** Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
   b. **Application:** Where required for fire-rated assemblies, unless otherwise indicated.
   c. **Thickness:** 1/2 inch, and 5/8 inch, as indicated.
   d. **Edges:** Tapered.

3. **Ceiling Board:** Special sag-resistant type.
   a. **Application:** Ceilings, unless otherwise indicated.
   b. **Thickness:** 5/8 inch.
   c. **Edges:** Tapered.

4. **Abuse-Resistant Type:** Gypsum wallboard especially formulated for increased impact resistance, with enhanced gypsum core and heavy duty face and back paper.
   a. **Application:** High-traffic areas indicated.
   b. **Core Type:** Regular and Type X, as indicated.
   c. **Thickness:** 1/2 inch, and 5/8 inch, as indicated.
   d. **Edges:** Tapered.

5. **Wet Locations - Product DensArmor Plus Paperless Interior Dywall in moisture prominent locations.**

**G. Water-Resistant Gypsum Backing Board:** ASTM C 1396/C 1396M; ends square cut.

1. **Application:** Vertical surfaces behind thinset tile, except in wet areas.
2. **Core Type:** Regular and Type X, as indicated.
3. **Thickness:** 1/2 inch, and 5/8 inch, as indicated.
4. **Edges:** Tapered.

**H. Wet Locations - Product DensArmor Plus Paperless Interior Dywall in moisture prominent locations.**

1. **Clarification:** 5/8" Durrock backer board needs to be installed in the Guestroom bathrooms with the moisture resistend gyp, except behind the ceramic tile suroundings.
J. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
   2. Core Type: Regular and Type X, as indicated.
   3. Thickness: 1/2 inch, and 5/8 inch, as indicated.

K. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
   1. Application: Exterior sheathing, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
   4. Core Type: Regular and Type X, as indicated.
   5. Type X Thickness: 5/8 inch.
   6. Thickness: 1/2 inch, and 5/8 inch, as indicated.
   7. Edges: Square.
   8. Glass Mat Faced Products:
      a. American Gypsum Company; M-Glass Exterior Sheathing Type X.
      b. CertainTeed Corporation; GlasRoc Brand.
      c. Georgia-Pacific Gypsum; DensGlass Sheathing.
      d. Temple-Inland Inc; GreenGlass Exterior Sheathing.
      e. USG Corporation; Sheetrock Gypsum Exterior Gypsum Ceiling Board.
   f. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

L. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
   2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
   3. Types: Regular and Type X, in locations indicated.
   4. Type X Thickness: 5/8 inch.
   5. Regular Type Thickness: 1/2 inch.
   7. Products:
      a. American Gypsum Company; Exterior Soffit Gypsum Wallboard Type X.
      b. CertainTeed Corporation; ProRoc Brand Exterior Soffit Board.
      c. Georgia-Pacific Gypsum; ToughRock Fireguard C Soffit Board.
      d. Temple-Inland Inc; Exterior Gypsum Soffit Board.
      e. USG Corporation; Sheetrock Exterior Gypsum Ceiling Board.
      f. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

M. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
   1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
   2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1656/C1658M.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   4. Products:
      a. American Gypsum Company; M-Glass Shaft Liner.
      b. National Gypsum Company; Gold Bond Brand eXP Shaftliner.
      c. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner XP (mold-resistant).
      d. Temple-Inland Inc; GreenGlass Liner Panel.
      e. USG Corporation; Sheetrock Gypsum Liner Panels--Enhanced (mold-resistant).
      f. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
N. Gypsum Shaftwall or Coreboard: ASTM C 1396/C 1396M; Type X core; sizes to minimize joints in place; 1 inch thick; square, tongue and groove, or double beveled edges, ends square cut.

2.04 FIBERGLASS REINFORCED BOARD MATERIALS
A. Cementitious Backer Board: ANSI A118.9, aggregated portland cement panels with glass fiber mesh embedded in front and back surfaces, 1/2 inch thick.
B. Glass Mat Gypsum Board: Gypsum panels with moisture-resistant core and coated inorganic fiberglass mat back surface designed to resist growth of mold and mildew, per ASTM D 3273.

2.05 SHAFT WALL ASSEMBLIES
A. Gypsum Liner Panels: ASTM C 442 or ASTM C 1396, gypsum liner panels in 1 inch thickness and with moisture-resistant paper faces.
   1. Product: Subject to compliance with requirements, provide SHEETROCK Brand Gypsum Liner Panels by United States Gypsum Company.
B. Intermittent Air Pressure Load: 7.5 psf.
C. Sustained Air Pressure Load: 10 psf limited to vent and air shaft assemblies.
D. Allowable Deflection: L/240.
E. Studs: USG Steel C-H Studs (CH) - 212CH20 for repetitive members and corner and end members and for fire resistance rated assembly indicated.
   1. Depth: 2-1/2 inches unless otherwise noted on drawings
   2. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
F. Track (Runner): USG Steel J-Runners (JR) with long-leg length as standard with manufacturer, but at least 2 inches, in depth matching studs.
   1. Minimum Base Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated.
G. Jamb Struts: USG Steel Jamb Struts (JS) with long-leg length of 3 inches, in depth matching studs, and not less than 0.0341 inch thick.
H. Cavity Insulation: Sound attenuation blankets.

2.06 ACCESSORIES
A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: _____ inch.
C. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
D. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
E. Water-Resistive Barrier: []
F. Building Paper: Asphalt impregnated building felt conforming to ASTM D 226, Type I.
G. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
H. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
I. Textured Finish Materials: Latex-based compound; plain.

J. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

K. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

L. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

M. Screws: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.

N. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
   1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
   2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

C. Studs: Space studs as indicated on drawings.
   1. Extend partition framing extend to structure where indicated and extend to 6" above ceiling at all other locations unless otherwise noted.
   2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.

F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

G. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.05 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistant barrier.

D. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.

E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. Glass Mat Faced Gypsum Board: Install in strict accordance with manufacturer's instructions.

G. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints as indicated on drawings and if not indicated on drawings follow the instructions as follows:
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   2. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.07 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

3.08 TEXTURE FINISH

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.09 FINISH LEVEL SCHEDULE

A. Level 1: Above finished ceilings concealed from view.

B. Level 2: Utility areas and areas behind cabinetry.

C. Level 3: Walls scheduled to receive textured wall finish.

D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.

E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

END OF SECTION
SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Tile for floor applications.
B. Tile for wall applications.
C. Stone thresholds.
D. Ceramic trim.

1.02 RELATED REQUIREMENTS
A. Section 03 5400 - Cast Underlayment.
B. Section 07 1200 - Built-Up Bituminous Waterproofing.
C. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
D. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS
   4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
14. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturers’ data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

1.05 QUALITY ASSURANCE
A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS
A. Do not install solvent-based products in an unventilated environment.
B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE
A. Manufacturers: Refer to Tru by Hilton, Interior finish schedule for tile brands and types.
B. See interior specification by interior designer.
C. Equivalent to: All floor tile must have a coefficient of friction rating of 0.6 ASTM (wet) or better.

2.02 TRIM AND ACCESSORIES
A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Manufacturers: Same as for tile.
C. Thresholds: Marble, white or gray, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

2.03 SETTING MATERIALS
A. Manufacturers:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4, ANSI A118.15, or _____.
   1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
   2. Products:
      a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: www.ardexamericas.com.
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Applications: Where indicated on drawings.
   2. Products:
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.
   1. Products:
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.04 ADHESIVE MATERIALS

A. Manufacturers:
   3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.

2.05 GROUTS

A. Manufacturers:
   1. ARDEX Engineered Cements; ____: www.ardexamericas.com.
   5. _____.
   6. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As scheduled. Refer to Tru finish index.
   4. Products:
      e. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Color(s): As scheduled.
   2. Products:
d. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

D. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.

E. Standard Grout: Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7.

2.06 MAINTENANCE MATERIALS
A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.

2.07 ACCESSORY MATERIALS
A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
B. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
   1. Standard Type: Thickness 1/2 inch.
   2. Fire Resistant Type: Type X core, thickness 5/8 inch.
C. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

3.02 PREPARATION
A. Protect surrounding work from damage.
B. Vacuum clean surfaces and damp clean.
C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
E. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
F. Install tile backer board in strict accordance with manufacturer's instructions, using galvanized roofing nails or corrosion-resistant bugle head drywall screws. Bed fiberglass self-adhesive tape at all joints and corners with material used to set tiles.

3.03 INSTALLATION - GENERAL
A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over exterior concrete substrates, install in accordance with TCNA (HB) Method F102, with standard grout.

B. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
   3. Where furan bond coat and grout are indicated, install in accordance with TCNA (HB) Method F133.
   4. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F115.

C. Over wood substrates, install in accordance with TCNA (HB) Method F142, with standard grout, unless otherwise indicated.
   1. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F143.

D. Over wood substrate with backer board underlayment, install in accordance with TCNA (HB) Method F144, for cementitious backer boards, with standard grout.

3.05 INSTALLATION - SHOWERS AND BATHTUB WALLS

A. At tiled shower receptors install in accordance with TCNA (HB) Method B415, mortar bed floor, and W244, thin-set over cementitious backer unit walls.

B. At bathtub walls install in accordance with TCNA (HB) Method B412, over cementitious backer units with waterproofing membrane.

C. Grout with standard grout as specified above.

D. Seal joints between tile work and other work with sealant Type ____ specified in Section 07 9005.

3.06 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.07 CLEANING
   A. Clean tile and grout surfaces.

3.08 PROTECTION
   A. Do not permit traffic over finished floor surface for 4 days after installation.

3.09 SCHEDULE
   A. See Home2 finish index by Hilton.

END OF SECTION
PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Suspended metal grid ceiling system.
   B. Acoustical units.
1.02 RELATED REQUIREMENTS
   A. Section 07 2100 - Thermal Insulation: Acoustical insulation.
   B. Section 07 9005 - Joint Sealers: Acoustical sealant.
1.03 REFERENCE STANDARDS
   B. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on suspension system components.
   C. Samples: Submit two samples 8 inch in size illustrating material and finish of acoustical units.
   D. Manufacturer's Installation Instructions: Indicate special procedures.
1.05 QUALITY ASSURANCE
   A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated, as shown on drawings.
   B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
1.06 FIELD CONDITIONS
   A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.
1.07 PROJECT CONDITIONS
   A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
   B. Install acoustical units after interior wet work is dry.
1.08 EXTRA MATERIALS
   A. See Section 01 6000 - Product Requirements, for additional provisions.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Acoustic Tiles/panels:
      4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
   B. Suspension Systems:
      1. Same as for acoustical units.
2.02 ACOUSTICAL CEILINGS

A. Manufacturers:
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Acoustical Units - General: ASTM E1264, Class A.
   1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the
      fire-resistive assembly as part of suspension system.

C. Acoustical Tile Type A: Painted mineral fiber, ASTM E1264 Type III, with the following
   characteristics:
      1. Size: 24" x 24" inches.
      2. Thickness: 5/8 inches.
      3. Edge: Square.
      4. Surface Color: To be selected by River Street Architecture, LLC from manufacturer's
         standard line.
      5. Surface Pattern: Perforated, regularly spaced large holes.

D. Acoustical Tile Type B: Plastic faced mineral fiber, ASTM E1264 Type IV, with the following
   characteristics:
      1. Size: 24" X 48" inches.
      2. Thickness: 5/8 inches.
      3. Edge: Square.

E. Acoustical Panels Type C: Painted mineral fiber, ASTM E1264 Type III, with the following
   characteristics:
      1. Size: 24 by 48 inches.
      2. Thickness: 5/8 inches.
      3. Edge: Square.
      4. Surface Color: To be selected by River Street Architecture, LLC from manufacturer's
         standard line.

2.03 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Same as for acoustical units.
   2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking
   components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as
   required.

C. Exposed Steel Suspension System Type ____: Formed steel, commercial quality cold rolled;
   heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   4. Products:
      a. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.04 ACCESSORIES

A. Support Channels and Hangers for type A System: Galvanized steel; size and type to suit
   application, seismic requirements, and ceiling system flatness requirement specified.

B. Wood Veneer Panel Safety Clips: Galvanized 1-9/16 by 5-1/2 inch bent sheet metal clips screw
   anchored to back of adjacent panels and spanning over top of suspended tee grid.
   1. Wire Ties: No. 12 galvanized wire.
C. Wood Veneer Perimeter Trim: Field cut wood veneer panels to match acoustic ceiling panels.
D. Support Channels and Hangers for type B System: Aluminum; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
E. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
F. Acoustical Insulation: Specified in Section 07 2100.
   1. Thickness: 2 inch.
   2. Size: To fit acoustical suspension system.
G. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.
H. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9005.
I. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.
J. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM
A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
H. Do not eccentrically load system or induce rotation of runners.
I. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS
A. Install acoustical units in accordance with manufacturer's instructions.
B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
C. Fit border trim neatly against abutting surfaces.
D. Install units after above-ceiling work is complete.
E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
G. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

END OF SECTION
OPTIONAL CHECKLIST

PART 1  GENERAL

2.01  SECTION INCLUDES

A. Surface preparation.
B. Field application of paints, stains, and varnishes.
C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Elevator pit ladders.
   3. Exposed surfaces of steel lintels and ledge angles.
   4. Exposed walls and bottom of swimming pools and fountains.
   5. Mechanical and Electrical:
D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   7. Concealed pipes, ducts, and conduits.

2.02  RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.
B. Section 09 9123 - Interior Painting.

2.03  DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

2.04  REFERENCE STANDARDS

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
F. SSPC-SP 1 - Solvent Cleaning; 2015.
G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
H. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

2.05  SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
2.06 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

2.07 DELIVERY, STORAGE, AND HANDLING
   A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
   B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
   C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

2.08 FIELD CONDITIONS
   A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
   B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
   C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS
3.01 MANUFACTURERS
   A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   B. Paints:
   C. Stains:
   D. Primer Sealers: Same manufacturer as top coats.
   E. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

3.02 PAINTS AND FINISHES - GENERAL
   A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
      1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
      2. Supply each paint material in quantity required to complete entire project's work from a single production run.
      3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
   B. Flammability: Comply with applicable code for surface burning characteristics.
   C. Colors: As indicated in Color Schedule.

3.03 PAINT SYSTEMS - EXTERIOR
1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
   a. Products:
      1) Behr Marquee Exterior Satin Enamel [No. 9450]. (MPI #15)
      2) Behr Marquee Exterior Semi-Gloss Enamel [No. 5450]. (MPI #11)
      3) Behr Premium Plus Exterior Satin Enamel [No. 9050]. (MPI #15)
      4) Pratt & Lambert Accolade Exterior, Eggshell.
      6) Pratt & Lambert RedSeal Exterior, Eggshell. (MPI #15)
      7) Pratt & Lambert RedSeal Exterior, Satin. (MPI #11)
     8) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
3. Top Coat Sheen:
   a. Flat: MPI gloss level 1; use this sheen for overhead surfaces.
   b. Velvet: MPI gloss level 2; use this sheen at all locations.
   c. Eggshell: MPI gloss level 3; use this sheen at all locations.
   d. Satin: MPI gloss level 4; use this sheen at all locations.
   e. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
4. Primer: As recommended by top coat manufacturer for specific substrate.
B. Paint E-TR-W - Stain on Wood:
   1. 2 coats stain.
      a. Products:
         1) Behr Premium Solid Color Weatherproofing Wood Stain No. 5011 Ultra White (MPI #16).
         2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
C. Paint WE-OP-3L - Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Gloss: Two coats of latex enamel; _____.
D. Paint CE-OP-3A - Concrete/Masonry, Opaque, Alkyd, 3 Coat:
   1. One coat of block filler.
   2. Semi-gloss: Two coats of alkyd enamel; _____.
E. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
   2. Semi-gloss: Two coats of latex enamel; _____.
   3. Flat: Two coats of latex enamel; _____.
F. Paint GE-OP-2L - Exterior Gypsum Board and Exterior Plaster, Opaque, Latex, 2 Coat:
   1. One coat of latex primer sealer.
   2. Flat: One coat of latex; _____.
G. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. One coat of latex primer.
   2. Gloss: Two coats of latex enamel; _____.
H. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Gloss: Two coats of latex enamel; _____.
   3. Semi-gloss: Two coats of latex enamel; _____.

3.04 PRIMERS
A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
   1. Interior/Exterior Latex Block Filler; MPI #4.
      a. Products:
         1) PPG Paints Speedhide Masonry Hi Fill Latex Block Filler, 6-15. (MPI #4)
2) Pratt & Lambert Acrylic Block Filler.
3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

2. Interior/Exterior Quick Dry Alkyd Primer for Metal; MPI #76.
3. Alkyd Primer for Galvanized Metal.
4. Water Based Primer for Galvanized Metal; MPI #134.
a. Products:
   1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No. 436]. (MPI #134)
   2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

3.05 ACCESSORY MATERIALS
A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION
4.01 EXAMINATION
A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
C. Test shop-applied primer for compatibility with subsequent cover materials.
D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Fiber Cement Siding: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   4. Concrete Floors and Traffic Surfaces: 8 percent.

4.02 PREPARATION
A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
D. Seal surfaces that might cause bleed through or staining of topcoat.
E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
F. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Clean concrete according to ASTM D4258. Allow to dry.
   3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
G. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
H. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

J. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

K. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

L. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

M. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.

N. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

4.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

4.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

4.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

4.06 PROTECTION

A. Protect finishes until completion of project.

4.07 COLOR SCHEDULE

A. Refer to Home2 finish index by Hilton.

END OF SECTION
OPTIONAL CHECKLIST

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints, stains, and varnishes.
C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   7. Concealed pipes, ducts, and conduits.

2.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
B. Section 05 5000 - Metal Fabrications: Shop-primed items.
C. Section 09 9113 - Exterior Painting.
D. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Painted identification.

2.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

2.04 REFERENCE STANDARDS

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
F. SSPC-SP 1 - Solvent Cleaning; 2015.
G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

2.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
2.06 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

2.07 DELIVERY, STORAGE, AND HANDLING
A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

2.08 FIELD CONDITIONS
A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
B. Follow manufacturer’s recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS
3.01 MANUFACTURERS
A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
B. Paints:
C. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

3.02 PAINTS AND FINISHES - GENERAL
A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer’s product instructions.
B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.
C. Colors: As indicated in Color Schedule. See Tru by Hilton Finish Index.
1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
3.03 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, wood, uncoated steel, and shop primed steel.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
      a. Products:
         1) Pratt & Lambert Industrial Acrylic Waterborne DTM, Semi-Gloss. (MPI #141)
         2) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Egg-Shel. (MPI #139)
         3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
   3. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
      a. Products:
         1) PPG Paints Pure Performance Interior Latex, 9-100 Series, Flat. (MPI #143)
         2) PPG Paints Pure Performance Interior Latex, 9-300XI Series, Eggshell. (MPI #144)
         3) PPG Paints Speedhide zero Latex, 6-4310XI Series, Eggshell. (MPI #144)
         4) PPG Paints Speedhide zero Latex, 6-4410XI Series, Satin. (MPI #145)
         5) PPG Paints Speedhide zero Latex, 6-4510XI Series, Semi-Gloss. (MPI #147)
         6) Pratt & Lambert Industrial Acrylic Waterborne DTM, Satin.
         7) Pratt & Lambert Industrial Acrylic Waterborne DTM, Semi-Gloss. (MPI #147)
         8) Pratt & Lambert Industrial Acrylic Waterborne DTM, Gloss. (MPI #148)
         9) Sherwin-Williams Harmony Interior Acrylic Latex, Egg-Shel. (MPI #144)
         11) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen. (MPI #144)
         12) Valspar Emblem Interior Latex, No. 54500 Series, Flat. (MPI #143)
         13) Valspar Emblem Interior Latex, No. 54510 Series, Eggshell. (MPI #144)
         14) Valspar Emblem Interior Latex, No. 54520 Series, Satin. (MPI #145)
         15) Valspar Emblem Interior Latex, No. 54530 Series, Semi-Gloss. (MPI #147)
         16) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
   4. Top Coat(s): Interior Latex; MPI #43, 44, 52, 53, 54, or 114.
      a. Products:
         2) PPG Paints Speedhide zero Latex, 6-4110XI Series, Flat. (MPI #53)
         3) PPG Paints Speedhide zero Latex, 6-4310XI Series, Eggshell. (MPI #44)
         4) PPG Paints Speedhide zero Latex, 6-4410XI Series, Satin. (MPI #52)
         5) PPG Paints Speedhide zero Latex, 6-4510XI Series, Semi-Gloss. (MPI #54)
         6) Pratt & Lambert Accolade Interior, Flat.
         7) Pratt & Lambert Accolade Interior, Velvet.
         8) Pratt & Lambert Accolade Interior, Satin.
         9) Pratt & Lambert Accolade Interior, Semi-Gloss. (MPI #54)
        10) Pratt & Lambert Industrial Acrylic Waterborne DTM, Gloss. (MPI #114)
        11) Sherwin-Williams Harmony Interior Acrylic Latex, Flat. (MPI #53)
        12) Sherwin-Williams Harmony Interior Acrylic Latex, Semi-Gloss. (MPI #54)
        13) Sherwin-Williams Harmony Interior Acrylic Latex, Egg-Shel. (MPI #44)
        15) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Semi-Gloss. (MPI #43)
        16) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen. (MPI #44)
        17) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Egg-Shel. (MPI #52)
        18) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
   5. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
2. Two top coats and one coat primer.
3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
   a. Products:
      1) Sherwin-Williams Pro Industrial Waterbased Catalyzed Epoxy, Gloss. (MPI #115)
      2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
4. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, or 141.
   a. Products:
      1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
      2) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
5. Top Coat(s): Interior Alkyd; MPI #47, 48, 81, or 96.
   a. Products:
      1) Behr Alkyd Semi-Gloss Enamel [No. 3900].
      2) Pratt & Lambert Pro-Hide Gold Interior Alkyd, Semi-Gloss.
      3) Pratt & Lambert RedSeal Interior Oil, Eggshell.
      4) Valspar Armor Anti-Rust Oil Enamel, No. 21800 Series, Gloss. (MPI #48)
      5) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
6. Top Coat(s): Interior Alkyd, Water Based; MPI #167, 168, or 169.
   a. Products:
      1) Sherwin-Williams ProMar 200 Waterbased Acrylic-Alkyd, Eg-Shel.
      4) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
7. Top Coat Sheen:
   a. Eggshell: MPI gloss level 3; use this sheen at all locations.
   b. Satin: MPI gloss level 4; use this sheen at all locations.
   c. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   d. Gloss: MPI gloss level 6; use this sheen at all locations.
8. Primer: As recommended by top coat manufacturer for specific substrate.

1. Two top coats and one coat primer.
2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
   a. Products:
      2) Pratt & Lambert Acrylic Waterborne Epoxy, Gloss.
      3) Sherwin-Williams Pro Industrial Waterbased Catalyzed Epoxy, Gloss. (MPI #115)
      4) Sherwin-Williams Waterbased Catalyzed Epoxy, Gloss.
      6) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
3. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
   a. Products:
      1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
      2) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
4. Top Coat(s): Interior Alkyd; MPI #47, 48, 49, 51, 81, or 96.
   a. Products:
      1) Pratt & Lambert Industrial Alkyd Enamel HS, Gloss.
      2) Valspar Armor Anti-Rust Oil Enamel, No. 21800 Series, Gloss. (MPI #48)
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

5. Top Coat(s): Interior Alkyd, Water Based; MPI #167, 168, or 169.
   a. Products:
      1) Sherwin-Williams ProMar 200 Waterbased Acrylic-Alkyd, Eg-Shel.
      4) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, galvanized piping, and ________.
   1. Shop primer by others.
   2. One top coat ________.
   3. Top Coat: Alkyd Dry Fall; MPI #55, 89, or 225.
      a. Products:
         1) Pratt & Lambert Alkyd Flat Dry Fall. (MPI #55)
         2) Pratt & Lambert Alkyd Semi-Gloss Dry Fall. (MPI #225)
         3) Sherwin-Williams Dryfall Flat. (MPI #55)
         4) Sherwin-Williams Super Save-Lite Dryfall, Semi-Gloss. (MPI #89)
         5) Sherwin-Williams Super Save-Lite Dryfall, Gloss VOC Complying.
         6) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

4. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
   a. Products:
      1) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog, 6-725XI, Flat. (MPI #118)
      2) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog, 6-724XI, Semi-Gloss. (MPI #155)
      3) Pratt & Lambert Waterborne Dry Fall, Flat. (MPI #118)
      4) Pratt & Lambert Waterborne Dry Fall, Semi-Gloss (MPI #155, 226)
      5) Sherwin-Williams Waterborne Acrylic Dryfall, Flat. (MPI #118)
      6) Sherwin-Williams Waterborne Acrylic Dryfall, Eg-Shel. (MPI #155, 226)
      7) Sherwin-Williams Waterborne Acrylic Dryfall, Semi-Gloss. (MPI #226)
      8) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

E. Paint I-TR -W - Transparent Finish on Wood.
   1. 1 top coat over sanding sealer over stain.
   2. Stain: Semi-Transparent Stain for Wood; MPI #90.
      a. Products:
         1) Sherwin-Williams Wood Classics Interior Oil Stain. (MPI #90)
         2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

   a. Products:
      1) Sherwin-Williams Wood Classics FastDry Sanding Sealer. (MPI #102)
      2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

4. Top Coat(s): Polyurethane Varnish, Oil Modified; MPI #56 or 57.
   a. Products:
      1) Sherwin-Williams Wood Classics Polyurethane Varnish, Satin. (MPI #57)
      2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

3.04 PRIMERS
   A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Alkali Resistant Water Based Primer; MPI #3.
   a. Products:
      1) PPG Paints Seal Grip Acrylic Primer, 17-921 Series. (MPI #3)
      2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
2. Interior/Exterior Latex Block Filler; MPI #4.
   a. Products:
      1) PPG Paints Speedhide Masonry Hi Fill Latex Block Filler, 6-15. (MPI #4)
      2) Pratt & Lambert Acrylic Block Filler.
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
3. Interior Latex Primer Sealer; MPI #50.
   a. Products:
      1) PPG Paints Speedhide Interior Latex Sealer, 6-2. (MPI #50)
      2) PPG Paints Speedhide zero Interior Latex Sealer, 6-4900XI. (MPI #50)
      3) Pratt & Lambert Multi-Purpose Waterborne Primer. (MPI #50)
      4) Pratt & Lambert Pro-Hide Gold Interior Latex High Holdout Primer/Sealer.
      5) Pratt & Lambert Pro-Hide Gold Interior Latex Primer.
      6) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
4. Interior Drywall Primer Sealer.
   a. Products:
      1) Pratt & Lambert Drywall Primer.
      2) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
5. Interior Rust-Inhibitive Water Based Primer; MPI #107.
   a. Products:
      1) PPG Paints Pitt-Tech Plus DTM Industrial Primer, 90-912 Series. (MPI #107)
      2) Pratt & Lambert Acrylic Primer/Finish.
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
6. Latex Primer for Interior Wood; MPI #39.
   a. Products:
      1) PPG Paints Seal Grip Acrylic Primer, 17-921 Series. (MPI #39)
      2) Pratt & Lambert Pro-Hide Gold Interior/Exterior Waterborne Primer. (MPI #39)
      3) Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

3.05 ACCESSORY MATERIALS
   A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
   B. Patching Material: Latex filler.
   C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

4.01 EXAMINATION
   A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
   B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
   C. Test shop-applied primer for compatibility with subsequent cover materials.
   D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
      1. Gypsum Wallboard: 12 percent.
      2. Plaster and Stucco: 12 percent.
      3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
      4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

4.02 PREPARATION
   A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete:

F. Masonry:

G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

H. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

J. Galvanized Surfaces:

K. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

L. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

N. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

4.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
4.04 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

4.05 CLEANING
   A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

4.06 PROTECTION
   A. Protect finishes until completion of project.

4.07 COLOR SCHEDULE

4.08 SEE HOME2 FINISH INDEX BY HILTON.

END OF SECTION
SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Accessories for toilet rooms, showers, residential bathrooms, and utility rooms.
B. Grab bars.

1.02 RELATED REQUIREMENTS
A. Section __________: Concealed supports for accessories, including in wall framing and plates, above ceiling framing, and ______.
B. Section 08 8300 - Mirrors: Other mirrors.
C. Section 09 3000 - Tiling: Ceramic washroom accessories.

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

1.04 ADMINISTRATIVE REQUIREMENTS
A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.
B. Refer to Tru by Hilton, Brand Standards document for specific requirements under this section.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.06 COORDINATION
A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Toilet Accessories:
   4. Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.
B. All items of each type to be made by the same manufacturer.

2.02 MATERIALS
A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
B. Stainless Steel Sheet: ASTM A666, Type 304.
C. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.
D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
E. Adhesive: Two component epoxy type, waterproof.
F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES
A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES
A. See drawings for specific accessories and locations.
B. Toilet Paper Dispenser: Single roll, surface mounted bracket type, chrome-plated zinc alloy brackets, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
C. Combination Towel Dispenser/Waste Receptacle: Recessed flush with wall, stainless steel; seamless wall flanges, continuous piano hinges, tumbler locks on upper and lower doors.
   1. Product: __________ manufactured by __________.
D. Soap Dispenser: Liquid soap dispenser, deck-mounted on vanity, with polyethylene container concealed below deck; piston and 4 inch spout of stainless steel with bright polished finish; chrome-plated deck escutcheon.
E. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
F. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base, tumbler lock.
G. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
   2. Heavy Duty Grab Bars: Floor supports are acceptable if necessary to achieve load rating.
      a. Push/Pull Point Load: Minimum 1000 pound-force, minimum.
      b. Dimensions: 1-1/2 inch outside diameter, minimum 0.125 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
H. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
   1. Length and Configuration: As indicated on drawings.
   2. Product: B-6806 manufactured by Bobrick.
I. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
J. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Style: Horizontal.

2.05 SHOWER AND TUB ACCESSORIES
A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
2. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
C. Folding Shower Seat: Wall-mounted recessed; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
   1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of ____ color.

2.06 UTILITY ROOM ACCESSORIES
A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
   1. Holders: 3 spring-loaded rubber cam holders.
B. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.

3.02 PREPARATION
A. Deliver inserts and rough-in frames to site for timely installation.
B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION
A. Install accessories in accordance with manufacturers’ instructions in locations indicated on the drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
   1. Grab Bars: As indicated on the drawings.
D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

END OF SECTION
SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Fire extinguishers.
B. Fire extinguisher cabinets.
C. Accessories.

1.02 RELATED REQUIREMENTS
A. Section 06 1054 - Wood Blocking and Curbing: Wood blocking and shims.
B. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS
B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 PERFORMANCE REQUIREMENTS
A. Conform to NFPA 10.
B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
C. Product Data: Provide extinguisher operational features.

1.06 FIELD CONDITIONS
A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Fire Extinguishers:
   5. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
B. Fire Extinguisher Cabinets and Accessories:

2.02 FIRE EXTINGUISHERS
A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   1. Cartridge Operated: Spun shell.
2. Class: A:B:C type.
3. Finish: Baked polyester powder coat, ____ color.
4. Temperature range: Minus 65 degrees F to ___ degrees F.

C. Carbon Dioxide Type Fire Extinguishers: Aluminum tank, with pressure gage.
   1. Class: B:C type.
   2. Finish: Baked polyester powder coat, ____ color.
   3. Temperature range: Minus 40 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS
   A. Equal to Larsen's Manufacturing Company Architectural Series; with steel door and steel trim having factory finished white baked enamel finish; Vertical Duo door with 1/4" clear tempered glass; no lock.
      1. Provide semi-recessed cabinets with 2-1/2" rolled edge trim, equal to Larsen's R3.
   B. Provide fire-rated cabinets in fire-rated walls, certified and listed by Warnock-Hersey for use in one and two-hour combustible and non-combustible wall systems conforming to the requirements of UBC Standard 43-6 (ASTM E-814). Provide fire-rated cabinets with factory drilled mounting holes and factory supplied anchoring devices, equal to Larsen's Model No. FS-2409.

2.04 ACCESSORIES
   A. Extinguisher Brackets: Formed steel, chrome-plated. Equal to Larsen's B-2 wall brackets, suitable for use with fire extinguishers by Larsen's Manufacturing Company, or approved equal.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify existing conditions before starting work.
   B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install cabinets plumb and level in wall openings, ____ inches from finished floor to inside bottom of cabinet.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Aluminum Flagpoles.

1.02 RELATED REQUIREMENTS
   A. Section ______ ________: Concrete base and foundation construction.
   B. Section 09 9113 - Exterior Painting: Site painting.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on pole, accessories, and configurations.

1.05 QUALITY ASSURANCE
   A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed Texas.
   B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
   B. Protect flagpole and accessories from damage or moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Approved Manufacturers:
      1. ACME Flagpole Co. (800-260-1897)
      5. Ewing Flagpoles <http://www.ewingflagpole.com> (716-833-3278)
      7. Michigan Flagpole, Inc. (800-875-3524)
   B. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.
2.02 FLAGPOLES
A. Pole Construction, General: Construct poles and ship to Project site in one piece, if possible. If more than one piece is necessary, provide snug-fitting precision joints with self-aligning, internal splicing sleeve arrangement for weathertight, hairline field joints.
   1. Provide the following above grade nominal heights, in locations shown on drawings.
      a. 30 feet high
   1. Provide cone-tapered aluminum flagpoles.
C. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635" minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16" steel bottom plate and support plate; 3/4" diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
D. Design:
   1. Design: Cone tapered.
   2. Mounting: Ground mounted type.
   3. Halyard: Interior type.

2.03 POLE MATERIALS
A. Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.04 ACCESSORIES
A. Truck Assembly: Cast aluminum; revolving.
B. Cleats: 9 inch size, aluminum with galvanized steel fastenings, two per halyard.
C. Finial Ball: Manufacturer's standard flush-seam ball, 5" to 6" diameter, gold anodized.
D. Internal Halyard: Ball-bearing, nonfouling, revolving truck assemblies of cast metal with continuous 5/16" (8 mm) diameter, braided polypropylene halyards and 9" cast-metal cleats with fasteners.
   1. Provide one halyard and one cleat at each flagpole.
   2. Provide halyard protectors consisting of a 2" (50 mm) channel, 60" (1500 mm) long, finished to match flagpole.
E. Halyard Flag Snaps: Provide 2 swivel snap hooks per halyard.
F. Winch: Stainless steel, direct drive, self-locking.
G. Lightning Rod: 3/4" diameter galvanized lightning spike welded to base steel plate.

2.05 MOUNTING COMPONENTS
A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gage, 0.0598 inch steel, galvanized, depth of _____ inches as indicated.
B. Pole Base Attachment: Flush; steel base with base cover.

2.06 FINISHING
A. Metal Surfaces in Contact With Concrete: Asphaltec paint.
B. Concealed Steel Surfaces: Prime painted.
C. Aluminum: Mill finish.
D. Stainless Steel: No. 4 satin finish.
E. Finial: Spun finish.
PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.02 PREPARATION

A. PREPARATION
   1. Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint.
   2. Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.
   3. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.
   4. Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a nonstaining curing compound. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

3.03 INSTALLATION

A. General: Install flagpoles where shown on drawings and according to Shop Drawings and manufacturer's written instructions.

B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood edges. Seal top of foundation tube with a 2" layer of elastomeric sealant and cover with flashing collar.

3.04 ADJUSTING

A. Adjust operating devices so that halyard and flag function smoothly.

3.05 SCHEDULES

A. See site plan for Flag Pole locations.

END OF SECTION
SECTION 14 2010
PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Complete elevator systems.
B. Hoist Beam, Pit Ladder and inserts mounted in CMU walls for railing attachment.
C. Elevator maintenance.
D. Work supplied under other sections; 1. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door. 2. Main line disconnects for each elevator. a. One fused three phase permanent power in building electrical distribution room, b. One non fused three phase permanent power in hoistway at top landing.
E. Hoistway ventilation shall be in accordance with local and national building code requirements.
F. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
G. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
H. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
I. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
J. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
K. Access Doors: As required for access to governor and/or seismic switch. Access door shall be self-closing, self-locking if necessary and operable from the inside without a key.

1.02 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls: Temporary power supply.
B. Section 03 3000 - Cast-in-Place Concrete: Includes elevator machine foundation.
C. Section 04 2000 - Unit Masonry: Masonry hoistway enclosure; building-in and grouting hoistway door frames.
D. Section 05 1200 - Structural Steel Framing: Includes hoistway framing.
E. Section 05 5000 - Metal Fabrications: Pit ladder, Sill supports, divider beams, and overhead hoist beams.
F. Section 07 1400: Waterproofing of elevator pit walls and floor.
G. Section 07 7200 - Roof Accessories: Smoke venting hatch at top of hoistway.
H. Section 07 8100 - Applied Fireproofing: Fireproofing of guide rail brackets where attached to building structural members.
I. Section 09 2116 - Gypsum Board Assemblies: Gypsum shaft walls.
J. Section 10 4400 - Fire Protection Specialties: Fire extinguisher in elevator machine room.
K. Section 22 3000 - Plumbing Equipment: Pit drain.
L. Section 26 0534 - Conduit:
   1. Empty conduit from controller cabinet in machine room to remote group supervisory panel in lobby.
M. Section 26 2717 - Equipment Wiring:
   1. Electrical characteristics and wiring connections.
   2. Electrical service to main disconnect in elevator machine room.
3. Emergency power transfer cabinet.
4. Electrical power for elevator installation and testing.
5. Electrical disconnecting device to elevator equipment prior to activation of sprinkler system.
6. Electrical service for machine room.
7. Lighting in elevator pit.
8. Empty conduit for telephone service to machine room.

1.03 REFERENCE STANDARDS
D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS
A. Preinstallation Meeting: Convene a meeting one week prior to starting work.
   1. Review schedule of installation, installation procedures and conditions, and coordination with related work.
   2. Review use of elevator for construction purposes, hours of use, scheduling of its use, cleanliness of cab, employment of operator, maintenance of system.

1.05 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Submit manufacturer’s product literature for each proposed system.
   1. Cab design, dimensions and layout.
   2. Layout, finishes, and accessories and available options.
   3. Controls, signals and operating system.
C. Shop Drawings:
   1. Clearances and travel of car.
   2. Clear inside hoistway and pit dimensions.
   3. Location and layout of equipment and signals.
   4. Car, guide rails, buffers and other components in hoistway.
   5. Maximum rail bracket spacing.
   7. Hoist beam requirements.
   8. Location and sizes of access doors.
   9. Location and details of hoistway door and frames.
   10. Electrical characteristics and connection requirements.
D. Operation and maintenance data:
   1. Provide manufacturer's standard maintenance and operation manual.
E. Diagnostic Tools
   1. Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed. This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner. Any diagnostic tool provided to the Owner by the
Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment and parametric software changes which are available to the Elevator Contractor. In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the competed project. During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner. The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor. Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

F.

G. Product Data: Provide data on the following items:
   1. Signal and operating fixtures, operating panels, indicators.
   2. Cab design, dimensions, layout, and components.
   3. Cab and hoistway door and frame details.
   4. Electrical characteristics and connection requirements.

H. Maintenance Contract.

I. Maintenance Data: Include:
   1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
   2. Technical information for servicing operating equipment.
   3. Legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the Work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with applicable code and as supplemented in this section.

B. Designer Qualifications: Design guide rails, brackets, anchors, and machine anchors under direct supervision of a Professional Structural Engineer experienced in design of work of this type and licensed in Texas.

C. Perform structural steel design, fabrication, and installation in accordance with AISC 360, Specification for Structural Steel Buildings. Perform seismic design in accordance with applicable code.

D. Fabricate and install door and frame assemblies in accordance with NFPA 80.

E. Perform electrical work in accordance with NFPA 70.

F. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

G. Installer Qualifications: Company specializing in performing the work of this section and approved by elevator equipment manufacturer.

H. Products Requiring Fire Resistance Rating: Listed and classified by UL.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Procedures & Submittals, for additional warranty requirements.

B. Provide one year manufacturer warranty for elevator operating equipment and devices.
PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. ThyssenKrupp Elevator.
   B. All components to be manufactured by same entity, unless otherwise indicated.
   C. Provide AC gearless, machine-room-less traction elevator systems.

2.02 ELEVATORS
   A. Elevator ALL: Passenger, holeless hydraulic type with cylinder in hoistway.
      1. ThyssenKrupp System Endura.
      2. Operation and Controls: VWF.
      3. Operation: TAC50-04
      6. Cab Height: 96 inches.
      7. Door Type: Single leaf.
      9. Rated Net Capacity: 2500 and 3500 lbs. 2 passenger elevators, see plan for locations.
     10. Rated Speed: 150 ft/min.
     13. Number of Openings: 8 Front; 4 Rear.

2.03 CAR ENCLOSURE
   A. Car Enclosure:
      1. Walls: wall panel finish to be selected by owner / interior designer.
   B. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Two coats factory applied reflective baked enamel.
      1. Ceiling: Halogen downlight with brushed stainless Steel panel.
      2. Cab Columns, Front, and Transom: Provide panels faced with brushed stainless steel.
      3. Doors: One speed, center opening.
         b. Cab Sills: Extruded aluminum, mill finish.
      4. Handrail: Provide 2" brushed stainless flat bar with returns.
     5.
     6.
     7.
   C. Car Top Inspection: Provide a car top inspection station with an “Auto-Inspection” switch, an “emergency stop” switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.04 CONTROLS
   A. Elevator Controls: Provide landing buttons and hall lanterns.
   B. Door Controls:
      1. Program door control to open doors automatically when car arrives at floor.
      2. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.
      3. If doors are prevented from closing for approximately ten seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared. Sound buzzer.
      4. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equip with photo-electric light rays.
C. Landing Buttons: Stainless steel type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows.

D. Interconnect elevator control system with building fire alarm systems.

E. Provide "Firefighter's Operation" in accordance with applicable code. Designated Landing: 1st Floor.

2.05 EMERGENCY POWER
A. Arrange elevator operation to operate under emergency power when normal power supply fails.

2.06 ELECTRICAL CHARACTERISTICS AND COMPONENTS
A. Electrical Characteristics:
   1. 460 volts, three phase, 60 Hz.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify existing conditions before starting work.
B. Verify that hoistway, pit, and machine room are ready for work of this section.
C. Verify hoistway shaft and openings are of correct size and within tolerance.
D. Verify that electrical power is available and of the correct characteristics.

3.02 PREPARATION
A. Arrange for temporary electrical power for installation work and testing of elevator components.

3.03 INSTALLATION
A. Install system components. Connect equipment to building utilities.
B. Provide conduit, boxes, wiring, and accessories.
C. Accommodate equipment in space indicated.
D. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.
E. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
F. Coordinate installation of hoistway wall construction.
G. Install hoistway door sills, frames, and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
H. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
I. Adjust equipment for smooth and quiet operation.

3.04 ERECTION TOLERANCES
A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1.
B. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL
A. Testing and inspection by regulatory agencies will be performed at their discretion.
   1. Schedule tests with agencies and notify Kana Hotel Group and River Street Architecture, LLC.
   2. Obtain permits required to perform tests.
   3. Document regulatory agency tests and inspections in accordance with the requirements of Section 01 4000.
   4. Perform tests required by regulatory agencies.
   5. Furnish test and approval certificates issued by authorities having jurisdiction.
B. Perform operational tests in the presence of Kana Hotel Group and River Street Architecture, LLC.

C. Operational Tests:
   1. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.

3.06 ADJUSTING
   A. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
   B. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch from flush.

3.07 CLEANING
   A. Remove protective coverings from finished surfaces.
   B. Clean surfaces and components ready for inspection.

3.08 PROTECTION
   A. Do not permit construction traffic within cab after cleaning.
   B. Protect installed products until project completion.
   C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.09 MAINTENANCE
   A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
   B. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer.
   C. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Kana Hotel Group.
   D. Provide service and maintenance of elevator system and components for one year from Date of Substantial Completion.
   E. Examine system components monthly. Clean, adjust, and lubricate equipment.
   F. Include systematic examination, adjustment, and lubrication of elevator equipment. Maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment. Replace wire ropes when necessary to maintain the required factor of safety.
   G. Perform work without removing cars during peak traffic periods.
   H. Provide emergency call back service at all hours for this maintenance period.
   I. Maintain an adequate stock of parts for replacement or emergency purposes locally, near the place of the Work. Have personnel available to ensure the fulfillment of this maintenance service, without unreasonable loss of time.

END OF SECTION
SECTION 14.9100
FACILITY CHUTES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Gravity chutes for soiled linen.

1.02 RELATED REQUIREMENTS
A. Section 06 1000 - Rough Carpentry: Wood curb at roof vent.
B. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflash at chute roof vent.
C. Section 28 3100 - Fire Detection and Alarm: Connection of interlock systems and sensors to fire alarm system.
D. Section 21 1300 - Fire Suppression Sprinklers: Connection to sprinklers inside chute.
E. Section 22 1005 - Plumbing Piping:
   1. Water piping connections to spray cleaning equipment.
   2. Connection of hopper discharge drain to sanitary drain.
F. Section 26 2717 - Equipment Wiring:
   1. Connection of control panels to 110 VAC electrical power.
   2. Wiring and conduit between control panels and controlled components.
   3. Wiring and conduit between discharge room spray cleaning switch and flushing spray head.

1.03 REFERENCE STANDARDS
B. ITS (DIR) - Directory of Listed Products; current edition.
E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for additional requirements.
B. Shop Drawings: Provide detailed layout of chute and components, indicating interface with structure, enclosing walls, and utilities; include the following:
   1. Openings in floors and required clearances.
   2. Location and size of each field connection to structure.
   3. Pipe sizes and locations.
   4. Electrical wiring sizes, conduits, and location of connections.
   5. Clearly indicate components required but not furnished by chute installer.
C. Test Reports: Submit for each test/inspection.
D. Certificates: Certify that chute assembly meets or exceeds NFPA 82 and other specified requirements.
E. Manufacturer Qualification Statement.

1.05 QUALITY ASSURANCE
A. See Section 01 4000 - Quality Requirements, for additional requirements.
B. Products Requiring Electrical Connection: Listed and classified by UL (DIR), ITS (DIR), or testing agency acceptable to authorities having jurisdiction as suitable for the purpose specified and indicated.
C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
   1. With not less than 5 years of experience.

1.06 WARRANTY AND MAINTENANCE SERVICE
   A. See Section 01 7800 - Closeout Procedures & Submittals, for additional requirements.
   B. Correct defective work within a five year period after Date of Substantial Completion.
   C. Maintenance Service: Provide service and maintenance of chute and equipment for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Facility Chutes:
      2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 FACILITY CHUTES
   A. Soiled Linens Chutes: Sheet metal, round, constant diameter extending from above roof to lowest floor, with chute intake doors at each floor and bottom of chute discharge door into designated room as indicated on drawings; complying with requirements of NFPA 82, and the local building code and authorities having jurisdiction.
      2. Intake Doors: Hopper type, self-closing and self-latching, with key locks.
      3. Intake Door Size: 18 by 21 inches wide by high #1HH 1-1/2 hr. U.L. B" Label.
      4. Provide electric interlock system and sensors that automatically prevents the following:
         a. Opening of any other chute intake doors at the same time.

2.03 COMPONENTS
   A. Chute: Factory-fabricated to the greatest extent possible, with continuously welded or lock-seamed joints and smooth, non-snag interior (no protruding bolts, rivets, hardware, sharp edges or corners).
      1. Material: Aluminum-coated steel sheet complying with ASTM A463/A463M, CS Type B, with minimum T1-40/T1M-120 coating.
      2. Sheet Metal Thickness: 0.06 inch.
      3. Fire Rating: In compliance with local building code requirements.
      4. Throat Sections: Provide sloped throat sections for chute intake doors, of same material and construction as chute.
      5. Factory-coat outside of chute with sprayed-on sound-dampening material.
      6. Fabricate with support frames at each floor with sound isolator pads and expansion joints in chute between each support point.
      7. Horizontal Outlets: Provide painted steel leg braces to floor to withstand impact of material on bottom of chute.

   B. Chute Intake Doors: Factory-assembled, UL (DIR) listed and labeled door and frame, with self- or automatic-closing and positive latching; frame designed for chase construction, and flush-mounted.
      1. Material: Stainless steel, brushed or satin finish.
      2. Fire Rating: In compliance with local building code requirements.
      3. Pulls: T-handle or lever handle latch; polished stainless steel.
      4. Signs: Mark on frame or door face the purpose of the chute, using engraving, integral raised lettering, or other permanent signs.

   C. Discharge Doors: Aluminum-coated steel; normally-open, 1 1/2-hour ("B" label) fire rated, with fusible link closing; style as required by chute configuration. Door size 24" x 30".
      1. Horizontal Discharge Style: Top-hinged, drop-down, self-latching, in horizontal housing with 2 inch NPS piped drain connection in bottom. Refer to Section 22 1005.
D. Access Doors: Same construction and fire rating as intake doors, with locks; provide wherever equipment requiring maintenance is located inside chute, including sprinklers and plumbing and electrical connections and Sanitizer access door.

E. Chute Intake and Access Door Locks: Mortise or rim cylinder locks keyed alike; key removable only when door is locked.
   1. Chute Access Doors: Provide two keys for each door.

F. Roof Vent: Full diameter, extending minimum 36 inches above roof level, with roof deck flange.
   1. Material: Manufacturer's standard.
   2. Counterflashing and clamping ring of non-ferrous metal compatible with chute material.
   3. Top Unit: Screened vent.

G. Fire Suppression Sprinklers: Comply with requirements of NFPA 82 and NFPA 13, and refer to Section 21 1300; provide 1/2 inch NPS sprinkler heads mounted inside chute intake throats at following locations:
   1. At or above the top intake opening.
   2. At the lowest intake opening.
   3. In buildings of more than two stories, at every other floor.

H. Spray Cleaning Equipment:
   1. Flushing Spray: Solenoid controlled 3/4 inch NPS spray head mounted above top intake door.
   2. Sanitizing Unit: Tank and feeder to introduce disinfectant into flushing spray line.
      a. Provide backflow preventer valve and actuator switch.
      b. Capacity: 1 gallon, minimum.
      c. Minimum 1 gallon capacity.
      d. Accessible through access door immediately above top intake door.

I. Electrical Controls: 110 VAC.

PART 3 EXECUTION

3.01 INTERFACE WITH OTHER WORK

A. Complete facility chutes and equipment installation and testing before completion of the enclosing construction.

B. Coordinate sprinkler and spray cleaning devices with size, location and installation of service utilities.

C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3.02 INSTALLATION

A. Install facility chutes and equipment in accordance with NFPA 82, requirements of local authorities having jurisdiction, and manufacturer's instructions.

B. Maintain fire-resistive capacity of enclosing walls.

C. Install facility chute plumb and without offsets or obstructions that might prevent free fall of materials, except where indicated on drawings.

D. Anchor securely in manner required to withstand impact and weight of materials in chute.

E. Install roof vent flange to roof deck prior to installation of roofing.

F. Install counterflashing after roofing installation.

G. Adjust doors and other operating components for smooth operation.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Place bagged material of expected size in chute to verify free fall.

C. Test the facility chute components for proper operation.
   1. Operate doors, locks, and interlocks.
2. Operate spray cleaning devices.
3. Simulate fire conditions inside chute to verify sprinkler and detector operation.

3.04 CLEANING
   
   A. After completion of enclosing walls, clean exposed facility chute components; do not remove testing agency labels.

   END OF SECTION
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## DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

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**DIVISION 27 - COMMUNICATIONS**

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**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**

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PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler, standpipe and fire hose, and combination sprinkler and standpipe systems.

1.02 RELATED REQUIREMENTS
   A. Section 21 12 00 - Fire-Suppression Standpipes: Standpipe design.
   B. Section 21 13 00 - Fire Suppression Sprinklers: Sprinkler systems design.

1.03 REFERENCE STANDARDS
   A. ASME B16.5 - Pipe Flanges and Flanged Fittings; The American Society of Mechanical Engineers (ANSI/ASME B16.5).
   B. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings; The American Society of Mechanical Engineers.
   C. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded; The American Society of Mechanical Engineers.
   D. ASME B16.25 - Buttwelding Ends; The American Society of Mechanical Engineers.
   E. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers.
   N. AWWA C606 - Grooved and Shouldered Joints (ANSI/AWWA C606).
   R. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc..
   S. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc..
   T. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc..

1.04 SUBMITTALS
B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified this section.
1. Minimum three years experience.

B. Conform to UL requirements.

C. Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.

D. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.06 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS


B. Standpipe and Hose Systems: Conform work to NFPA 14.

C. Private Fire Main: Conform work to NFPA 24.

D. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 BURIED PIPING

A. Steel Pipe: ASTM A53/A53M Schedule 40 or ASTM A795 Standard Weight, black, with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
3. Joints: Welded in accordance with AWS D1.1/D.1M.
4. Casing: Closed glass cell insulation.


2.03 ABOVE GROUND PIPING

1. Steel Fittings: ASME B16.5, steel flanges and fittings or ASME B16.11, forged steel socket welded and threaded.
3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, “C” shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
4. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.
2.04 PIPE HANGERS AND SUPPORTS
   A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
   C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
   E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
   F. Vertical Support: Steel riser clamp.
   G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.05 MECHANICAL COUPLINGS
   A. Rigid Mechanical Couplings for Grooved Joints:
      3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
      5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
      6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel

2.06 GATE VALVES
   A. Up to and including 2 inches:
      1. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.
   B. Over 2 inches:
      1. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.
   C. Over 4 inches:
      1. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.07 GLOBE OR ANGLE VALVES
   A. Over 2 inches:
      1. Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.08 BALL VALVES
   A. Up to and including 2 inches:
      1. Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
   B. Over 2 inches:
      1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches and over, flanged.

2.09 BUTTERFLY VALVES
   A. Cast or Ductile Iron Body
      1. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and internal tamper switch rated 10 amp at 115 volt AC.

2.10 CHECK VALVES
   A. Up to and including 2 inches:
      1. Bronze body and swing disc, rubber seat, threaded ends.
B. Over 2 inches:
   1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.

C. 4 inches and Over:
   1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.11 DRAIN VALVES

A. Compression Stop:
   1. Bronze with hose thread nipple and cap.

B. Ball Valve:

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs.
B. Remove scale and foreign material, from inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
D. Install piping to conserve building space, to not interfere with use of space and other work.
E. Group piping whenever practical at common elevations.
F. Sleeve pipes passing through partitions, walls, and floors.
G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
H. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
K. Do not penetrate building structural members unless indicated.
L. Provide sleeves when penetrating footings, floors, walls, and partitions and seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
M. Escutcheons:
   1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

P. Provide gate or butterfly valves for shut-off or isolating service.

Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION
SECTION 21 12 00
FIRE-SUPPRESSION STANDPIPES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Valves.
   B. Fire department connections.

1.02 RELATED REQUIREMENTS
   A. Section 21 05 00 - Common Work Results for Fire Suppression: Fire Protection Piping.
   B. Section 21 13 00 - Fire-Suppression Sprinkler Systems.

1.03 REFERENCE STANDARDS
   B. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc.

1.04 SUBMITTALS
   A. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories.
   B. Shop Drawings: Indicate supports, components, accessories, and sizes.
   C. Project Record Documents: Record actual locations of components.
   D. Operation Data: Include appropriate manufacturer's data.
   E. Maintenance Data: Include servicing requirements and test schedule.
   F. Certificates: Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.

1.05 QUALITY ASSURANCE
   A. Perform Work in accordance with NFPA 14. Maintain one copy on site.

PART 2 PRODUCTS

2.01 VALVES
   A. Hose Connection Valve: Angle type; brass finish; 2-1/2 inch size, thread to match fire department hardware, 300 psi working pressure, with threaded cap and chain of same material and finish; refer to Section 21 05 00.

2.02 FIRE DEPARTMENT CONNECTION
   A. Type: Free standing type with ductile iron pedestal red enamel finish.
   B. Outlets: Two way with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.
   C. Drain: 3/4 inch automatic drip, outside.
   D. Label: "Auto Sprinkler & Standpipe - Fire Department Connection".

PART 3 EXECUTION

3.01 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install in accordance with NFPA 14.
   C. Flush entire system of foreign matter.

3.02 FIELD QUALITY CONTROL
   A. Test entire system in accordance with NFPA 14.

END OF SECTION
SECTION 21 13 00
FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Wet-pipe sprinkler system.
   B. Dry-pipe sprinkler system.
   C. System design, installation, and certification.
   D. Fire department connections.

1.02 RELATED REQUIREMENTS
   A. Section 28 31 00 - Fire Detection and Alarm.
   B. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe, fittings, and valves.
   C. Section 21 12 00 - Fire-Suppression Standpipes.

1.03 REFERENCE STANDARDS
   B. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc..

1.04 SUBMITTALS
   A. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
   B. Shop Drawings:
      1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
      2. Submit shop drawings to authority having jurisdiction and Architect for approval. Submit proof of approval to Architect.
   C. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
   D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
   E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      1. See Section 01 60 00 - Product Requirements, for additional provisions.
      2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
      3. Sprinkler Wrenches: For each sprinkler type.

1.05 QUALITY ASSURANCE
   A. Conform to UL (DIR) requirements.
   B. Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years experience.
   C. Equipment and Components: Provide products that bear UL (DIR) label or marking.
   D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

PART 2 PRODUCTS
2.01 MANUFACTURERS
   A. Sprinklers, Valves, and Equipment:
      1. As indicated on plans or approved equivalent.
2.02 SPRINKLER SYSTEM
A. Sprinkler System: Provide coverage for entire building.
B. Occupancy: as indicated on plans and in accordance with NFPA 13.
C. Water Supply: Determine volume and pressure from water flow test data.
D. Storage Cabinet for Spare Sprinklers and Tools: Steel, in location approved by the owner and architect.

2.03 PIPING SPECIALTIES
A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
   1. Activate electric alarm.
   2. Test and drain valve.
   3. Manufacturers:
      a. As indicated on plans or approved equivalent.
B. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, accelerator, and with the following additional capabilities and features:
   1. Activate electric alarm.
   2. Test and drain valve.
   3. Externally resettable.
   4. Manufacturers:
      a. As indicated on plans or approved equivalent.
C. Test Connections:
   1. Inspector's Test Connection for Dry Systems:
      a. Provide test connections approximately 6 ft above floor for each or portion of each sprinkler system equipped with an alarm device, located at the most remote part of each system.
      b. Route test connection to an open-site drain location, excluding janitor sinks, accepting full flow without negative consequences.
      c. Supply discharge orifice with same size as corresponding sprinkler orifice.
      d. Limit vertical height of exterior wall penetration to 2 ft above finished grade.
D. Electric Alarm: Electrically operated red enameled gong with pressure alarm switch.
E. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
F. Fire Department Connections:
   1. Type: Free standing type with ductile iron pedestal red enamel finish.
   2. Outlets: Two way with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.
   4. Label: "Automatic Sprinkler & Standpipe - Fire Department Connection".

2.04 AIR COMPRESSOR
A. Manufacturers:
   1. As indicated on plans or approved equivalent.
B. Compressor: Single unit, electric motor driven, motor, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install in accordance with referenced NFPA design and installation standard.
B. Install equipment in accordance with manufacturer's instructions.
C. Provide approved double check detector valve assembly at sprinkler system water source connection.
D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
E. Locate outside alarm gong on building wall as indicated.
F. Place pipe runs to minimize obstruction to other work.
G. Place piping in concealed spaces above finished ceilings.
H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
J. Flush entire piping system of foreign matter.
K. Hydrostatically test entire system.

3.02 INTERFACE WITH OTHER PRODUCTS
A. Ensure required devices are installed and connected as required to fire alarm system.

3.03 SCHEDULES
A. System Hazard Areas:
   1. As indicated on plans.
B. Sprinklers:
   1. As indicated on plans or approved equivalent.

END OF SECTION
SECTION 22 05 13
COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. General construction and requirements.
   B. Applications.
   C. Single phase electric motors.

1.02 RELATED REQUIREMENTS
   A. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS
   A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
   B. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
   C. Operation Data: Include instructions for safe operating procedures.
   D. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE
   A. Conform to NFPA 70.
   B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS
   A. Electrical Service:
      1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
   B. Nominal Efficiency:
      1. Enclosed Motor with Two Poles: 75.5.
   C. Construction:
      1. Open drip-proof type except where specifically noted otherwise.
      2. Design for continuous operation in 104 degrees F environment.
      3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

E. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

2.04 APPLICATIONS

A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.

B. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.
B. Starting Current: Less than five times full load current.
C. Pull-up Torque: Up to 350 percent of full load torque.
D. Breakdown Torque: Approximately 250 percent of full load torque.
E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
C. Check line voltage and phase and ensure agreement with nameplate.

3.02 SCHEDULES

A. See Plumbing plans for equipment schedule

END OF SECTION
SECTION 22 05 16
EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Flexible pipe connectors.
   B. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS
   A. Section 21 05 00 - Common Work Results for Fire Suppression.
   B. Section 22 10 05 - Plumbing Piping.
   C. Section 23 23 00 - Refrigerant Piping.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data:
      1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
      2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

1.05 REGULATORY REQUIREMENTS
   A. Conform to UL requirements.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING
   A. Manufacturers:
      3. Substitutions: See Section 01 60 00 - Product Requirements.
   B. Inner Hose: Carbon Steel.
   D. Size: Use pipe sized units.
   E. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING
   A. Manufacturers:
      3. Substitutions: See Section 01 60 00 - Product Requirements.
   B. Inner Hose: Bronze.
   C. Exterior Sleeve: Braided bronze.
   D. Size: Use pipe sized units.
   E. Maximum offset: 3/4 inch on each side of installed center line.
   F. Application: Copper piping.
PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.

C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

D. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

E. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION
PART 1  GENERAL

1.01  SECTION INCLUDES

A. Pressure gages and pressure gage taps.
B. Thermometers and thermometer wells.

1.02  REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; The American Society of Mechanical Engineers.
D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Underwriters Laboratories Inc..

1.03  SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
C. Project Record Documents: Record actual locations of components and instrumentation.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Pressure Gages: One of each type and size.

1.04  FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2  PRODUCTS

2.01  PRESSURE GAGES

A. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.

2.02  PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03  STEM TYPE THERMOMETERS

A. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.
2.04 TEST PLUGS
   A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

PART 3 EXECUTION
3.01 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
   C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
   D. Provide instruments with scale ranges selected according to service with largest appropriate scale.
   E. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
   F. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
   G. Locate test plugs adjacent thermometers and thermometer sockets.

3.02 SCHEDULES
   A. Pressure Gages, Location and Scale Range:
      1. Pumps - inlets and outlets
      2. Pressure reducing assembly - inlets and outlets
   B. Pressure Gage Tappings, Location:
      1. Circuit Setter
   C. Stem Type Thermometers, Location and Scale Range:
      1. Water heater - inlets and outlets
      2. Mixing Valve - inlets and outlets

END OF SECTION
SECTION 22 05 48
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Vibration isolators.
B. Seismic restraints for suspended components and equipment.

1.02 REFERENCE STANDARDS
C. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.
D. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors’ National Association.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data:
   1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
   2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.
C. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.04 QUALITY ASSURANCE
A. Perform design and installation in accordance with applicable codes.
B. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.
C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS
D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS
A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.

2.03 VIBRATION ISOLATORS
A. Non-Seismic Type:
   1. All Elastomeric-Fiber Glass Pads:
      a. Configuration: Flat or molded.
      b. Thickness: 0.25 inch minimum.
      c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
2. Restrained Steel Springs:
   a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
   b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.

3. Elastomeric Hangers:
   a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
   b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.

4. Spring Hanger:
   a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
   b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

5. Combination Elastomeric-Spring Hanger:
   a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
   b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

6. Thrust Restraints:
   a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
   b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

2.04 SEISMIC RESTRAINTS FOR SUSPENDED COMPONENTS AND EQUIPMENT

A. Comply with:
   2. SMACNA (SRM).

B. Cable Restraints:
   1. Wire Rope: Steel wire strand cables sized to resist seismic loads in all lateral directions.
   3. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   4. Connections:
      a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves or seismically rated tool-less wedge insert lock connectors.
      b. Internally brace clevis hanger bracket cross bolt to prevent deformation.
   5. Vertical Suspension Rods: Attach required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

C. Rigid Restraints:
   1. Structural Element: Sized to resist seismic loads in all lateral directions and carry both compressive and tensile loading.
   2. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   3. Connections: Internally brace clevis hanger bracket cross bolt to prevent deformation.
   4. Static Support System: Anchorage capable of carrying additional tension loads generated by the vertical component of the rigid brace compression which is additive to any static load requirements on the system.
   5. Vertical Suspension Rods: Attached required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

   A. Install in accordance with manufacturer's instructions.
B. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

C. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.

### 3.02 INSTALLATION - SEISMIC

**A. Comply with:**

2. FEMA 414.
3. SMACNA (SRM).

**B. Piping:**

1. Provide seismic bracing in accordance ASCE 7.
2. Provide supports, braces, and anchors to resist gravity and seismic design forces.
3. Provide flexible connections between floor mounted equipment and suspended piping; between unbraced piping and restrained suspended items; as required for thermal movement; at building separations and seismic joints; and wherever relative differential movements could damage pipe in an earthquake.
4. Brace resiliently supported pipe with cable bracing or alternate means designed to prevent transmission of vibrations and noise to the structure.
5. Brace every run 5.0 feet or more in length with two transverse and one longitudinal bracing locations.
6. Pipes and Connections Constructed of Ductile Materials (copper, ductile iron, steel or aluminum and brazed, welded or screwed connections):
   a. Provide transverse bracing at spacing not more than 40.0 feet on center.
   b. Provide longitudinal bracing at spacing not more than 80.0 feet on center.
7. Pipes and Connections Constructed of Non Ductile Materials (cast iron, no-hub, plastic or non-UL listed grooved coupling pipe):
   a. Provide transverse bracing at spacing not more than 20.0 feet on center.
   b. Provide longitudinal bracing at spacing not more than 40.0 feet on center.
8. Provide lateral restraint for risers at not more than 30 feet on center or as required for horizontal runs, whichever is less.
9. Piping Explicitly Exempt from Seismic Bracing Requirements:
   a. Provide flexible connections between piping and connected equipment, including in-line devices such as VAV boxes and reheat coils.
   b. Install piping consistent with ASCE 7, such that swinging of the pipes will not cause damaging impact with adjacent components, finishes, or structural framing while maintaining clear horizontal distance of 67 percent of the hanger length between subject components.
   c. Provide swing restraints as required to control potential impact due to limited space between subject components.
10. Use of proprietary restraint systems with a certificate of compliance, verified and listed by an accredited inspection body is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.
11. Re-use of Existing Hangers:
   a. Re-using existing hangers at locations of seismic bracing are to be judged on a case-by-case basis by the registered project design professional.
   b. Unless otherwise shown on the drawings, it is assumed all hangers supporting new piping, located at a seismic brace, will be new.

**C. Tanks:**

1. Install tank anchorage, tank legs and/or supporting structure designed to resist design force.
2. Provide flexible connections between tank and interconnected piping.
3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Inspect isolated equipment after installation and submit report. Include static deflections.
C. Perform testing and inspections of the installation in accordance with Section 01 45 33.

END OF SECTION
SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Nameplates.
B. Tags.
C. Stencils.
D. Pipe markers.

1.02 RELATED REQUIREMENTS
A. Section 09 91 23 - Interior Painting: Identification painting.
B. Section 22 60 05 - Medical Air, Gas, and Vacuum Systems: Supply of pipe labels for placement under this section.

1.03 REFERENCE STANDARDS
A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers (ANSI/ASME A13.1).

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS
A. Piping: Tags.
B. Pumps: Nameplates.
C. Small-sized Equipment: Tags.
D. Tanks: Nameplates.
E. Thermostats: Nameplates.
F. Valves: Tags and ceiling tacks where located above lay-in ceiling.
G. Water Treatment Devices: Nameplates.

2.02 NAMEPLATES
A. Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.
B. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS
A. Manufacturers:
   5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 STENCILS
A. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.
B. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors conforming to ASME A13.1.

2.05 PIPE MARKERS
A. Manufacturers:
   5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Comply with ASME A13.1.
C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
F. Color code as follows:
   1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
   2. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION
3.01 PREPARATION
A. Degrease and clean surfaces to receive adhesive for identification materials.
B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.02 INSTALLATION
A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install tags with corrosion resistant chain.
C. Apply stencil painting in accordance with Section 09 91 23.
D. Install plastic pipe markers in accordance with manufacturer's instructions.
E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
G. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION
SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Piping insulation.
   B. Jackets and accessories.

1.02 RELATED REQUIREMENTS
   A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
   B. Section 07 84 00 - Firestopping.
   C. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS
   I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
   C. Manufacturer’s Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Accept materials on site, labeled with manufacturer’s identification, product density, and thickness.

1.06 FIELD CONDITIONS
   A. Maintain ambient conditions required by manufacturers of each product.
   B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS
2.01 REGULATORY REQUIREMENTS
   A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER
   A. Manufacturers:
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 650 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.03 CELLULAR GLASS

A. Manufacturers:

B. Insulation: ASTM C552, Type II.
   1. Apparent Thermal Conductivity; 'K' Value: Grade 6, 0.35 at 100 degrees F.
   2. Service Temperature: Up to 800 degrees F.
   3. Water Vapor Permeability: 0.005 perm inch.
   4. Water Absorption: 0.5 percent by volume, maximum.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.05 JACKETS

A. PVC Plastic.
   1. Manufacturers:
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that piping has been tested before applying insulation materials.
   B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Exposed Piping: Locate insulation and cover seams in least visible locations.
   C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
   D. Glass fiber insulated pipes conveying fluids below ambient temperature:
      1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
      2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
   E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
   F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
   G. Glass fiber insulated pipes conveying fluids above ambient temperature:
      1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
      2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
   H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

3.03 SCHEDULES
   A. Plumbing Systems:
      1. All domestic hot water lines (HW & HWR) shall be insulated with 1" insulated and jacketed.
      2. All domestic cold water lines (CW) shall be insulated with 1/2" insulation and jacketed.
      3. All condensate drain lines (CD) shall be insulated with 1/2" insulation and jacketed.
      4. All roof drains & drain bodies (SD) shall be insulated with 1" insulation and jacketed.

END OF SECTION
SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

   A. Pipe, pipe fittings, valves, and connections for piping systems.
      1. Sanitary sewer.
      2. Domestic water.
      3. Storm water.
      4. Gas.
      5. Flanges, unions, and couplings.
      6. Pipe hangers and supports.
      7. Valves.
      9. Check.
     10. Water pressure reducing valves.
     11. Relief valves.
     12. Strainers.

1.02 RELATED REQUIREMENTS

   A. Section 08 31 00 - Access Doors and Panels.
   B. Section 09 91 23 - Interior Painting.
   C. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
   D. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
   E. Section 22 07 19 - Plumbing Piping Insulation.
   F. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.

1.03 REFERENCE STANDARDS

   B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers.
   C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers (ANSI B16.18).
   D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers.
   E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.
   F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers.
   G. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.1).
   H. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.9).
   I. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers.
   J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers.
   K. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; The American Society of Sanitary Engineering.
V. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
AC. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
AJ. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association (ANSI/AWWA C105/A21.5).
1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
D. Project Record Documents: Record actual locations of valves.
E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE
A. Perform work in accordance with applicable codes.
B. Valves: Manufacturer's name and pressure rating marked on valve body.
C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Provide temporary protective coating on cast iron and steel valves.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS
   A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS
   A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING
   A. Foam Core PVC not acceptable.
   B. Cast Iron Pipe: ASTM A74 extra heavy weight.
      1. Fittings: Cast iron.
      2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
   C. Cast Iron Pipe: CISPI 301, hubless.
      1. Fittings: Cast iron.
      2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
      1. Fittings: PVC.

2.03 SANITARY SEWER PIPING, ABOVE GRADE
   A. Foam Core PVC not acceptable.
   B. Cast Iron Pipe: ASTM A74, service weight.
      1. Fittings: Cast iron.
      2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
   C. PVC Pipe: ASTM D2665.
      1. Fittings: PVC.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
   A. Copper Pipe: ASTM B42, hard drawn.
      1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   B. PE Pipe: ASTM D2239.
      1. Fittings: ASTM D2609, PE.
      2. Joints: Mechanical with stainless steel clamp.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE
   A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
      1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   B. Cross-Linked Polyethylene Pipe: ASTM F876 or ASTM F877.
      1. Manufacturers:
      2. PPI TR-4 Pressure Design Basis:
         a. 160 psig at maximum 73 degrees F.
         b. 80 psig at maximum 200 degrees F.
      3. Fittings: Brass and copper.

2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Foam Core PVC not acceptable.
B. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
C. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.

2.07 STORM WATER PIPING, ABOVE GRADE
A. Foam Core PVC not acceptable.
B. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
C. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.

2.08 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING
A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.09 NATURAL GAS PIPING, ABOVE GRADE
A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   2. Joints: Threaded or welded to ASME B31.1.

2.10 FLANGES, UNIONS, AND COUPLINGS
A. Unions for Pipe Sizes 3 Inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
B. Flanges for Pipe Size Over 1 Inch:
   1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

2.11 PIPE HANGERS AND SUPPORTS
A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
   6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.

e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.

B. Plumbing Piping - Drain, Waste, and Vent:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

C. Plumbing Piping - Water:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

2.12 BALL VALVES

A. Manufacturers:

   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder, threaded, or grooved ends with union.

2.13 FLOW CONTROLS

A. Manufacturers:

   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.14 SWING CHECK VALVES

A. Manufacturers:

   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up to 2 Inches:

   1. Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.
2.15 **WATER PRESSURE REDUCING VALVES**

A. Manufacturers:
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Up to 2 Inches:
   1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

2.16 **RELIEF VALVES**

A. Pressure Relief:
   1. Manufacturers:
      b. Substitutions: See Section 01 60 00 - Product Requirements.
   2. 1 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief:
   1. Manufacturers:
   2. 2 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity 1 certified and labelled.

2.17 **STRAINERS**

A. Manufacturers:
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Size 2 inch and Under:
   1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
   2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

**PART 3 EXECUTION**

3.01 **EXAMINATION**

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 **PREPARATION**

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.03 **INSTALLATION**

A. Install in accordance with manufacturer's instructions.
B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
E. Group piping whenever practical at common elevations.
F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.
G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
H. Provide access where valves and fittings are not exposed.
I. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.
J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
L. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
M. Install water piping to ASME B31.9.
N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
O. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
P. Sleeve pipes passing through partitions, walls and floors.
Q. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
R. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   8. Provide copper plated hangers and supports for copper piping.
   9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.04 APPLICATION
A. Use grooved mechanical couplings and fasteners only in accessible locations.
B. Install unions downstream of valves and at equipment or apparatus connections.
C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
E. Install globe valves for throttling, bypass, or manual flow control services.
F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
G. Provide spring loaded check valves on discharge of water pumps.
H. Provide plug valves in natural gas systems for shut-off service.
I. Provide flow controls in water recirculating systems where indicated.
3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.

   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

   2. Provide 18 gage, 0.0478 inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

C. Provide new gas service complete with gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 2 psi. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment.

3.08 SCHEDULES

A. Pipe Hanger Spacing:

   1. Metal Piping:

      a. Pipe size: 1/2 inches to 1-1/4 inches:

         1) Maximum hanger spacing: 6.5 ft.
         2) Hanger rod diameter: 3/8 inches.

      b. Pipe size: 1-1/2 inches to 2 inches:

         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 3/8 inch.

      c. Pipe size: 2-1/2 inches to 3 inches:

         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 1/2 inch.

END OF SECTION
SECTION 22 10 06
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.
B. Roof and floor drains.
C. Cleanouts.
D. Hose bibbs.
E. Hydrants.
F. Washing machine boxes and valves.
G. Backflow preventers.
H. Double check valve assemblies.
I. Water hammer arrestors.
J. Sumps and interceptors.
K. Mixing valves.
L. Interceptors.
M. Thermostatic mixing valves.
N. Catch basins and manholes.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.
B. Section 22 40 00 - Plumbing Fixtures.
C. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; The American Society of Mechanical Engineers.
B. ASME A112.6.4 - Roof, Deck, and Balcony Drains; The American Society of Mechanical Engineers.
C. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering (ANSI/ASSE 1011).
E. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; American Society of Sanitary Engineering.
F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; American Society of Sanitary Engineering (ANSI/ASSE 1019).
G. NSF 61 - Drinking Water System Components - Health Effects.
H. NSF 372 - Drinking Water System Components - Lead Content.
I. PDI-WH 201 - Water Hammer Arresters; Plumbing and Drainage Institute.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
C. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
D. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
E. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
G. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, shut off valves.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS
A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS
A. Manufacturers:
   5. Substitutions: See Section 01 60 00 - Product Requirements.
B. Roof Drains:
   1. Assembly: ASME A112.6.4.
   2. Body: Lacquered cast iron with sump.
   4. Accessories: Coordinate with roofing type.
      a. Adjustable under deck clamp.
      b. Roof sump receiver.
      c. Waterproofing flange.
      d. Controlled flow weir.
      e. Leveling frame.
      f. Adjustable extension sleeve for roof insulation.
      g. Perforated or slotted ballast guard extension for inverted roof.
      h. Perforated stainless steel ballast guard extension.
C. Roof Overflow Drains:
   1. Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended to above flood elevation.
   2. Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended above flood elevation
D. Downspout Nozzles:
   1. Bronze round with straight bottom section.
E. Linear Drains:
   1. Body: Provide PVC, ABS, or stainless-steel with sloped channel to vertical waste pipe.
   2. Clamping Ring: Stainless steel mechanism to clamp waterproof membrane to linear drain body.
   3. Strainer: Removable brushed stainless steel or tile top strainer furnished by manufacturer or others.
   5. Additional Components: Manufacturer's standard membrane, sealant, fasteners, and anchors.
F. Floor Drain (FD-1):
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

G. Floor Drain (FD-2):
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable round nickel bronze strainer with removable perforated sediment bucket.

2.03 CLEANOUTS
A. Manufacturers:
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cleanouts at Exterior Surfaced Areas (CO-1):
1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Exterior Unsurfaced Areas (CO-2):
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.

D. Cleanouts at Interior Finished Floor Areas (CO-3):
1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

E. Cleanouts at Interior Finished Wall Areas (CO-4):
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

F. Cleanouts at Interior Unfinished Accessible Areas (CO-5): Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 HOSE BIBBS
A. Manufacturers:
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Interior Hose Bibbs:
1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in conformance with ASSE 1011.

2.05 HYDRANTS
A. Manufacturers:
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wall Hydrants:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.06 WASHING MACHINE BOXES AND VALVES
A. Box Manufacturers:
3. Substitutions: See Section 01 60 00 - Product Requirements.
B. Valve Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

C. Description: Plastic preformed rough-in box with brass valves with single lever handle, socket for 2 inch waste, slip in finishing cover.

2.07 BACKFLOW PREVENTERS
A. Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reduced Pressure Backflow Preventers:
   1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.08 DOUBLE CHECK VALVE ASSEMBLIES
A. Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Double Check Valve Assemblies:
   1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.09 WATER HAMMER ARRESTORS
A. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Water Hammer Arrestors:
   1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.10 SUMP AND INTERCEPTORS
A. Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Sumps:
   1. Precast concrete with required openings and drainage fittings.
   2. Cover: 3/8 inch thick checkered steel plate with gasket seal frames and anchor bolts.

C. Grease Interceptors:
   1. Construction:
      c. Accessories: Multi-weir baffle assembly, integral deep seal trap, removable integral flow control, sediment bucket.
d. Cover: Steel, epoxy coated, non-skid with gasket, securing handle, and enzyme injection port, recessed for floor finish.

2.11 MIXING VALVES

A. Thermostatic Mixing Valves:
   1. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
   2. Accessories:
      a. Check valve on inlets.
      b. Volume control shut-off valve on outlet.
      c. Stem thermometer on outlet.
      d. Strainer stop checks on inlets.

B. Pressure Balanced Mixing Valves:
   1. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment.
   2. Accessories:
      a. Volume control shut-off valve on outlet.
      b. Stem thermometer on outlet.
      c. Strainer stop checks on inlets.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
C. Encase exterior cleanouts in concrete flush with grade.
D. Install floor cleanouts at elevation to accommodate finished floor.
E. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
F. Pipe relief from backflow preventer to nearest drain.
G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or flush valve fixtures.
H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Water heaters.
   B. Packaged water heating systems.
   C. Water storage tanks.
   D. Pumps.
      1. Circulators.
      2. Sump pumps.

1.02 RELATED REQUIREMENTS
   A. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

1.03 REFERENCE STANDARDS
   A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less.
   B. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous.
   C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers.
   D. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Underwriters Laboratories Inc..
   E. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Underwriters Laboratories Inc..

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
   B. Product Data:
      1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
      2. Indicate pump type, capacity, power requirements.
      3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
      4. Provide electrical characteristics and connection requirements.
   C. Shop Drawings:
      1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
   D. Project Record Documents: Record actual locations of components.
   E. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
   F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
   G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      1. See Section 01 60 00 - Product Requirements, for additional provisions.
      2. Extra Pump Seals: One of each type and size.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.06 CERTIFICATIONS
A. Water Heaters: NSF approved.
B. Gas Water Heaters: Certified by CSA International to 1 or 2, as applicable, in addition to requirements specified elsewhere.
C. Electric Water Heaters: UL listed and labeled to UL 174 or UL 1453.
D. Water Tanks: ASME labeled, to 1.
E. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.08 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS
2.01 WATER HEATER MANUFACTURERS
E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMMERCIAL GAS FIRED WATER HEATERS
A. Type: Automatic, natural gas-fired, vertical storage.
B. Performance: Refer to Design Documents
C. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
D. Accessories: Provide:
   2. Dip tube: Brass.
   3. Drain Valve.
   4. Anode: Magnesium.
   5. Temperature and Pressure Relief Valve: ASME labelled.
E. Certified For The Following Applications:
   1. Automatic storage water heater.
   2. Automatic circulating tank water heater.
   3. For operation at 180 degrees F
   4. For operation on combustible floors.
F. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.
2.03 PACKAGED WATER HEATING SYSTEMS

A. Manufacturers:
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. System: Gas-fired direct heating boiler, circulating pump, controls, piping and valving as indicated, storage tank, all mounted on structural steel skid.

C. Boiler:
   1. Type: Gas-fired water tube boiler, with copper finned tube heat exchanger, steel jacket with glass fiber insulation.
   2. Boiler Trim: Gas burner, thermometer and pressure gage, immersion thermostats for operating and high limit protection, 100 percent safety shut-off electric gas valve with transformer, electronic safety pilot and pilot burner, gas pressure regulator, manual gas shut-off, low water cut off, ASME rated temperature and pressure relief valve, coil relief valve, automatic boiler fill and expansion tank, draft inverter.
   3. Performance:

D. Vertical storage tank:
   2. Lining: 15 mils thick epoxy lining extended through flanges and couplings.
   3. Support: Two welded tank saddles not less than 4 inches wide by 1/4 inch thick, mounted on 2 inch pipe stand with minimum four cross braced legs; sheet teflon isolation strip between tank and saddle; dielectric unions between tank and piping system.
   4. Insulation: 3 inch glass fiber insulation with steel jacket.

E. Pump:
   1. Type: All bronze, in-line circulation pump mounted on boiler, controlled by tank mounted immersion thermostat.

F. Thermostatic Valve: Three-way, self-contained, full line size, bronze body 1/2 to 2 inches size, iron body 2-1/2 inches and over, set at 140 degrees F.

2.04 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   3. Grundfos: us.grundfos.com/
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

2.05 SUMP PUMPS

A. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Type: Vertical centrifugal, direct connected, simplex arrangement.

C. Casing: Cast iron volute with radial clearance around impeller, inlet strainer, slide away couplings.

D. Impeller: Cast iron; open non-clog, keyed to corrosion resistant alloy steel shaft.
E. Support: Cast iron pedestal motor support on steel floor plate with gas tight gaskets.
F. Bearings: Forced grease lubricated bronze sleeve spaced maximum 48 inches and grease lubricated ball thrust at floor plate.
G. Drive: Flexible coupling to vertical, solid shaft ball bearing electric motor.
H. Sump: Steel cover plate with steel curb frame for grouting into concrete sump with inspection opening and cover, and alarm fittings.
I. Controls (Simplex): Float switch with float rod, stops, and corrosion resistant float, and separate pressure switch high level alarm with transformer, alarm bell and stand-pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer’s instructions, as required by code, and complying with conditions of certification, if any.
B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
C. Pumps:
   1. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.
   2. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
   3. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

3.02 SCHEDULES

A. Refer to project construction documents

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Water closets.
B. Urinals.
C. Lavatories.
D. Sinks.
E. Service sinks.
F. Electric water coolers.
G. Drinking fountains.
H. Bathtubs.
I. Showers.
J. Eye and face wash fountains.
K. Emergency showers.

1.02 RELATED REQUIREMENTS
A. Section 07 90 05 - Joint Sealers: Seal fixtures to walls and floors.
B. Section 22 10 05 - Plumbing Piping.
C. Section 22 10 06 - Plumbing Piping Specialties.
D. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS
B. ASME A112.18.1 - Plumbing Supply Fittings; The American Society of Mechanical Engineers.
C. ASME A112.19.2 - Ceramic Plumbing Fixtures; The American Society of Mechanical Engineers.
D. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; The American Society of Mechanical Engineers.
E. NSF 61 - Drinking Water System Components - Health Effects.
F. NSF 372 - Drinking Water System Components - Lead Content.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
C. Manufacturer's Instructions: Indicate installation methods and procedures.
D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Accept fixtures on site in factory packaging. Inspect for damage.
B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.
1.07 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL
   A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and
      NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS
   A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china
      bolt caps.
      1. Flush Valve: Exposed (top spud).
      3. Outlet Size: 4 inches.
      5. Manufacturers:
         a. Per Brand Fixture Matrix
   B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and
      accessories.
      1. Sensor-Operated Type: Solenoid operator, low voltage hard-wired, infrared sensor and
         over-ride push button.
      2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
   C. Seats:
      1. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with
         cover.

2.03 TANK TYPE WATER CLOSETS
   A. Tank Type Water Closet Manufacturers:
      1. Per Brand Fixture Matrix.
   B. Bowl: ASME A112.19.2; floor mounted, siphon jet, vitreous china, 16.5 inches high,
      close-coupled closet combination with elongated rim, insulated vitreous china closet tank with
      fittings and lever flushing valve, bolt caps, vandalproof cover locking device.
      1. Water Consumption: Maximum 1.28 gallons per flush.
   C. Seat: Solid white plastic, open front, extended back, less cover, complete with self-sustaining
      hinge.

2.04 LAVATORIES
   A. Lavatory Manufacturers:
      1. Per Brand Fixture Matrix.
   B. Supply Faucet Manufacturers:
      1. Per Brand Fixture Matrix.
   C. Accessories:
      1. Chrome plated 17 gage, 0.0538 inch brass P-trap with clean-out plug and arm with
         escutcheon.
      2. Offset waste with perforated open strainer.

2.05 SINKS
   A. Sink Manufacturers:
      1. Per Brand Fixture Matrix.
      2. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 BATHTUBS AND SHOWERS
   A. Bathtub Manufacturers:
1. Per Brand Fixture Matrix

2.07 SHOWERS
A. Shower Manufacturers:
   1. Per Brand Fixture Matrix

2.08 ELECTRIC WATER COOLERS
A. Electric Water Cooler Manufacturers:
B. Water Cooler: Electric, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
   1. Electrical: 115 V, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

2.09 SERVICE SINKS
A. Service Sink Manufacturers:
   1. Per Brand Fixture Matrix.
B. Accessories:
   1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
   2. Hose clamp hanger.
   3. Mop hanger.

2.10 EMERGENCY EYE WASH
A. Emergency Wash Manufacturers:
B. Emergency Wash: ANSI Z358.1; wall-mounted, self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel eye and face wash receptor, twin eye wash heads and face spray ring, stainless steel dust cover, copper alloy control valve and fittings.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
B. Verify that electric power is available and of the correct characteristics.
C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION
A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION
A. Install each fixture with trap, easily removable for servicing and cleaning.
B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
C. Install components level and plumb.
D. Install and secure fixtures in place with wall supports and bolts.
E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.
F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
3.04 INTERFACE WITH WORK OF OTHER SECTIONS
   A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING
   A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING
   A. Clean plumbing fixtures and equipment.

3.07 PROTECTION
   A. Protect installed products from damage due to subsequent construction operations.
   B. Do not permit use of fixtures by construction personnel.
   C. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES
   A. See project construction documents.

END OF SECTION
SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL
1.01 SECTION INCLUDES
A. General construction and requirements.
B. Applications.
C. Single phase electric motors.
D. Three phase electric motors.
E. Electronically Commutated Motors (ECM).

1.02 RELATED REQUIREMENTS
A. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.
B. Section 26 29 13 - Enclosed Controllers.

1.03 REFERENCE STANDARDS
A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

1.05 QUALITY ASSURANCE
A. Conform to NFPA 70.
B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.07 WARRANTY
A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS
2.01 MANUFACTURERS
E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS
A. Electrical Service: Refer to Section 26 27 17 for required electrical characteristics.
B. Electrical Service:
   1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
2. Motors Larger than 1/2 Horsepower: 208/3 volts, three phase, 60 Hz.

C. Nominal Efficiency:
   1. Open Motor with Two Poles: 82.5.
   2. Open Motor with Four Poles: 82.5.
   3. Open Motor with Six Poles: 50.0.
   4. Enclosed Motor with Two Poles: 75.5.
   5. Enclosed Motor with Four Poles: 82.5.

D. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 104 degrees F environment.
   3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

E. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 40 degrees C environment.
   3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.

F. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

G. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.

B. Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.

C. Motors located in outdoors, in wet air streams downstream of sprayed coil dehumidifiers, in draw through cooling towers, and in humidifiers: Totally enclosed weatherproof epoxy-treated type.

2.04 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Applications:
   1. Commercial:
      a. Roof Top Unit:
         1) Operating Mode: Constant speed.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the roof top unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) RPM: 300 through 1200.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.
3.02 SCHEDULE
   A. Refer to project construction documents

PART 3 EXECUTION
4.01 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
   C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION
SECTION 23 05 48
VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Equipment support bases.
   B. Vibration isolators.
   C. Seismic restraints for suspended components and equipment.
   D. Roof curbs.

1.02 REFERENCE STANDARDS
   B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc..
   C. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment.
   D. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.
   E. FEMA 414 - Installing Seismic Restraints for Duct and Pipe.
   G. SMACNA (SRM) - Seismic Duct Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors’ National Association.

1.03 SUBMITTALS
   A. Product Data:
      1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.
      2. Include seismic rating documentation for each isolator and restraint component accounting for horizontal, vertical, and combined loads.
   B. Shop Drawings:
      1. Provide schedule of vibration isolator type with location and load on each.
      2. Fully dimensioned fabrication drawings and installation details for vibration isolation bases, member sizes, attachments to isolators, and supported equipment.
   C. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.04 QUALITY ASSURANCE
   A. Perform design and installation in accordance with applicable codes.
   B. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and registered and licensed in the State in which the Project is located.
   C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
      1. Member of Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).

PART 2 PRODUCTS

2.01 MANUFACTURERS
   D. Or Engineer Approved Equal.
   E. Substitutions: See Section 01 60 00 - Product Requirements.
2.02 PERFORMANCE REQUIREMENTS

A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection
      and stability requirements under all operating loads.
   2. Steel springs to function without undue stress or overloading.
   3. Steel springs to operate in the linear portion of the load versus deflection curve over
      deflection range of not less than 50 percent above specified deflection.
   4. Lateral to vertical stiffness ratio to not exceed 0.08 with spring deflection at minimum 75
      percent of specified deflection.
   5. All equipment mounted on vibration isolated bases to have minimum operating clearance
      of 2 inches between the base and floor or support beneath unless noted otherwise.

2.03 EQUIPMENT SUPPORT BASES

A. Structural Bases:
   1. Construction: Engineered, structural steel frames with welded brackets for side mounting
      of the isolators.
   2. Frames: Square, rectangular or T-shaped.
   3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to
      transmit design loads to isolators and snubbers.

B. Concrete Inertia Bases:
   1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts,
      welded or tied reinforcing bars running both ways in a single layer.
   2. Size: 6 inches minimum depth and sized to accommodate elbow supports.
   3. Mass: Minimum of 1.5 times weight of isolated equipment.
   4. Connecting Point: Reinforced to connect isolators and snubbers to base including
      template and fastening devices for equipment.
   5. Concrete: Filled on site with minimum 3000 psi concrete. See Section 03 30 00 for
      additional requirements.

2.04 VIBRATION ISOLATORS

A. Non-Seismic Type:
   1. All Elastomeric-Fiber Glass Pads:
      a. Configuration: Flat or molded.
      b. Thickness: 0.25 inch minimum.
      c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation
         plate between each layer with load plate providing evenly distributed load over pad
         surface.
   2. Elastomeric Mounts:
      a. Material: Oil, ozone, and oxidant resistant compounds.
      b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with
         anchor hole bolted to supporting structure.
   3. Steel Springs:
      a. Assembly: Freestanding, laterally stable without housing.
      b. Leveling Device: Rigidly connected to equipment or frame.
   4. Restrained Steel Springs:
      a. Housing: Rigid blocking during rigging prevents equipment installed and operating
         height from changing during temporary weight reduction.
      b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment
         and isolator base plate to supporting structure.
   5. Elastomeric Hangers:
      a. Housing: Steel construction containing elastomeric isolation element to prevent rod
         contact with housing and short-circuiting of isolating function.
      b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
   6. Spring Hanger:
VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

7. Combination Elastomeric-Spring Hanger:
   a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
   b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

8. Thrust Restraints:
   a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
   b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

2.05 SEISMIC RESTRAINTS FOR SUSPENDED COMPONENTS AND EQUIPMENT

A. Comply with:
   1. ASHRAE Handbook - HVAC Applications
   2. FEMA 412.
   3. FEMA 413.
   4. FEMA 414.
   5. FEMA E-74.
   6. SMACNA (SRM).

B. Cable Restraints:
   1. Wire Rope: Steel wire strand cables sized to resist seismic loads in all lateral directions.
   3. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   4. Connections:
      a. Use overlapping wire rope U clips, cable clamping bolts, swaged sleeves or seismically rated tool-less wedge insert lock connectors.
      b. Internally brace clevis hanger bracket cross bolt to prevent deformation.
   5. Vertical Suspension Rods: Attach required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

C. Rigid Restraints:
   1. Structural Element: Sized to resist seismic loads in all lateral directions and carry both compressive and tensile loading.
   2. Size: Based on the lesser of cable capacity or anchor load taking into account bracket geometry.
   3. Connections: Internally brace clevis hanger bracket cross bolt to prevent deformation.
   4. Static Support System: Anchorage capable of carrying additional tension loads generated by the vertical component of the rigid brace compression which is additive to any static load requirements on the system.
   5. Vertical Suspension Rods: Attached required bracing of sufficient strength to prevent rod buckling from vertical compression forces utilizing series of attachment clips.

2.06 ROOF CURBS

A. Vibration Isolation Curbs:
   1. Non-Seismic Curb Rail:
      a. Location: Between existing roof curb and rooftop equipment.
      b. Construction: Aluminum.
      c. Integral vibration isolation to conform to requirements of this section.
      d. Weather exposed components consist of corrosion resistant materials.
   2. Non-Seismic Curb:
      a. Location: Between structure and rooftop equipment.
      b. Construction: Aluminum.
      c. Integral vibration isolation to conform to requirements of this section.
      d. Weather exposed components consist of corrosion resistant materials.
PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Bases:
   1. Set steel bases for one inch clearance between housekeeping pad and base.
   2. Set concrete inertia bases for 2 inches clearance between housekeeping pad and base.
   3. Adjust equipment level.

C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

E. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
   1. Up to 4 Inches Pipe Size: First three points of support.

3.02 INSTALLATION - SEISMIC

A. Comply with:
   2. SMACNA (SRM).

B. Floor and Base-Mounted Equipment, Vibration Isolated Equipment and associated Vibration and Seismic Controls for Connections:
   1. Install equipment anchorage items designed to resist seismic design force in any direction.
   2. Install vibration and seismic controls designed to include base and isolator requirements.
   3. Provide flexible connections between equipment and interconnected piping.
   4. Provide isolators and restraints designed for amplified code forces per ASCE 7 and with demonstrated ability to resist required forces including gravity, operational and seismic forces.

C. Suspended Mechanical Equipment:
   1. Provide supports and bracing to resist seismic design force in any direction.
   2. Provide flexible connections between equipment and interconnected piping.
   3. Brace equipment hung from spring mounts using cable or other bracing that will not transmit vibration to the structure.
   4. Use of proprietary restraint systems with a certificate of compliance, verified and listed by an accredited inspection body is acceptable (pending shop drawing approval), as an alternative to project specific seismic bracing design.

D. Piping:
   1. Provide supports, braces, and anchors to resist gravity and seismic design forces.
   2. Provide flexible connections between floor mounted equipment and suspended piping; between unbraced piping and restrained suspended items; as required for thermal movement; at building separations and seismic joints; and wherever relative differential movements could damage pipe in an earthquake.
   3. Brace resiliently supported pipe with cable bracing or alternate means designed to prevent transmission of vibrations and noise to the structure.
   4. Brace every run 5.0 feet or more in length with two transverse and one longitudinal bracing locations.

E. Ductwork:
   1. Provide seismic bracing for ducts with cross sectional area greater than 6 sq ft (independent of duct contents).
   2. Provide seismic bracing for all ducts containing hazardous materials.
   3. Provide supports, braces, and anchors to resist gravity and seismic design forces.
   4. Install ducts and duct risers designed to accommodate interstory drift.
5. Independently support in-line devices weighing more than 20 pounds.
6. Positively attach dampers, louvers, diffusers and similar appurtenances to ductwork with mechanical fasteners.
7. Install duct supports designed to resist not less than 150 percent of the duct weight.

3.03 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Inspect isolated equipment after installation and submit report. Include static deflections.

END OF SECTION
SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL
1.01 SECTION INCLUDES
   A. Nameplates.
   B. Tags.
   C. Stencils.
   D. Pipe markers.
   E. Ceiling tacks.

1.02 RELATED REQUIREMENTS
   A. Section 09 91 23 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS
   A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers (ANSI/ASME A13.1).

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
   B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 PRODUCTS
2.01 IDENTIFICATION APPLICATIONS
   A. Air Handling Units: Nameplates.
   B. Automatic Controls: Tags. Key to control schematic.
   C. Control Panels: Nameplates.
   D. Dampers: Ceiling tacks, where located above lay-in ceiling.
   E. Ductwork: Nameplates.
   F. Instrumentation: Tags.
   G. Major Control Components: Nameplates.
   H. Piping: Tags.
   I. Small-sized Equipment: Tags.
   J. Thermostats: Nameplates.

2.02 NAMEPLATES
   A. Manufacturers:
       5. Substitutions: See Section 01 60 00 - Product Requirements.
   B. Plastic: Conform to ASTM D709.

2.03 TAGS
   A. Manufacturers:
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.04 STENCILS

A. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors conforming to ASME A13.1.

2.05 PIPE MARKERS

A. Manufacturers:

B. Color: Conform to ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.06 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.

G. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION
SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.
B. Measurement of final operating condition of HVAC systems.

1.02 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances: Inspection and testing allowances.

1.03 REFERENCE STANDARDS

A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council.
C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; National Environmental Balancing Bureau.
D. SMACNA (TAB) - HVAC Systems Testing, Adjusting, and Balancing; Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Procedures for formal deficiency reports, including scope, frequency and distribution.
C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   4. Units of Measure: Report data in I-P (inch-pound) units only.
D. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC MN-1, AABC National Standards for Total System Balance.
4. SMACNA (TAB).
5. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Certified by one of the following:

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION
A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.
   8. Air coil fins are cleaned and combed.
   9. Access doors are closed and duct end caps are in place.
  10. Air outlets are installed and connected.
  11. Duct system leakage is minimized.
  12. Hydronic systems are flushed, filled, and vented.
  13. Pumps are rotating correctly.
  14. Proper strainer baskets are clean and in place.
  15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES
A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING
A. Ensure recorded data represents actual measured or observed conditions.
3.05 **AIR SYSTEM PROCEDURE**

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

3.06 **WATER SYSTEM PROCEDURE**

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

3.07 **SCOPE**

A. Test, adjust, and balance the following:
   1. Plumbing Pumps.
   2. Forced Air Furnaces.
3. Direct Fired Furnaces.
4. Packaged Roof Top Heating/Cooling Units.
5. Packaged Terminal Air Conditioning Units.
6. Unit Air Conditioners.
7. Air Handling Units.
8. Fans.
9. Air Inlets and Outlets.

**3.08 MINIMUM DATA TO BE REPORTED**

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.
   7. Starter size, rating, heater elements.
   8. Sheave Make/Size/Bore.

B. Pumps:
   1. Identification/number.
   2. Manufacturer.
   3. Size/model.
   4. Impeller.
   5. Service.
   6. Design flow rate, pressure drop, BHP.
   7. Actual flow rate, pressure drop, BHP.
   8. Discharge pressure.
   10. Total operating head pressure.

C. Combustion Equipment:
   1. Boiler manufacturer.
   2. Model number.
   3. Serial number.
   4. Gas meter timing dial size.
   5. Gas meter time per revolution.
   6. Gas pressure at meter outlet.
   7. Gas flow rate.
   8. Heat input.

D. Air Cooled Condensers:
   1. Identification/number.
   2. Location.
   3. Manufacturer.
   4. Model number.
   5. Serial number.
   6. Entering DB air temperature, design and actual.
   7. Leaving DB air temperature, design and actual.

E. Air Moving Equipment:
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Arrangement/Class/Discharge.
   6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
13. Number of Belts/Make/Size.
14. Fan RPM.

F. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

G. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
10. Number of Belts/Make/Size.
11. Fan RPM.

H. Duct Traverses:
1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.

I. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Design air flow.
6. Test (final) velocity.
7. Test (final) air flow.
8. Percent of design air flow.

END OF SECTION
SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Duct insulation.
   B. Duct Liner.
   C. Insulation jackets.

1.02 RELATED REQUIREMENTS
   A. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
   B. Section 23 05 53 - Identification for HVAC Piping and Equipment.
   C. Section 23 31 00 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS
   H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.
   I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
   C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
   B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS
   A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
   B. Maintain temperature during and after installation for minimum period of 24 hours.
PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 JACKETS

A. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

2.04 DUCT LINER

A. Manufacturers:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.
B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
C. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

D. Duct and Plenum Liner Application:
   1. Adhere insulation with adhesive for 90 percent coverage.
   2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
   4. Seal liner surface penetrations with adhesive.
   5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES
   A. See project construction documents

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Equipment insulation.
B. Covering.

1.02 RELATED REQUIREMENTS
A. Section 23 05 53 - Identification for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS
G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc..

1.04 SUBMITTALS
A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 FIELD CONDITIONS
A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS
A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE
A. Manufacturers:
B. Insulation: ASTM C553; flexible, noncombustible.
   1. 'K' Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   2. Secure with self-sealing longitudinal laps and butt strips.
   3. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

2.03 JACKETS

A. PVC Plastic:
   1. Manufacturers:
   2. Jacket: Sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.

B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
   1. Lagging Adhesive: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Finish insulation at supports, protrusions, and interruptions.

G. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.

H. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

END OF SECTION
SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1  GENERAL

1.01  SECTION INCLUDES
A. Metal ductwork.
B. Nonmetal ductwork.
C. Duct cleaning.

1.02  RELATED REQUIREMENTS
A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
B. Section 07 84 00 - Firestopping.
C. Section 23 01 30.51 - HVAC Air Duct Cleaning: Cleaning ducts after completion of installation.
D. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.
E. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
F. Section 23 33 00 - Air Duct Accessories.
G. Section 23 37 00 - Air Outlets and Inlets.

1.03  REFERENCE STANDARDS
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.04  SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data for duct materials.
C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems.

1.05  QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.06  FIELD CONDITIONS
A. All ductwork and equipment shall remain sealed and protected from construction debris prior to system start-up.
B. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
C. Maintain temperatures within acceptable range during and after installation of duct sealants.

**PART 2 PRODUCTS**

**2.01 DUCT ASSEMBLIES**

A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
B. Ducts: Galvanized steel, unless otherwise indicated.
C. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.
D. Return and Relief: 1/2 inch w.g. pressure class, galvanized steel.
E. General Exhaust: 1/2 inch w.g. pressure class, galvanized steel.
F. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.
G. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.

**2.02 MATERIALS**

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. VOC Content: Not more than 250 g/L, excluding water.
   3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
   4. For Use With Flexible Ducts: UL labeled.
C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
   6. Other Types: As required.

**2.03 DUCTWORK FABRICATION**

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook - Fundamentals.
C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
G. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).
B. Install in accordance with manufacturer's instructions.
C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
D. Flexible Ducts: Connect to metal ducts with adhesive.
E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
G. Connect diffusers to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.
H. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

3.02 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
B. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION
SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Air turning devices/extractors.
   B. Backdraft dampers - metal.
   C. Backdraft dampers - fabric.
   D. Combination fire and smoke dampers.
   E. Duct access doors.
   F. Duct test holes.
   G. Fire dampers.
   H. Flexible duct connections.
   I. Smoke dampers.
   J. Volume control dampers.

1.02 RELATED REQUIREMENTS
   A. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
   B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
   C. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS
   D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.
   E. UL 33 - Standard for Safety Heat Responsive Links for Fire-Protection Service; Underwriters Laboratories Inc..
   F. UL 555 - Standard for Fire Dampers; Underwriters Laboratories Inc..
   G. UL 555S - Standard for Smoke Dampers; Underwriters Laboratories Inc..

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
   C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
   D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
   E. Project Record Drawings: Record actual locations of access doors and test holes.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
   B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
   A. Protect dampers from damage to operating linkages and blades.
PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS
   A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL
   A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
   B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 COMBINATION FIRE AND SMOKE DAMPERS
   A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
   B. Provide factory sleeve and collar for each damper.
   C. Multiple Blade Dampers: Fabricate with 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
   D. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
   E. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.

2.04 DUCT ACCESS DOORS
   A. Fabricate in accordance with SMACNA (DCS) and as indicated.
   B. Access doors with sheet metal screw fasteners are not acceptable.

2.05 DUCT TEST HOLES
   A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
   B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.06 FIRE DAMPERS
   A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
   B. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
   C. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.07 FLEXIBLE DUCT CONNECTIONS
   A. Fabricate in accordance with SMACNA (DCS) and as indicated.
   B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.08 SMOKE DAMPERS
   A. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.
   B. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by pneumatic actuator.
C. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.09 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Single Blade Dampers: Fabricate for duct sizes up to 6 by 30 inch.
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

C. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer’s instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

I. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

J. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Forward curved centrifugal fans.
B. Motors and drives.
C. Fan accessories.

1.02 RELATED REQUIREMENTS
A. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
B. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.
C. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
D. Section 23 07 13 - Duct Insulation.
E. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.
F. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS
A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; American Bearing Manufacturers Association, Inc.
C. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.
D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
D. Manufacturer's Instructions: Include complete installation instructions.
E. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE
A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 FIELD CONDITIONS
A. Permanent fans may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 WHEEL AND INLET
A. Forward Curved: Black enameled steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and back plate; steel hub swaged to back plate and keyed to shaft with set screw.
2.02 HOUSING
   A. Heavy gage steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut
   B. Factory finish before assembly to manufacturer's standard. For fans handling air downstream of humidifiers, provide two additional coats of paint. Prime coating on aluminum parts is not required.
   C. Provide bolted construction with horizontal flanged split housing, where indicated.
   D. Fabricate plug fans without volute housing, in lined steel cabinet. Refer to Section 23 07 13.

2.03 BEARINGS AND DRIVES
   A. Bearings: Heavy duty pillow block type, selfgreasing ball bearings, with ABMA STD 9 life at 50,000 hours.
   B. Shafts: Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil, and shaft guard.
   C. Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid Fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
   D. Belt Guard: Fabricate to SMACNA (DCS); 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.04 ACCESSORIES
   A. Fixed Inlet Vanes: Steel construction with fixed cantilevered inlet guide vanes welded to inlet bell.
   B. Inlet/Outlet Screens: Galvanized steel welded grid.

PART 3 EXECUTION

3.01 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Install fans with resilient mountings and flexible electrical leads. Refer to Section 22 05 48.
   C. Install flexible connections between fan inlet and discharge ductwork; refer to Section 23 33 00. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
   D. Provide fixed sheaves required for final air balance.
   E. Provide safety screen where inlet or outlet is exposed.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Diffusers.
   B. Registers/grilles.
   C. Door grilles.
   D. Louvers.
   E. Roof hoods.
   F. Goosenecks.

1.02 REFERENCE STANDARDS
   A. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets.
   B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
   B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
   C. Project Record Documents: Record actual locations of air outlets and inlets.

1.04 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ROUND CEILING DIFFUSERS
   A. Type: Round, adjustable pattern, stamped or spun, multi-core diffuser to discharge air in 360 degree pattern, with sectorizing baffles where indicated. Diffuser collar shall project not more than 1 inch above ceiling. In plaster ceilings, provide plaster ring and ceiling plaque.
   B. Color: As selected by Architect from manufacturer's standard range.

2.03 RECTANGULAR CEILING DIFFUSERS
   A. Type: Provide square, stamped, multi-core, square, adjustable pattern, stamped, multi-core, square and rectangular, multi-louvered, square and rectangular, adjustable pattern, and multi-louvered diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern with sectorizing baffles where indicated.
   B. Connections: Round.
   C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.
   D. Fabrication: Steel with baked enamel finish.
   E. Color: As selected by Architect from manufacturer's standard range.
   F. Accessories: Provide radial opposed blade, butterfly, combination splitter, and volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing...
grid, operating rod extension, anti-smudging device, and gaskets for surface mounted diffusers with damper adjustable from diffuser face.

2.04 PERFORATED FACE CEILING DIFFUSERS
   A. Type: Perforated face with fully adjustable pattern and removable face.
   B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.
   C. Fabrication: Steel with steel frame and baked enamel finish.
   D. Color: As selected by Architect from manufacturer's standard range.
   E. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.05 CEILING SLOT DIFFUSERS
   A. Type: As indicated on Drawings.
   B. Color: To be selected by Architect from manufacturer's standard range.
   C. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket, mitered end border.
   D. Plenum: Integral, galvanized steel, insulated.

2.06 CEILING SUPPLY REGISTERS/GRILLES
   A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.
   B. Frame: 1-1/4 inch margin with countersunk screw mounting.
   C. Construction: Made of aluminum extrusions with factory enamel finish.
   D. Color: As selected by Architect from manufacturer's standard range.
   E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.07 CEILING EXHAUST AND RETURN REGISTERS/GRILLES
   A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
   B. Frame: 1-1/4 inch margin with countersunk screw mounting.
   C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
   D. Color: To be selected by Architect from manufacturer's standard range.
   E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.08 CEILING LINEAR EXHAUST AND RETURN GRILLES
   A. Type: Streamlined blades with 90 degree one-way deflection, 1/8 x 3/4 inch on 1/2 inch centers.
   B. Frame: 1-1/4 inch margin, extra heavy for floor mounting, with countersunk screw mounting.
   C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
   D. Color: To be selected by Architect from manufacturer's standard range.
   E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.09 CEILING EGG CRATE EXHAUST AND RETURN GRILLES
   A. Type: Egg crate style face consisting of 1/2 x 1/2 x 1 inch grid core.
   B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
C. Color: To be selected by Architect from manufacturer's standard range.
D. Frame: Channel lay-in frame for suspended grid ceilings.
E. Accessories: Provide integral, gang & face operated opposed blade damper and 45 degree angled eggcrate or other similar provisions for visual blocking such as angled louver, 90 degree duct elbow, etc.

2.10 WALL SUPPLY REGISTERS/GRILLES
A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, single deflection.
B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
C. Fabrication: Steel with 0.0359 inch minimum frames and 0.0299 inch minimum blades, steel and aluminum with 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
D. Color: To be selected by Architect from manufacturer's standard range.
E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.11 DOOR GRILLES
A. Type: V-shaped louvers of 0.0359 inch thick steel, 1 inch deep on 1/2 inch centers.
B. Frame: 0.0359 inch steel with auxiliary frame to give finished appearance on both sides of door, with factory prime coat finish.

2.12 LOUVERS
A. Type and size as indicated on drawings.
B. Type: 4 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.
C. Fabrication: 16 gage, 0.0598 inch thick galvanized steel welded assembly, with factory prime coat finish.
D. Color: To be selected by Architect from manufacturer's standard range.

2.13 ROOF HOODS
A. Fabricate air inlet or exhaust hoods in accordance with SMACNA (DCS).
B. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
C. Mount unit on minimum 12 inch high curb base with insulation between duct and curb.
D. Make hood outlet area minimum of twice throat area.

2.14 GOOSENECKS
A. Fabricate in accordance with SMACNA (DCS) of minimum 18 gage, 0.0598 inch galvanized steel.

PART 3 EXECUTION
3.01 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
C. Install diffusers to ductwork with air tight connection.
D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION
SECTION 23 72 23
PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Energy recovery units.
B. Casing.
C. Fans.
D. Total energy wheel.
E. Filters.
F. Dampers.
G. Vibration isolation.
H. Roof curbs.
I. Power and controls.
J. Accessories.
K. Service accessories.

1.02 RELATED REQUIREMENTS
A. Section 07 72 00 - Roof Accessories: Roof curb.

1.03 REFERENCE STANDARDS
A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating.
B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.
D. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
J. NFPA 70 - National Electrical Code.
L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
M. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.
D. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Spare Parts: One of each kind of filter.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store in manufacturer's unopened packaging.

1.06 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Warranty dessicant core to be free from defects in material and workmanship for 5 years under circumstances of normal use.

PART 2 PRODUCTS

2.01 ENERGY RECOVERY DESIGN CRITERIA
A. Designe Criteria as specified in equipment schedule on drawings.

2.02 ENERGY RECOVERY UNITS
A. Energy Recovery Units: Dessicant wheel type; prefabricated packaged system designed by manufacturer.
   1. Access: Hinged and/or screwed access panels on front.
   2. Framing: Welded extruded aluminum tubular frame capable of supporting components and casings.

2.03 CASING
A. Wall, Floor, and Roof Panels:
   1. Construction: 1 inch thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
   2. Exterior Wall: Galvanized steel sheet.
      a. 0.040 inch thick aluminum.
   3. Interior Wall: Galvanized sheet metal.
      a. 22 gage, 0.0299 inch galvanized sheet metal.
   4. Insulation:
      a. 1/2 inch insulated fiberglass.
      b. Panel Cores: Mineral wool board.
      c. Mold Resistance: "Pass" when tested according to ASTM C1338.
      d. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
      e. Smoke Developed Index (SDI): 50, maximum, when tested in accordance with ASTM E84 or UL 723.
      f. Secure insulation to unit with waterproof adhesive and permanent mechanical fasteners.
   6. Isolation and Seal: Form continuous, thermally isolated, weather tight seal between inner wall of panels and structural framing with closed cell PVC foam gasketing.
   7. Seams: Sealed, requiring no caulking at job site.
B. Access Panels: Provide access to components through a large, tightly sealed and easily removable panel.
C. Doors:
   1. Construct doors of same construction and thickness as wall panels.
   2. Height: 80 inches.
   3. Hardware:
      a. Hinges: Aluminum.
b. Provide exterior handle and interior 3-point latching device.
c. Prop Rod: Capable of propping doors in open position.
d. Wind Restraint: Door chain with spring to absorb force of door swinging open.
e. Gasket: P-shaped extruded neoprene.
f. Label each door to identify equipment located within.

D. Duct Connection Collars: 0.08 inches aluminum, continuously welded.

E. Weather Hood: Provide on fresh air inlet and exhaust air outlet; removable for access.
   2. Fresh Air Weather Hood: Maintain a face velocity less than 340 feet/min.

2.04 FANS
A. Provide separate fans for exhaust and supply blowers.
B. Fans:
   1. Individually driven with a dedicated motor.
   2. Provide with non-overloading characteristics.
C. Bearings:
   1. Pillow block.
   2. Bearings: Permanently lubricated sealed ball bearings.
   3. Rated for not less than 200,000 hours of operation with accessible greased fittings.
D. Housings: 12 gage, 0.1046 inch aluminized steel with plenums integral to general housing and constructed to Class 1 fan standards.
E. Motors:
   1. Motors: Open drip proof.
   2. Efficiency: High.
   4. Control: Constant Speed.
   5. Fan Motor: UL listed and labeled.
F. Drives:
   1. Fans: Belt driven.
   2. Horsepower: 7.5 HP.
G. Belt Guards: Full sized, hinged, painted with high-visibility safety color, and accessible with standard tools.

2.05 TOTAL ENERGY WHEEL
A. Wheel: Transfer heat and humidity from one air stream to the other with minimum carryover of the exhaust air into the supply air stream.
B. Energy Wheel Media: Cleanable with low temperature steam, hot water or light detergent, without degrading the latent recovery.
C. Sensible Recovery Efficiency: 83.
D. Latent Recovery Efficiency: 87%.
E. Wheel Effectiveness: Rated in accordance with ASHRAE Std 84 and AHRI 1060.
F. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
G. Smoke Developed Index (SDI): 50 or less, when tested in accordance with ASTM E84 or UL 723.
H. Energy Recovery Wheel Media Face:
   1. Conform to NFPA 90A.
I. Rotor:
   1. Type: Non-segmented hygroscopic aluminum wheel.
2. Rotor Matrix: Corrosion resistant aluminum alloy composed of alternating corrugated and flat, continuously wound layers of uniform widths.

J. Desiccant:
   1. Type: 3A.
   2. Performance:
      a. Desiccant: Non-dissolving, permanent, and resistant to damage from compressed air, low temperature steam, hot water or by vacuum cleaning.

K. Drive:
   1. Drive: Tensioned drive with full perimeter link style belt.
   2. Inertial Shock Absorber: Absorb start and stop inertial shock to gear reducer.
   3. Select above or below depending on type of motor required.

L. Wheel Rotation Detection:
   1. Turn off energy recovery unit if improper rotor rotation is detected.
   2. Send alarm to Building Management System if rotation is not detected or belt is slipping.

2.06 FILTERS
   A. Thickness: 2 inch.
   B. Exhaust and Fresh Air Streams: MERV 7 filters constructed to meet ASHRAE Std 52.2.
   C. Filter Racks: Bolt-on rack constructed of 0.08 inch, minimum, thick aluminum with hinged side access door and snap fasteners.
   D. Mount 1/2 inches thick permanent aluminum washable type filter in the outside air hood and in the return plenum air.
   E. Provide spare set of filters.

2.07 DAMPERS
      1. High performance, backdraft dampers suitable for application in HVAC systems with velocities to 3000 feet per minute.
      2. Louvers, Dampers, and Shutters: AMCA 500-D and AMCA 500-L.
      3. Damper Capacity: Demonstrate damper capacity to withstand HVAC system operating conditions.
      4. Fabrication:
         a. Frame: 20 gage, 0.0359 inch, 3 inch roll formed galvanized steel channel with rear flange, prepunched mounting holes, and welded corner clips for maximum rigidity.
         b. Blades:
            1) Style: Single-piece, overlap frame.
            2) Material: Roll formed 28 gage, 0.0149 inch galvanized steel.
            3) Width: Maximum 6 inches.
   B. Return Air Damper:
      1. Factory installed, adjustable volume control, opposed blade damper for regulating airflow, based on external static pressure.
      2. Return Air Damper: Structural hat channels, reinforced at corners.
      3. Roll-formed Frames: Structurally superior to 13 gage, 0.0897 inch U-channel frames.
      4. Blades: Single skin, 16 gage, 0.0598 inch.
   C. Motorized Dampers: Provide motorized dampers at outside air inlet, exhaust air outlet, and supply air outlet.
      1. Type: Motorized two position parallel blade damper with blade seals.
   D. Motorized Louvers:
      1. Type: Motorized two position parallel blade louver with drainable blades, blade seals, and jamb seals.
2. Adjustable louver:
   a. Fabrication: Mullion style.
      1) Frame:
         (a) Material: Extruded aluminum, Alloy 6063-T5.
      2) Blades:
         (a) Style: Horizontal, adjustable, drainable.
         (b) Material: Formed aluminum, Alloy 6063-T5.

2.08 VIBRATION ISOLATION
   A. Vibration Isolation: Provide whole unit vibration isolation with the energy recovery unit assembly.

2.09 ROOF CURBS
   A. Curbs: Provide full perimeter roof curb fabricated from 10 gage, 0.1345 inch aluminized steel.
      1. Curbs: Knock-down type.

2.10 POWER AND CONTROLS
   A. Motor Control Panels: UL listed.
   B. Include necessary motor starters, fuses, transformers and overload protection according to NFPA 70.
   C. Provide single-point field connection to power supply.
   D. Install wiring in accordance with NFPA 70.
   E. Wiring: Enclosed in flexible, liquid tight steel conduit.

2.11 ACCESSORIES
   A. Airflow Monitor:
      1. Include integral airflow monitoring station with ability to read both ventilation and exhaust airflow expressed in cu ft/min.
   B. Rotation Detector:
      1. Equip unit with rotation sensor.
   C. Remote Indicating Panel: Provide remote indication of status of unit power on, wheel rotation alarm, outside air dirty filter and return air dirty filter.

2.12 SERVICE ACCESSORIES
   A. Internal Service Lights: Provide vapor tight light with protective cage and minimum 40 watt bulb.
   B. Electrical Receptacle:
      1. Provide duplex, ground fault interrupter type receptacle.
      2. Provide re-settable circuit breaker in control panel.
   C. Electrical Components: Factory wired for single point power connection.
      1. 60 Hz power connection.
      2. Isolate electrical box from the airflow.
      3. Protect all integral wires and connections.
      4. Electrical Components: UL Listed.
      5. Electrical Panel: NEMA 3R mounted on the unit exterior for ease of access.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

3.02 INSTALLATION
   A. Provide openings for suitable ductwork connection.
   B. Outdoor Installations:
      1. Roof Panels:
a. Fasteners: Use concealed means of attachment.  
b. Minimize penetrations through roof.  
c. Provide weather tight seal at required penetrations.  
2. Provide drip edge around roof perimeter.  
3. Do not locate roof panel joints above doors.  

3.03 SYSTEM STARTUP  
A. Provide services of manufacturer's authorized representative to provide start up of unit.  

3.04 CLEANING  
A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.  

END OF SECTION
SECTION 23 81 19
SELF-CONTAINED AIR-CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Packaged terminal air conditioning units.
B. Wall sleeves.
C. Louvers.
D. Controls.

1.02 RELATED REQUIREMENTS
A. Section 22 30 00 - Plumbing Equipment: Cooling condensate removal pumps.
B. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Installation of thermostats and other control components.
C. Section 26 27 17 - Equipment Wiring: Installation of thermostats and other control components.

1.03 REFERENCE STANDARDS

1.04 PERFORMANCE REQUIREMENTS
A. Air Cooled Units:
B. Scheduled performance:

1.05 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide drawings indicating dimensions, rough-in connections, and electrical characteristics and connection requirements.
C. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE
A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING
A. Protect finished cabinets from physical damage by leaving factory packing cases in place before installation and providing temporary covers after installation.

1.08 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp: www.carrier.com.

2.02 PERFORMANCE REQUIREMENTS
A. See project construction documents
2.03 AIR CONDITIONING UNITS
   A. Description: Packaged, self-contained, through-the-wall air cooled terminal air conditioning units, with wall sleeve, room cabinet, electric refrigeration system, electric heating, outside air louvers, built-in temperature controls; fully charged with refrigerant and filled with oil.
   B. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
   C. Electrical Characteristics:
      1. 208 volts, single phase, 60 Hz.

2.04 CABINET
   A. Discharge Grille and Access Door: Removable punched louver discharge grilles, allowing 4-way discharge air pattern with hinged door in top of cabinet for access to controls.

2.05 WALL SLEEVES AND LOUVERS
   A. Louvers: Provide Flush anodized aluminum with enamel finish, color per architect.

2.06 CHASSIS
   A. Refrigeration System:
      1. Direct expansion cooling coil.
      2. Hermetically sealed compressor with internal spring isolation, external isolation, permanent split capacitor motor and overload protection.
      3. Accumulator.
      4. Condenser coil and fan.
   B. Air System: Centrifugal forward curved tangential evaporator fans with two speed permanent split capacitor motor, permanent washable filters, positive pressure ventilation damper with concealed manual operator.
   C. Condensate Drain: Drain pan to direct condensate to condenser coil for re-evaporation.
   D. Condenser Fan: Centrifugal, forward curved type with separate permanent split capacitor motor.

2.07 CONTROLS
   A. Control Module: Unit mounted adjustable thermostat with heat anticipator, heat-off-cool switch, high-low fan switch.
   B. Low Ambient Lockout Control: Below 35 degrees F, outdoor thermostat shall prevent compressor operation and switch to heat mode.

PART 3 EXECUTION

3.01 INSTALLATION
   A. Install in accordance with manufacturer's instructions.
   B. Coordinate installation of units with architectural, mechanical, and electrical work.

3.02 SCHEDULES
   A. See project construction documents

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Air cooled condensing units.
B. Indoor air handler (fan & coil) units for duct connection.
C. Indoor ductless fan & coil units.
D. Controls.

1.02 RELATED REQUIREMENTS
A. Section 03 30 00 - Cast-in-Place Concrete: Mounting pad for outdoor unit.
B. Section 22 10 05 - Plumbing Piping: Includes indoor coil condensate drain.
C. Section 23 31 00 - HVAC Ducts and Casings.
D. Section 26 27 17 - Equipment Wiring: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS
B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; Air-Conditioning, Heating, and Refrigeration Institute.
D. ASHRAE Std 23.1 - Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant.
E. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.
H. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Underwriters Laboratories Inc..

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
D. Design Data: Indicate refrigerant pipe sizing.
E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
F. Project Record Documents: Record actual locations of components and connections.
G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
H. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SYSTEM DESIGN
   A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
      1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator; auxiliary electric heat.
      2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.
      3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
   B. Performance Requirements: See Drawings for additional requirements.

2.03 INDOOR UNITS FOR DUCTED SYSTEMS
   A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
      2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
   B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
      1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
      2. Motor Electrical Characteristics:
   C. Air Filters: 1 inch thick urethane, washable type arranged for easy replacement.
   D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
      1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.

2.04 INDOOR UNITS FOR DUCTLESS SYSTEMS
   A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
   B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
      1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
C. Remote Actuators:

2.05 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Comply with AHRI 210/240.
   2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
   3. Refrigerant: R-410A.
   4. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
   5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.

B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.

C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.

D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.
   2. Provide heat pump reversing valves.

E. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.
   2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.

F. Mounting Pad: Precast concrete parking bumpers, minimum 6 inches square; minimum of two located under cabinet feet.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

C. Install refrigeration systems in accordance with ASHRAE Std 15.

D. Pipe drain from AHU to nearest floor drain.

3.03 SCHEDULE

A. See project construction documents

END OF SECTION
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Single conductor building wire.
B. Nonmetallic-sheathed cable.
C. Underground feeder and branch-circuit cable.
D. Metal-clad cable.
E. Wiring connectors.

1.02 REFERENCE STANDARDS
A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire.
G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association.
H. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable; National Electrical Contractors Association (NECA/AA 104).
I. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); National Electrical Contractors Association (NECA/NACMA 102).
J. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); National Electrical Contractors Association.
N. UL 44 - Thermoset-Insulated Wires and Cables.
O. UL 83 - Thermoplastic-Insulated Wires and Cables.
P. UL 486A-486B - Wire Connectors.
Q. UL 486C - Splicing Wire Connectors.
R. UL 486D - Sealed Wire Connector Systems.
S. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.
T. UL 719 - Nonmetallic-Sheathed Cables.
U. UL 854 - Service-Entrance Cables.
V. UL 1569 - Metal-Clad Cables.

1.03 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect/Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Field Quality Control Test Reports.
C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.05 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS
A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS
2.01 CONDUCTOR AND CABLE APPLICATIONS
A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
C. Nonmetallic-sheathed cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For branch circuits rated 20A and less in structures permitted to be of Types III, IV and V construction except where code prohibits.
   2. In addition to other applicable restrictions, may not be used:
      a. Where exposed to view.
      b. Where exposed to damage.
      c. For damp, wet, or corrosive locations.
      d. Where not approved for use by the authority having jurisdiction.
      e. Unless approved by the owner.
D. Armored cable is not permitted.
E. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
         1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
   2. In addition to other applicable restrictions, may not be used:
      a. Unless approved by Owner.
b. Where not approved for use by the authority having jurisdiction.
c. Where exposed to view.
d. Where exposed to damage.
e. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
D. Comply with NEMA WC 70.
E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
G. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.
H. Conductors and Cables Installed in Cable Tray: Listed and labeled as suitable for cable tray use.
I. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.
J. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
K. Conductor Material:
   1. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
      a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, only for the following:
         1) Services: Copper conductors size 1/0 AWG and larger.
         2) Feeders: Copper conductors size 1/0 AWG and larger.
      b. Where aluminum conductors are substituted for copper, comply with the following:
         1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
         2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
         3) Provide aluminum equipment grounding conductor sized according to NFPA 70.
         4) Equip electrical distribution equipment with compression lugs for terminating aluminum conductors.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.
   4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

L. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 150 ft: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 200 ft: 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
M. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

N. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 480V/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208V/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      c. 240/120 V High-Leg Delta, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B (High-Leg): Orange.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      d. 240/120 V, 1 Phase, 3 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Neutral/Grounded: White.
      e. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Subject to compliance with requirements, manufacturers include, but are not limited to the following:
   1. Copper Building Wire:
   2. Aluminum Building Wire (only where specifically indicated or permitted for substitution):

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
   1. Feeders and Branch Circuits:
      b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
2.04 NONMETALLIC-SHEATHED CABLE
A. Description: NFPA 70, Type NM multiple-conductor cable listed and labeled as complying with UL 719, Type NM-B.
B. Conductor Stranding:
   2. Size 8 AWG and Larger: Stranded.
C. Insulation Voltage Rating: 600 V.

2.05 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE
A. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.
B. Provide equipment grounding conductor unless otherwise indicated.
C. Conductor Stranding:
   2. Size 8 AWG and Larger: Stranded.
D. Insulation Voltage Rating: 600 V.

2.06 METAL-CLAD CABLE
A. Subject to compliance with requirements, manufacturers include, but are not limited to the following manufacturers:
B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
C. Conductor Stranding:
   2. Size 8 AWG and Larger: Stranded.
D. Insulation Voltage Rating: 600 V.
E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
F. Provide dedicated neutral conductor for each phase conductor where indicated or required.
G. Grounding: Full-size integral equipment grounding conductor.
H. Armor: Steel, interlocked tape.
I. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.07 WIRING CONNECTORS
A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.
C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
D. Wiring Connectors for Terminations:
   1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   2. Aluminum Conductors: Use compression connectors for all connections.

E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

F. Mechanical Connectors: Provide bolted type or set-screw type.

G. Compression Connectors: Provide circumferential type or hex type crimp configuration.

H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as shown on the drawings.

E. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 PREPARATION**

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

**3.03 INSTALLATION**

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. Arrange circuiting to minimize splices.
   3. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   4. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Install aluminum conductors in accordance with NECA 104.

E. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.

F. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.

G. Install metal-clad cable (Type MC) in accordance with NECA 120.

H. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

I. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
J. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

K. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

L. Install conductors with a minimum of 12 inches of slack at each outlet.

M. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

N. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

O. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

P. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
   6. Mechanical Connectors: Secure connections according to manufacturer’s recommended torque settings.
   7. Compression Connectors: Secure connections using manufacturer’s recommended tools and dies.

Q. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

R. Insulate ends of spare conductors using vinyl insulating electrical tape.

S. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

T. Identify conductors and cables in accordance with Section 26 05 53.

U. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

V. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Perform inspection, testing, and adjusting in accordance with Section 01 40 00.
   C. Inspect and test in accordance with NETA ATS, except Section 4.
D. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is only required for conductors larger than 1/0. The resistance test for parallel conductors listed as optional is not required.

E. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION
SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Grounding and bonding requirements.
B. Conductors for grounding and bonding.
C. Connectors for grounding and bonding.
D. Ground bars.
E. Ground rod electrodes.
F. Ground plate electrodes.
G. Ground access wells.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
B. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.04 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS
A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
E. Grounding System Resistance:
   1. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   2. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
F. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Metal Underground Water Pipe(s):
   a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
   b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
   c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.

3. Metal Building or Structure Frame:
   a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.

4. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.

5. Ground Rod Electrode(s):
   a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
   b. Space electrodes not less than 10 feet from each other and any other ground electrode.

6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
   b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
   c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

G. Separately Derived System Grounding:
   1. Separately derived systems include, but are not limited to:
      a. Transformers (except autotransformers such as buck-boost transformers).
      b. Uninterruptible power supplies (UPS), when configured as separately derived systems.
      c. Generators, when neutral is switched in the transfer switch.
   2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
   3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
   4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
5. Outdoor Source: Where the source of the separately derived system is located outside the building or structure supplied, provide connection to grounding electrode at source in accordance with NFPA 70.

6. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.

7. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

H. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
   7. Provide bonding for interior metal air ducts.
   8. Provide bonding and equipment grounding for pools and fountains and associated equipment in accordance with NFPA 70.
   9. Provide redundant grounding and bonding for patient care areas of health care facilities in accordance with NFPA 70 and NFPA 99.

I. Communications Systems Grounding and Bonding:
   1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
   2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
      a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
      b. Raceway Size: 3/4 inch unless otherwise indicated or required.
      c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
      d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

J. Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).
C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
      a. Exceptions:
         1) Use mechanical connectors for connections to electrodes at ground access wells.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
      a. Exceptions:
         1) Use exothermic welded connections for connections to metal building frame.

D. Ground Bars:
   1. Description: Copper rectangular ground bars with mounting brackets and insulators.
   2. Size: As indicated.
   3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

F. Ground Plate Electrodes:
   1. Material: Copper.
   2. Size: 24 by 24 by 1/4 inches, unless otherwise indicated.

G. Ground Access Wells:
   1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
   2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
   3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
   4. Cover: Factory-identified by permanent means with word "GROUND".

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that work likely to damage grounding and bonding system components has been completed.
   B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
   A. Install products in accordance with manufacturer's instructions.
   B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
   C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
      1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
      2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.
   D. Ground Plate Electrodes: Unless otherwise indicated, install ground plate electrodes at a depth of not less than 30 inches.
E. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.13.
D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION
SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 ADMINISTRATIVE REQUIREMENTS
   A. Coordination:
      1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
      2. Coordinate the work with other trades to provide additional framing and materials required for installation.
      3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
      4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
      5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
   B. Sequencing:
      1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.03 QUALITY ASSURANCE
   A. Comply with NFPA 70.
   B. Comply with applicable building code.

1.04 DELIVERY, STORAGE, AND HANDLING
   A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS
   A. General Requirements:
      1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
      2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
      3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
      4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
      5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
         a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
         b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
   B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
      1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
      2. Conduit Clamps: Bolted type unless otherwise indicated.
   C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   2. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
   1. Minimum Size, Unless Otherwise Indicated or Required:
      a. Equipment Supports: 1/2 inch diameter.
      b. Busway Supports: 1/2 inch diameter.
      c. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch diameter.
      d. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch diameter.
      e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
      f. Outlet Boxes: 1/4 inch diameter.
      g. Luminaires: 1/4 inch diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
   1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
   3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

G. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
   6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
   7. Sheet Metal: Use sheet metal screws.
   8. Wood: Use wood screws.
   9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
      b. Channel Material: Use galvanized steel.
      c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that mounting surfaces are ready to receive support and attachment components.
   B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
   A. Install products in accordance with manufacturer's instructions.
   B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer’s recommended torque settings.

J. Remove temporary supports.

3.03 FIELD QUALITY CONTROL
   A. Inspect support and attachment components for damage and defects.
   B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
   C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Aluminum rigid metal conduit (RMC).
C. Intermediate metal conduit (IMC).
D. PVC-coated galvanized steel rigid metal conduit (RMC).
E. Flexible metal conduit (FMC).
F. Liquidtight flexible metal conduit (LFMC).
G. Electrical metallic tubing (EMT).
H. Rigid polyvinyl chloride (PVC) conduit.
I. Electrical nonmetallic tubing (ENT).
J. Liquidtight flexible nonmetallic conduit (LFNC).
K. Conduit fittings.
L. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete encasement of conduits.
B. Section 07 84 00 - Firestopping.
C. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
D. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.
E. Section 26 05 29 - Hangers and Supports for Electrical Systems.
F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
G. Section 31 23 16 - Excavation.
H. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.05 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS
A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
   6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
   7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges.
D. Embedded Within Concrete:
   1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
   4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
   5. Where electrical metallic tubing (EMT) emerges from concrete into salt air, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges.
E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

K. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.

L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
   1. Maximum Length: 6 feet.

N. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.

### 2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
   5. Underground, Interior: 1 inch (27 mm) trade size.
   6. Underground, Exterior: 1 inch (27 mm) trade size.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

### 2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.
2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

C. PVC-Coated Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.07 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.

2.09 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
2.10 **Rigid Polyvinyl Chloride (PVC) Conduit**

A. **Description:** NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. **Fittings:**
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.11 **Electrical Nonmetallic Tubing (ENT)**

A. **Description:** NFPA 70, Type ENT electrical nonmetallic tubing complying with NEMA TC 13 and listed and labeled as complying with UL 1653.

B. **Fittings:**
   1. Manufacturer: Same as manufacturer of ENT to be connected.
   2. Use solvent-welded type fittings.
   3. Solvent-Welded Fittings: Rigid PVC fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; suitable for use with ENT.

2.12 **Liquidtight Flexible Nonmetallic Conduit (LFNC)**

A. **Description:** NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.

B. **Fittings:**
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.13 **Accessories**

A. **Corrosion Protection Tape:** PVC-based, minimum thickness of 20 mil.

B. **Conduit Joint Compound:** Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. **Solvent Cement for PVC Conduit and Fittings:** As recommended by manufacturer of conduit and fittings to be installed.

D. **Pull Strings:** Use nylon cord with average breaking strength of not less than 200 pound-force.

E. **Sealing Compound for Sealing Fittings:** Listed for use with the particular fittings to be installed.

F. **Modular Seals for Conduit Penetrations:** Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 **Examination**

A. Verify that mounting surfaces are ready to receive conduits.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 **Installation**

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

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
H. Install electrical nonmetallic tubing (ENT) in accordance with NECA 111.
I. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
J. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated and routing is not shown, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   6. Arrange conduit to maintain adequate headroom, clearances, and access.
   7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   8. Arrange conduit to provide no more than 150 feet between pull points.
   9. Route conduits above water and drain piping where possible.
   10. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Hot water piping.
      c. Flues.
   13. Group parallel conduits in the same area together on a common rack.
K. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
   4. Use conduit strap to support single surface-mounted conduit.
      a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
   5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
   6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
   7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
   8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
L. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

M. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

N. Underground Installation:
1. Provide trenching and backfilling in accordance with Sections 31 23 16 and 31 23 23.
2. Minimum Cover, Unless Otherwise Indicated or Required:
   b. Under Slab on Grade: 12 inches to bottom of slab.
3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.

O. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Secure conduits to prevent floating or movement during pouring of concrete.

P. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 03 30 00 with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

Q. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.
R. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

S. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

T. Provide grounding and bonding in accordance with Section 26 05 26.

U. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL
   A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
   B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer’s instructions.
   C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING
   A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION
   A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION
SECTION 26 05 37

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
C. Floor boxes.
D. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.
B. Section 07 84 00 - Firestopping.
C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
D. Section 26 05 29 - Hangers and Supports for Electrical Systems.
E. Section 26 05 34 - Conduit:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
G. Section 26 27 26 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Poke-through assemblies.
   5. Additional requirements for locating boxes for wiring devices.
H. Section 27 10 05 - Structured Cabling for Voice and Data: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association.
C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association (ANSI/NEMA FB 1).
D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association (ANSI/NEMA OS 1).
E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association.
G. SCTE 77 - Specification for Underground Enclosure Integrity; Society of Cable Telecommunications Engineers (ANSI/SCTE 77).
H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.
I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.
J. UL 508A - Industrial Control Panels.
K. UL 514A - Metallic Outlet Boxes.
1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
Use raised covers suitable for the type of wall construction and device configuration where required.

Use shallow boxes where required by the type of wall construction.

Do not use "through-wall" boxes designed for access from both sides of wall.

Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.

Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.

2. NEMA 250 Environment Type, Unless Otherwise Indicated:
   a. Indoor Clean, Dry Locations: Type 1, painted steel.
   b. Outdoor Locations: Type 3R, painted steel.

3. Junction and Pull Boxes Larger Than 100 cubic inches:
   a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.

D. Floor Boxes:

1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.

2. Use cast iron floor boxes within slab on grade.

3. Use sheet-steel or cast iron floor boxes within slab above grade.

4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).

5. Manufacturer: Same as manufacturer of floor box service fittings.

E. Underground Boxes/Enclosures:

1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.

2. Size: As indicated on drawings.

3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.

4. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
   b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 15 load rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.

5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that mounting surfaces are ready to receive boxes.

B. Verify that conditions are satisfactory for installation prior to starting work.
3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
D. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
   2. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
      b. Communications Systems Outlets: Comply with Section 27 10 05.
   3. Locate boxes so that wall plates do not span different building finishes.
   4. Locate boxes so that wall plates do not cross masonry joints.
   5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   7. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
      b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
   9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 34.
   10. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
        a. Concealed above accessible suspended ceilings.
        b. Within joists in areas with no ceiling.
        c. Electrical rooms.
        d. Mechanical equipment rooms.
E. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
   4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
F. Install boxes plumb and level.
G. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

H. Install boxes as required to preserve insulation integrity.
I. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
J. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.
K. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches deep.
   2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
N. Close unused box openings.
O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
P. Provide grounding and bonding in accordance with Section 26 05 26.

3.03 CLEANING
A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION
A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Electrical identification requirements.
B. Identification nameplates and labels.
C. Wire and cable markers.
D. Voltage markers.
E. Underground warning tape.
F. Floor marking tape.
G. Warning signs and labels.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

PART 2 PRODUCTS
2.01 IDENTIFICATION REQUIREMENTS
A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchboards:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Use identification nameplate to identify main overcurrent protective device.
         3) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      b. Motor Control Centers:
         1) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      c. Panelboards:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      d. Transformers:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Identify load(s) served. Include location when not within sight of equipment.
      e. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify power source and circuit number. Include location when not within sight of equipment.
         2) Identify load(s) served. Include location when not within sight of equipment.
      f. Busway:
1) Identify power source and circuit number. Include location when not within sight of equipment.
2) Provide identification at maximum intervals of 40 feet.
3) Use identification nameplate to identify load(s) served for each plug-in unit. Include location when not within sight of equipment.

   **g. Time Switches:**
   1) Identify load(s) served and associated circuits controlled. Include location.
   
   **h. Enclosed Contactors:**
   1) Identify load(s) and associated circuits controlled. Include location.

   **i. Transfer Switches:**
   1) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
   2) Identify load(s) served. Include location when not within sight of equipment.

2. **Service Equipment:**
   a. Use identification nameplate to identify each service disconnecting means.
   b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
   c. Use identification nameplate at each piece of service equipment to identify the available fault current and the date calculations were performed.

3. **Emergency System Equipment:**
   a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
   b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
4. Use identification nameplate to identify switchboards and panelboards utilizing a high leg delta system in accordance with NFPA 70.
5. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
6. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
7. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
   a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 91 23 and 09 91 13.
8. **Arc Flash Hazard Warning Labels:** Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
   a. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
9. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
10. Use warning signs to identify electrical hazards for entrances to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
11. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

12. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
   2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
   3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
      a. At each source and load connection.
      b. Within boxes when more than one circuit is present.
      c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
   4. Use underground warning tape to identify direct buried cables.

C. Identification for Raceways:
   1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
      a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
         1) Color Code:
            (a) Emergency Power System: Red.
            (b) Fire Alarm System: Red.
         2) Field-Painting: Comply with Section 09 91 23 and 09 91 13.
         3) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.
   2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
   3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
   4. Use underground warning tape to identify underground raceways.
   5. Use warning labels to identify electrical hazards for cable tray containing conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP AWAY" at maximum intervals of 10 feet.

D. Identification for Boxes:
   1. Use voltage markers or color coded boxes to identify systems other than normal power system.
      a. Color-Coded Boxes: Field-painted in accordance with Section 09 91 23 and 09 91 13 per the same color code used for raceways.
         2) Fire Alarm System: Red.
   2. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".

E. Identification for Devices:
   1. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
   2. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
2.02 IDENTIFICATION NAMEPLATES AND LABELS
   A. Identification Nameplates:
      1. Materials:
         a. Indoor Clean, Dry Locations: Use plastic nameplates.
         b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
      2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
      3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
      4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
      5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

   B. Identification Labels:
      1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
      2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS
   A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
   B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
   C. Legend: Power source and circuit number or other designation indicated.
   D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
   E. Minimum Text Height: 1/8 inch.
   F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS
   A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
   B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
   C. Minimum Size:
      1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
      2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   D. Legend:
      1. Markers for System Identification:
         a. Emergency Power System: Text "EMERGENCY".
   E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE
   A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
   B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
   C. Legend: Type of service, continuously repeated over full length of tape.
D. Color:

2.06 FLOOR MARKING TAPE
   A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

2.07 WARNING SIGNS AND LABELS
   A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
   B. Warning Signs:
      1. Materials:
      2. Minimum Size: 7 by 10 inches unless otherwise indicated.
   C. Warning Labels:
      1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION
   A. Install products in accordance with manufacturer’s instructions.
   B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
      3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
      4. Elevated Equipment: Legible from the floor or working platform.
      5. Branch Devices: Adjacent to device.
      6. Interior Components: Legible from the point of access.
      7. Conduits: Legible from the floor.
      8. Boxes: Outside face of cover.
      9. Conductors and Cables: Legible from the point of access.
     10. Devices: Outside face of cover.
   C. Install identification products centered, level, and parallel with lines of item being identified.
   D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
   E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
   F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
   G. Mark all handwritten text, where permitted, to be neat and legible.

3.02 FIELD QUALITY CONTROL
   A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Networked switching controls.
B. Programmable switching controls.
C. Remote control switching relays.
D. Remote switches.
E. Remote sensors.
F. Power supplies.
G. Relay cabinets.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data showing dimensions and ratings for components.
C. Shop Drawings: Indicate wiring diagrams of system, showing interface with branch circuit wiring.
D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
E. Project Record Documents: Record actual locations of components and record circuiting and switching arrangements.
F. Maintenance Data: Include replacement parts numbers.
G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Relays: Two of each type.
   2. Extra Switches: Two of each type.
   3. Cabinet Keys: Two of each different key.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
C. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MANUFACTURERS

C. Douglas Lighting Controls.
D. Lighting Control and Design

2.02 PROGRAMMABLE RELAY PANELS

A. Description: Relay cabinet with power supply, terminal blocks, and logic cards for the specified programming functions.
B. Programming Functions:
   1. Multiple Switch Control: More than 1 switch can control each relay.
   2. Pilot Status Indication: Signal for indicating relay status at remote location.
   3. Relay Grouping: Allow relays to be grouped for common control.
4. Scheduling: Allow scheduling of 99 events each capable of switching 1 relay groups according to a programmed time schedule. Allow for up to 12 holidays.

C. Cabinet: Surface-mounted sheet metal cabinet.

**2.03 REMOTE CONTROL SWITCHING RELAYS**

A. Description: Heavy duty, two-coil momentary contact type remote control relays.

B. Contacts: Rated 20 amperes at 120 volts and with isolated and non-isolated pilot contacts where indicated.

C. Line Voltage Connections: Clamp type screw terminals.

**2.04 REMOTE SWITCHES**

A. Wall Switch: Rocker type.

1. Description: Momentary contact, three position switches, ivory color, rated 3 amperes at 25 VAC.

B. Key Switches: Match non-key switch ratings.

1. Description: Spade key type.

C. Switch Plates:

1. Description: Smooth plastic, white.

D. Master Sequencer:

1. Description: Electronic circuit module to allow single switch to control up to 8 relays.

**2.05 REMOTE SENSORS**

A. Exterior Lighting Sensor:

1. Description: Photodiode lighting sensor in weatherproof housing.

B. Photocell Control Unit:

1. Photodiode control unit with PHOTOCELL ENABLE and MASTER OVERRIDE inputs for remote control, 3-minute time delay.
2. Selectable ranges for 1 to 10 fc, 10 to 100 fc, 100 to 1000 fc, 1000 to 10,000 fc.

**2.06 RELAY CABINETS**

A. Boxes: Galvanized steel with removable endwalls.

B. Interior Panel: Metal, suitable for mounting components, matte white.

C. Fronts: Steel, flush type with concealed trim clamps door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

D. Metal Barriers: Between wiring of different systems and voltages.

E. Ground Bus Terminal Block: Bond each connector to enclosure.

F. Power Supply: NFPA 70, Class 2 transformer.

**2.07 POWER LIMITED WIRE AND CABLE**

A. Remote Control Cable: Copper conductor, 300 volt insulation rated 60 degrees C, individual conductors twisted together and covered with PVC jacket.

B. Plenum Cable: Copper conductor, 300 volt insulation rated 60 degrees C, individual conductors twisted together and covered with nonmetallic jacket; suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

A. Install wiring in conduit in accordance with Section 26 05 34.

B. Install wiring in the following locations in conduit in accordance with Section 26 05 34:

C. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.
3.02 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of system.

B. Provide minimum 4 hours of owner training. Record training and include with closeout documentation.

END OF SECTION
SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Occupancy sensors.
   B. Time switches.
   C. Outdoor photo controls.

1.02 REFERENCE STANDARDS
   B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association.
   D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association.
   G. UL 773 - Plug-in Locking Type Photocontrols for Use with Area Lighting.
   H. UL 916 - Energy Management Equipment.
   I. UL 917 - Clock-Operated Switches.
   J. UL 1472 - Solid-State Dimming Controls.

1.03 ADMINISTRATIVE REQUIREMENTS
   A. Coordination:
      1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
      2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
      3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
      4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
   B. Sequencing:
      1. Do not install lighting control devices until final surface finishes and painting are complete.

1.04 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
   D. Operation and Maintenance Data: Include detailed information on device programming and setup.
   E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      1. Extra Locking Receptacle-Mounted Outdoor Photo Controls: Five percent of total quantity installed for each type, but not less than two of each type.
F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.05 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.06 DELIVERY, STORAGE, AND PROTECTION
A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.07 FIELD CONDITIONS
A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Provide five year manufacturer warranty for all occupancy sensors.
C. Provide five year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.

PART 2 PRODUCTS
2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS
A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS
A. Manufacturers:
   1. Hubbell Building Automation, Inc: www.hubbellautomation.com
   5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
B. All Occupancy Sensors:
   1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
   2. Sensor Technology:
      a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
   3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
   4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
   5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
   6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
10. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
11. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
12. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
13. Wireless Sensors:
   a. RF Range: 30 feet through typical construction materials.
   c. Power: Battery-operated with minimum ten-year battery life.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
   a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
   b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay.
   c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.
   d. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
   e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
   f. Finish: Color to be selected by Architect.
2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.

D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
   a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability, and no leakage current to load in off mode.
   b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
   c. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
   d. Finish: Color to be selected by Architect.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
   a. Description: Low profile occupancy sensors designed for ceiling installation.
   b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
c. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
d. Finish: White unless otherwise indicated.

2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
   a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
   b. Extended Range Sensors: Capable of detecting motion within an area of 1,200 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.

F. Directional Occupancy Sensors:
   1. All Directional Occupancy Sensors: Designed for wall or ceiling mounting, with integral swivel for field adjustment of motion detection coverage.
      a. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
      b. Finish: White unless otherwise indicated.
   2. Passive Infrared (PIR) Directional Occupancy Sensors:
      a. Long Range Sensors: Capable of detecting motion within a distance of 80 feet at a mounting height of 10 feet.
      b. High Bay Sensors: Capable of detecting motion within a distance of 50 feet at a mounting height of 30 feet.
   3. Passive Infrared/Ultrasonic Dual Technology Directional Occupancy Sensors: Capable of detecting motion within a distance of 40 feet at a mounting height of 10 feet.

G. Power Packs for Low Voltage Occupancy Sensors:
   1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
   2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
   3. Input Supply Voltage: Dual rated for 120/277 V ac.
   4. Load Rating: As required to control the load indicated on the drawings.

H. Power Packs for Wireless Occupancy Sensors:
   1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
   2. Input Supply Voltage: Dual rated for 120/277 V ac.
   3. Load Rating: As required to control the load indicated on the drawings.

2.03 TIME SWITCHES

A. Manufacturers:
   4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. Digital Electronic Time Switches:
   1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
   2. Program Capability:
      a. Astronomic Time Switches: Single channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days and field-configurable astronomic feature to automatically adjust for seasonal changes in sunrise and sunset times.
      3. Schedule Capacity: Not less than 16 programmable on/off operations.
      4. Provide automatic daylight savings time and leap year compensation.
      5. Provide power outage backup to retain programming and maintain clock.
6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
7. Input Supply Voltage: As indicated on the drawings.
8. Output Switch Configuration: As required to control the load indicated on the drawings.
9. Output Switch Contact Ratings: As required to control the load indicated on the drawings.
10. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
    a. Indoor clean, dry locations: Type 1.

2.04 OUTDOOR PHOTO CONTROLS
A. Manufacturers:
B. Locking Receptacle-Mounted Outdoor Photo Controls
   1. Description: Plug-in locking type photo control unit complying with ANSI C136.10 for mounting on a compatible receptacle, listed and labeled as complying with UL 773.
   2. Housing: Weatherproof, impact resistant UV stabilized polypropylene, color to be selected.
   4. Light Level Activation: 1 to 3 footcandles turn-on and 1.5 to 1 turn-off to turn-on ratio with instant turn-on and delayed turn-off.
   5. Voltage: As required to control the load indicated on the drawings.
   6. Failure Mode: Fails to the on position.
   7. Load Rating: As required to control the load indicated on the drawings.
   9. Provide the following accessories where indicated or as required to complete installation:
      b. Mounting Bracket.
      c. Shorting Cap: Suitable for replacing locking photo control to complete circuit.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that field measurements are as shown on the drawings.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
D. Verify that final surface finishes are complete, including painting.
E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION
A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of lighting control devices provided under this section.
   1. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

G. Identify lighting control devices in accordance with Section 26 05 53.

H. Occupancy Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
   2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

I. Outdoor Photo Control Locations:
   1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
   2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.

J. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.

3.04 FIELD QUALITY CONTROL

A. Inspect each lighting control device for damage and defects.

B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

C. Test time switches to verify proper operation.

D. Test outdoor photo controls to verify proper operation, including time delays where applicable.

E. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.

D. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

E. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by [Owner]. Record settings in written report to be included with submittals.
3.06 CLEANING
   A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES
   A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
   B. Training: Train [Owner]'s personnel on operation, adjustment, programming, and maintenance of lighting control devices.
      1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
      2. Location: At project site.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Electrical service requirements.

1.02 DEFINITIONS
A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.03 ADMINISTRATIVE REQUIREMENTS
A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
B. Coordination:
   1. Verify the following with Utility Company representative:
      a. Utility Company requirements, including division of responsibility.
      b. Exact location and details of utility point of connection.
      c. Utility easement requirements.
      d. Utility Company charges associated with providing service.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
   3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work with other installers to provide communication lines required for Utility Company meters.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
D. Utility Company charges associated with providing permanent service to be paid by Owner.
E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
F. Scheduling:
   1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
   2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.04 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer’s standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
C. Shop Drawings: Include dimensioned plan views and sections indicating locations and arrangement of Utility Company and service entrance equipment, metering provisions, required clearances, and proposed service routing.
D. Project Record Documents: Record actual locations of equipment and installed service routing.

1.05 QUALITY ASSURANCE
A. Comply with the following:
   2. NFPA 70 (National Electrical Code).
   3. The requirements of the Utility Company.
B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS
A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
B. Electrical Service Characteristics: As indicated on drawings.
C. Utility Company: As indicated on drawings.
D. Division of Responsibility:
   1. Pad-Mounted Utility Transformers:
      a. Transformer Vaults and Pads: Furnished and installed by Contractor per Utility Company requirements.
      b. Transformers: Furnished and installed by Utility Company.
      d. Transformer Protective Bollards: Furnished and installed by Contractor per Utility Company requirements.
      e. Primary:
         1) Trenching and Backfilling: Provided by Contractor.
         2) Conduits: Furnished and installed by Contractor.
         3) Conductors: Furnished and installed by Utility Company.
      f. Secondary:
         1) Trenching and Backfilling: Provided by Contractor.
         2) Conduits: Furnished and installed by Contractor.
         3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
         4) Cable Limiters: Furnished and installed by contractor per Utility Company Requirements.
   2. Terminations at Service Point: Provided by Utility Company.
   3. Metering Provisions:
      a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
      b. Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.
      d. Metering Transformers: Furnished and installed by Utility Company.
      e. Conduits Between Metering Transformers and Meters: Furnished and installed by Contractor per Utility Company requirements.
      f. Wiring Between Metering Transformers and Meters: Furnished and installed by Utility Company.
      g. Communications Conduits for Meters: Furnished and installed by Contractor per Utility Company requirements.
E. Products Furnished by Contractor: Comply with Utility Company requirements.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
   B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION
   A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION
   A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
   B. Perform work in a neat and workmanlike manner in accordance with NECA 1.
   C. Arrange equipment to provide minimum clearances and required maintenance access.
   D. Provide required trenching and backfilling in accordance with Sections 31 23 16 and 31 23 23.
   E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 30 00.
   F. Provide required protective bollards in accordance with Utility Company requirements.
   G. Provide required support and attachment components in accordance with Section 26 05 29.
   H. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
   I. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

3.04 PROTECTION
   A. Protect installed equipment from subsequent construction operations.

END OF SECTION
SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. General purpose transformers.

1.02 ADMINISTRATIVE REQUIREMENTS
   A. Coordination: Coordinate the work with placement of support framing and anchors required for mounting of transformers.

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
   C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
   D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
   E. Maintenance Data: Include recommended maintenance procedures and intervals.
   F. Project Record Documents: Record actual locations of transformers.

1.04 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
   B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 TRANSFORMERS - GENERAL REQUIREMENTS
   A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
   B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
      1. Altitude: Less than 3,300 feet.
      2. Ambient Temperature:
         a. Greater than 10 kVA: Not exceeding 104 degrees F.
         b. Less than 10 kVA: Not exceeding 77 degrees F.
      3. Ambient Temperature: Not exceeding 86 degrees F average or 104 degrees F maximum measured during any 24 hour period.
   C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
   D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
E. Basic Impulse Level: 10 kV.
F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
G. Isolate core and coil from enclosure using vibration-absorbing mounts.
H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.02 GENERAL PURPOSE TRANSFORMERS
A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
B. Insulation System and Allowable Average Winding Temperature Rise:
   1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
   2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
C. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
D. Winding Taps:
   1. Less than 3 kVA: None.
   2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
   3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
   4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
   1. Test efficiency according to NEMA TP 2.
   2. Label transformer according to NEMA TP 3.
F. Sound Levels: Standard sound levels complying with NEMA ST 20.
G. Mounting Provisions:
   1. Less than 15 kVA: Suitable for wall mounting.
   2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
   3. Larger than 75 kVA: Suitable for floor mounting.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      2. Construction: Steel.
         a. Less than 15 kVA: Totally enclosed, non-ventilated.
         b. 15 kVA and Larger: Ventilated.
   3. Finish: Manufacturer’s standard grey, suitable for outdoor installations.
   4. Provide lifting eyes or brackets.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.

B. Overcurrent protective devices for switchboards.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of all equipment and components.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; and switchboard instrument details.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual installed locations of switchboards and final equipment settings.

F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Enclosure Keys: Two of each different key.

1.03 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store switchboards in accordance with manufacturer's instructions, NECA 400, and NEMA PB 2.1.

B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchboards, which are not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.

C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

E. Deliver in 48 inch maximum width shipping splits, individually wrapped for protection and mounted on shipping skids.

F. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

G. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.
PART 2 PRODUCTS

2.01 MANUFACTURERS

D. Schneider Electric; Square D Products:  www.schneider-electric.us.

2.02 SWITCHBOARDS

A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.
D. Service Conditions:
   1. Provide switchboards and associated components suitable for operation under the following service conditions without derating:
      a. Altitude: Less than 6,600 feet.
      b. Ambient Temperature:
   2. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
E. Short Circuit Current Rating:
F. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.
G. Bussing: Sized in accordance with UL 891 temperature rise requirements.
   1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.
   2. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
H. Conductor Terminations: Suitable for use with the conductors to be installed.
   1. Line Conductor Terminations:
      a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
      b. Main and Neutral Lug Type: Mechanical.
   2. Load Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
      b. Lug Type:
I. Enclosures:
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   2. Finish: Manufacturer's standard unless otherwise indicated.
J. Future Provisions:
   1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
K. Instrument Transformers:
2. Select suitable ratio, burden, and accuracy as required for connected devices.

L. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.

M. Main Section Devices: Individually mounted and compartmented.
N. Distribution Section Devices: Panel mounted.
O. Bus Material: Copper, standard size.
P. Bus Connections: Bolted, accessible from front for maintenance.
Q. Molded Case Circuit Breakers: Integral thermal and instantaneous magnetic trip in each pole.
   1. Include shunt trip where indicated.
R. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.
S. Metering Transformer Compartment: For utility company's use; compartment size, bus spacing and drilling, door, and locking and sealing requirements in accordance with Utility Company requirements.
T. Pull Section:
V. Pull Box: Removable top and sides, same construction as switchboard.
W. Enclosure: Type 1 - General Purpose.
   1. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

2.03 OVERCURRENT PROTECTIVE DEVICES
   A. Analog Ammeters: IEC 60051-1 and IEC 60051-2, direct reading, full range, indicating ammeter with 4.5 inch square recessed case and 250 degree scale, white dial with black figures and pointer, 5 ampere, 60 Hertz movement, 1 percent accuracy.

2.04 SOURCE QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Factory test switchboards according to NEMA PB 2, including the following production (routine) tests on each switchboard assembly or component:
      1. Dielectric tests.
      2. Mechanical operation tests.
      3. Grounding of instrument transformer cases test.
      4. Electrical operation and control wiring tests, including polarity and sequence tests.
      5. Ground-fault sensing equipment test.
   C. Shop inspect and test switchboard according to NEMA PB 2.
   D. Make completed switchboard available for inspection at manufacturer's factory prior to packaging for shipment. Notify Owner at least 7 days before inspection is allowed.

PART 3 EXECUTION
3.01 PREPARATION
   A. Provide concrete housekeeping pad under the provisions of Section 03 30 00.

3.02 INSTALLATION
   A. Install products in accordance with manufacturer's instructions.
   B. Install switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.
C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.

D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 1/2 inch between switchboard and wall.

E. Provide required support and attachment components in accordance with Section 26 05 29.

F. Install switchboards plumb and level.

G. Unless otherwise indicated, mount switchboards on properly sized 4 inch high concrete pad constructed in accordance with Section 03 30 00.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Install all field-installed devices, components, and accessories.

J. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

K. Provide filler plates to cover unused spaces in switchboards.

L. Install switchboard in locations shown on drawings, according to NEMA PB 2.1.

M. Install in a neat and workmanlike manner, as specified in NECA 400.

N. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.

C. Perform field inspection and testing in accordance with Section 01 40 00.

D. Inspect and test in accordance with NETA ATS, except Section 4.

E. Perform inspections and tests listed in NETA ATS, Section 7.1.

F. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10.

G. Correct deficiencies and replace damaged or defective switchboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of switchboard covers and doors.

C. Adjust all operating mechanisms for free mechanical movement.

D. Tighten bolted bus connections in accordance with manufacturer's instructions.

E. Adjust circuit breaker trip and time delay settings to values indicated.

F. Adjust circuit breaker trip and time delay settings to values as instructed by Architect.

3.05 CLEANING

A. Clean dirt and debris from switchboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred surfaces to match original factory finish.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Power distribution panelboards.
B. Lighting and appliance panelboards.
C. Load centers.
D. Overcurrent protective devices for panelboards.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
   2. Include wiring diagrams showing all factory and field connections.
   3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Panelboard Keys: Two of each different key.

1.04 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.06 FIELD CONDITIONS
A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS
D. Schneider Electric; Square D Products: www.schneider-electric.us.
E. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS
A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Label equipment utilizing series ratings as required by NFPA 70.
D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
H. Conductor Terminations: Suitable for use with the conductors to be installed.
I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.

3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   c. Finish for Painted Steel Fronts: Manufacturer’s standard grey unless otherwise indicated.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
   1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.

L. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

M. Provide the following features and accessories where indicated or where required to complete installation:
   1. Feed-through lugs.
   2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Aluminum.

D. Circuit Breakers:
   1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
   2. Provide thermal magnetic circuit breakers unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted enclosures unless otherwise indicated.
   2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 LOAD CENTERS
A. Description: Circuit breaker type load centers listed and labeled as complying with UL 67; ratings, configurations, and features as indicated on the drawings.
B. Bussing:
   2. Bus Material: Aluminum or copper.
C. Circuit Breakers: Thermal magnetic plug-in type.
D. Enclosures:
   1. Provide flush-mounted enclosures unless otherwise indicated.
   2. Provide circuit directory label on inside of door or individual circuit labels adjacent to circuit breakers.

2.06 OVERCURRENT PROTECTIVE DEVICES
A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
         2) 14,000 rms symmetrical amperes at 480 VAC.
      b. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
      a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   6. Provide the following circuit breaker types where indicated:
      a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
      b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
      c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.

7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.

8. Do not use handle ties in lieu of multi-pole circuit breakers.

9. Provide the following features and accessories where indicated or where required to complete installation:
   a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
   b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.07 SOURCE QUALITY CONTROL

A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 26 05 29.

E. Install panelboards plumb.

F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.

I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 26 05 26.

K. Install all field-installed branch devices, components, and accessories.

L. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

M. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

N. Provide filler plates to cover unused spaces in panelboards.

O. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
   1. Emergency and night lighting circuits.
   2. Fire detection and alarm circuits.

P. Identify panelboards in accordance with Section 26 05 53.
3.03 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Inspect and test in accordance with NETA ATS, except Section 4.
   C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 225 amperes. Tests listed as optional are not required.
   D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
   E. Test GFCI circuit breakers to verify proper operation.
   F. Test AFCI circuit breakers to verify proper operation.
   G. Test shunt trips to verify proper operation.
   H. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING
   A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
   B. Adjust alignment of panelboard fronts.

3.05 CLEANING
   A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
   B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Wall switches.
   B. Wall dimmers.
   C. Fan speed controllers.
   D. Receptacles.
   E. Wall plates.
   F. Floor box service fittings.
   G. Poke-through assemblies.

1.02 ADMINISTRATIVE REQUIREMENTS
   A. Coordination:
      1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed
         under other sections or by others.
      2. Coordinate wiring device ratings and configurations with the electrical requirements of
         actual equipment to be installed.
      3. Coordinate the placement of outlet boxes for wall switches with actual installed door
         swings.
      4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to
         provide suitable surface for installation of wiring devices.
      5. Coordinate the core drilling of holes for poke-through assemblies with the work covered
         under other sections.
      6. Notify Architect of any conflicts or deviations from the contract documents to obtain
         direction prior to proceeding with work.

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use
      stipulated by product testing agency. Include instructions for storage, handling, protection,
      examination, preparation, and installation of product.
   C. Operation and Maintenance Data:
      1. Wall Dimmers: Include information on operation and setting of presets.
      2. GFCI Receptacles: Include information on status indicators.
   D. Project Record Documents: Record actual installed locations of wiring devices.

1.04 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.
   B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.05 DELIVERY, STORAGE, AND PROTECTION
   A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

F. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

2.02 WIRING DEVICE APPLICATIONS
A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
D. Provide tamper resistant receptacles for receptacles installed in dwelling units.
E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
F. Provide GFCI protection for receptacles installed in kitchens.
G. Provide GFCI protection for receptacles serving electric drinking fountains.
H. For flush floor service fittings, use tile rings for installations in tile floors.
I. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.03 ALL WIRING DEVICES
A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
B. Finishes:
   1. All Wiring Devices: White with white nylon wall plate unless otherwise indicated.
   2. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate unless otherwise indicated.
   3. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate unless otherwise indicated.
   4. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover unless otherwise indicated.
   5. Wiring Devices Connected to Emergency Power: Red with red nylon wall plate.
   6. Flush Floor Box Service Fittings: Gray wiring devices with aluminum cover and ring/flange.
   8. Access Floor Boxes: Gray wiring devices with gray steel cover with insert to match floor covering.

2.04 WALL SWITCHES
A. Manufacturers:
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
D. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

E. Momentary Contact Wall Switches: Industrial specification grade, 20 A, 120/277 V with toggle type three position switch actuator and momentary contacts; single pole double throw, off with switch actuator in center position.

2.05 WALL DIMMERS

A. Manufacturers:
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

C. Control: Slide control type with separate on/off switch.

D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:

E. Provide accessory wall switches to match dimmer appearance when installed adjacent to each other.

2.06 FAN SPEED CONTROLLERS

A. Manufacturers:
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan noise elimination circuitry, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.

   1. Current Rating: 1.5 A unless otherwise indicated or required to control the load indicated on the drawings.

2.07 RECEPTACLES

A. Manufacturers:
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.

   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:

   1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.

4. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
   4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
   5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

E. Locking Receptacles: Industrial specification grade, configuration as indicated on the drawings.

2.08 WALL PLATES

A. Manufacturers:
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard;
   3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.09 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
   3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us
B. Description: Service fittings compatible with floor boxes provided under Section 26 05 37 with components, adapters, and trims required for complete installation.

C. Flush Floor Service Fittings:
1. Single Service Flush Convenience Receptacles:
   a. Cover: Round.
   b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Communications Outlets:
   a. Cover: Round.
   b. Voice and Data Jacks: As specified in Section 27 10 05.
3. Single Service Flush Furniture Feed:
   a. Cover: Round.
   b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
4. Dual Service Flush Combination Outlets:
   a. Cover: Round.
   b. Configuration:
      1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
      2) Voice and Data Jacks: As specified in Section 27 10 05.
5. Accessories:
   a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
   b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

2.10 POKE-THROUGH ASSEMBLIES

A. Manufacturers:
3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us

B. Description: Assembly comprising floor service fitting, poke-through component, fire stops and smoke barriers, and junction box for conduit termination; fire rating listed to match fire rating of floor and suitable for floor thickness where installed.

C. Flush Floor Service Fittings:
1. Single Service Flush Convenience Receptacles:
   a. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Furniture Feed:
   a. Configuration: One 2 inch by 1-1/4 inch combination threaded opening(s).
3. Dual Service Flush Combination Outlets:
   a. Cover: Hinged door(s).
   b. Configuration:
      1) Power: One standard convenience duplex receptacle(s).
      2) Voice and Data Jacks: As specified in Section 27 10 05.
4. Accessories:
   a. Closure Plugs: Size and fire rating as required to seal unused core hole and maintain fire rating of floor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
C. Verify that final surface finishes are complete, including painting.
D. Verify that floor boxes are adjusted properly.
E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION
A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of wiring devices provided under this section.
   1. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   2. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
   3. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
   4. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
C. Install wiring devices in accordance with manufacturer's instructions.
D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.
I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
J. Install wall switches with OFF position down.
K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

P. Identify wiring devices in accordance with Section 26 05 53.

Q. Install poke-through closure plugs in each unused core holes to maintain fire rating of floor.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION
SECTION 26 28 13
FUSES

PART 1 GENERAL
1.01 SECTION INCLUDES
A. Fuses.
B. Spare fuse cabinet.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
   2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   1. Extra Fuses: One set(s) of three for each type and size installed.
   2. Fuse Pullers: One set(s) compatible with each type and size installed.
   3. Spare Fuse Cabinet Keys: Two.

1.04 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS
2.01 MANUFACTURERS

2.02 APPLICATIONS
A. Service Entrance:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
B. Feeders:
   1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
   2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
C. General Purpose Branch Circuits: Class RK1, time-delay.
D. Individual Motor Branch Circuits: Class RK1, time-delay.
E. Primary Protection for Control Transformers: Class CC, time-delay.

2.03 FUSES
A. Provide products listed, classified, and labeled as suitable for the purpose intended.
B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
C. Provide fuses of the same type, rating, and manufacturer within the same switch.
D. Comply with UL 248-1.
E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
F. Voltage Rating: Suitable for circuit voltage.
G. Class R Fuses: Comply with UL 248-12.
H. Class L Fuses: Comply with UL 248-10.
I. Class CC Fuses: Comply with UL 248-4.
J. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
K. Provide the following accessories where indicated or where required to complete installation:
   1. Fuseholders: Compatible with indicated fuses.
   2. Fuse Reducers: For adapting indicated fuses to permit installation in switch designed for fuses with larger ampere ratings.

2.04 SPARE FUSE CABINET
   A. Description: Wall-mounted sheet metal cabinet with shelves and hinged door with cylinder lock, suitably sized to store spare fuses and fuse pullers specified.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that fuse ratings are consistent with circuit voltage and manufacturer’s recommendations and nameplate data for equipment.
   B. Verify that mounting surfaces are ready to receive spare fuse cabinet.
   C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
   A. Do not install fuses until circuits are ready to be energized.
   B. Install fuses with label oriented such that manufacturer, type, and size are easily read.
   C. Install spare fuse cabinet where indicated.

END OF SECTION
PART 1  GENERAL

1.01  ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.02  SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
   1. Include characteristic trip curves for each type and rating of circuit breaker upon request.
C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
   2. Include documentation of listed series ratings upon request.
D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
E. Project Record Documents: Record actual installed locations of enclosed circuit breakers.
F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.03  QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.04  DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed circuit breaker internal components, enclosure, and finish.

1.05  FIELD CONDITIONS

A. Maintain ambient temperature between 23 degrees F and 104 degrees F during and after installation of enclosed circuit breakers.

PART 2  PRODUCTS

2.01  MANUFACTURERS

D. Schneider Electric; Square D Products:  www.schneider-electric.us.
E. Source Limitations: Furnish enclosed circuit breakers and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOURED CIRCUIT BREAKERS

A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between 23 degrees F and 104 degrees F.

D. Short Circuit Current Rating:
   1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.
   2. Listed series ratings are acceptable, except where not permitted by motor contribution according to NFPA 70.
   3. Label equipment utilizing series ratings as required by NFPA 70.

E. Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

F. Conductor Terminations: Suitable for use with the conductors to be installed.

G. Provide thermal magnetic circuit breakers unless otherwise indicated.

H. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

I. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.

J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   2. Finish for Painted Steel Enclosures: Manufacturer’s standard, factory applied grey unless otherwise indicated.
   3. Provide surface-mounted enclosures unless otherwise indicated.

K. Provide externally operable handle with means for locking in the OFF position.

L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

2.03 MOLDED CASE CIRCUIT BREAKERS

A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

B. Interrupting Capacity:
   1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
   2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated.

C. Conductor Terminations:
   1. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   1. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.

E. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

F. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.

G. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.

H. Provide the following features and accessories where indicated or where required to complete installation:
   1. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
   2. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that the ratings of the enclosed circuit breakers are consistent with the indicated requirements.
   B. Verify that mounting surfaces are ready to receive enclosed circuit breakers.
   C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
   A. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions.
   B. Install enclosed circuit breakers securely, in a neat and workmanlike manner in accordance with NECA 1.
   C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
   D. Provide required supports in accordance with Section 26 05 29.
   E. Install enclosed circuit breakers plumb.
   F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
   G. Provide grounding and bonding in accordance with Section 26 05 26.
   H. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
   I. Identify enclosed circuit breakers in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.
   C. Test shunt trips to verify proper operation.
   D. Correct deficiencies and replace damaged or defective enclosed circuit breakers.

3.04 ADJUSTING
   A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
3.05 CLEANING

A. Clean dirt and debris from circuit breaker enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION
SECTION 26 28 18
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Enclosed safety switches.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Coordination:
   1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer’s standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
D. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
E. Project Record Documents: Record actual locations of enclosed switches.
F. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.04 QUALITY ASSURANCE
A. Conform to requirements of NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle carefully in accordance with manufacturer’s written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.06 FIELD CONDITIONS
A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS
D. Schneider Electric; Square D Products: www.schneider-electric.us.
E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Minimum Ratings:
      a. Switches Protected by Class H Fuses: 10,000 rms symmetrical amperes.
      b. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.

G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

H. Provide with switch blade contact position that is visible when the cover is open.

I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
   1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

J. Conductor Terminations: Suitable for use with the conductors to be installed.

K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.
   2. Finish for Painted Steel Enclosures: Manufacturer’s standard, factory applied grey unless otherwise indicated.

N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

O. Heavy Duty Switches:
   2. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
      a. Provide means for locking handle in the ON position.
PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
   B. Verify that mounting surfaces are ready to receive enclosed safety switches.
   C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
   A. Install enclosed switches in accordance with manufacturer's instructions.
   B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.
   C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
   D. Provide required supports in accordance with Section 26 05 29.
   E. Install enclosed switches plumb.
   F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
   G. Provide grounding and bonding in accordance with Section 26 05 26.
   H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
   I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
   J. Identify enclosed switches in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Inspect and test in accordance with NETA ATS, except Section 4.
   C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
   D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING
   A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING
   A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
   B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION
SECTION 26 43 00
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Surge protective devices for service entrance locations.

1.02 RELATED REQUIREMENTS
   A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   B. Section 26 24 13 - Switchboards.

1.03 ABBREVIATIONS AND ACRONYMS
   B. SPD: Surge Protective Device.

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to ordering equipment.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
   C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.
   D. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
      1. UL 1449.
      2. UL 1283 (for Type 2 SPDs).
   E. Field Quality Control Test Reports.
   F. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
   G. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.
   H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
   I. Project Record Documents: Record actual connections and locations of surge protective devices.

1.06 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND PROTECTION
   A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.08 FIELD CONDITIONS
   A. Maintain field conditions within manufacturer's required service conditions during and after installation.
1.09 WARRANTY
   A. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.
   B. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Field-installed, Externally Mounted Surge Protective Devices:
   B. Factory-installed, Internally Mounted Surge Protective Devices:
      1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.
   C. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS
   A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
   B. Protected Modes:
   C. UL 1449 Voltage Protection Ratings (VPRs):
      1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
      2. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.
   D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
   E. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      1. Indoor clean, dry locations: Type 1.
      2. Outdoor locations: Type 3R.
   F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
      1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
   G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS
   A. Unless otherwise indicated, provide field-installed, externally mounted or factory-installed, internally mounted SPDs.
   B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
   C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.
D. Surge Current Rating: Not less than 100kA per mode / 200kA per phase.
E. UL 1449 Nominal Discharge Current (I-n): 20 kA.
F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
G. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
H. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
   3. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
I. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
B. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of the drawings and manufacturer's instructions.
C. Verify system grounding and bonding is in accordance with Section 26 05 26, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION
A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
B. Install SPD in accordance with manufacturer's instructions.
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
D. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.
E. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.
F. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
G. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

3.03 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for additional requirements.
B. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
3.04 CLEANING
   A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.
B. Emergency lighting units.
C. Exit signs.
D. Ballasts and drivers.
E. Fluorescent emergency power supply units.
F. Lamps.
G. Luminaire accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
   2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
   3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
   4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.03 SUBMITTALS

A. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
   2. Fluorescent Emergency Power Supply Unit: Include list of compatible lamp configurations and associated lumen output.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.
   2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.

F. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.04 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.
   B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND PROTECTION
   A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
   B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.06 FIELD CONDITIONS
   A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.07 WARRANTY
   A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
   B. Provide two year manufacturer warranty for all linear fluorescent ballasts.
   C. Provide five year pro-rata warranty for batteries for emergency lighting units.
   D. Provide ten year pro-rata warranty for batteries for self-powered exit signs.
   E. Provide three year full warranty for fluorescent emergency power supply units.

PART 2 PRODUCTS

2.01 MANUFACTURERS - LUMINAIRES
   A. Subject to the requirements of this specification and the "Basis of Design", Luminaires are not limited to any one manufacturer. Refer to drawings for "Basis of Design" products.

2.02 LUMINAIRE TYPES
   A. Furnish products as indicated in luminaire schedule included on the drawings.

2.03 LUMINAIRES
   A. Provide products that comply with requirements of NFPA 70.
   B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
   C. Provide products listed, classified, and labeled as suitable for the purpose intended.
   D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
   E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
   F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
   G. Recessed Luminaires:
      2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
      3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
   H. Fluorescent Luminaires:
1. Provide ballast disconnecting means complying with NFPA 70 where required.
2. Fluorescent Luminaires Controlled by Occupancy Sensors: Provide programmed start ballasts.
3. Fluorescent Luminaires Controlled by Dual-Level Switching: Provide with two ballasts.
   a. Luminaires with Three Lamps: One ballast controls two outer lamps and one ballast controls inner lamp.
   b. Luminaires with Four Lamps: One ballast controls two outer lamps and one ballast controls two inner lamps.

I. LED Luminaires Components: UL 8750 recognized or listed as applicable.

J. Track Lighting Systems: Provide track compatible with specified track heads, with all connectors, power feed fittings, dead ends, hangers and canopies as necessary to complete installation.

K. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.04 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
C. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
G. Accessories:
   1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
   2. Provide compatible accessory wire guards where indicated.
   3. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.05 EXIT SIGNS

A. Description: Exit signs and similar signs for special purpose applications such as area of refuge/rescue assistance.
B. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.
C. Self-Powered Exit Signs:
   1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
   2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
3. **Diagnostics:** Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
4. **Provide low-voltage disconnect to prevent battery damage from deep discharge.**

### 2.06 BALLASTS AND DRIVERS

#### A. Ballasts - General Requirements:
1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. **Minimum Efficiency/Efficacy:** Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

#### B. Fluorescent Ballasts:
1. **All Fluorescent Ballasts:** Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
   a. **Input Voltage:** Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
   b. **Total Harmonic Distortion:** Not greater than 10 percent.
   c. **Power Factor:** Not less than 0.95.
   d. **Thermal Protection:** Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
   e. **Sound Rating:** Class A, suitable for average ambient noise level of 20 to 24 decibels.
   f. **Lamp Compatibility:** Specifically designed for use with the specified lamp, with no visible flicker.
   g. **Lamp Operating Frequency:** Greater than 20 kHz, except as specified below.
   h. **Lamp Current Crest Factor:** Not greater than 1.7.
   i. **Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
   j. **Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
   k. **Surge Tolerance:** Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
   l. **Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits:** Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
   m. **Ballast Marking:** Include wiring diagrams with lamp connections.

2. **Non-Dimming Fluorescent Ballasts:**
   a. **Lamp Starting Method:**
      1) **T8 Lamp Ballasts:** Instant start unless otherwise indicated.
      2) **T5 Lamp Ballasts:** Programmed start unless otherwise indicated.
      3) **Compact Fluorescent Lamp Ballasts:** Programmed start unless otherwise indicated.
   b. **Lamp Starting Temperature:** Capable of starting standard lamp(s) at a minimum of 0 degrees F, and energy saving lamp(s) at a minimum of 60 degrees F unless otherwise indicated.

3. **Dimming Fluorescent Ballasts:**
   a. **Dimming Range:** Continuous dimming from 100 percent to 10 percent relative light output unless dimming capability to lower level is indicated, without flicker and with even tracking across multiple lamps.
   b. **Control Compatibility:** Fully compatible with the dimming controls to be installed.
      1) **Wall Dimmers:** See Section 26 27 26.
      2) **Network Lighting Controls:** See Section 26 09 43 - Network Lighting Controls - Lutron QS/Quantum.
   c. **Lamp Starting Method:** Programmed start unless otherwise indicated.
   d. **Dimmed Lamp Starting:** Capable of starting lamp(s) at any dimmed preset without transitioning first to full light output.

**C. Dimmable LED Drivers:**
1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.07 FLUORESCENT EMERGENCY POWER SUPPLY UNITS

A. Description: Self-contained fluorescent emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Compatibility:
   1. Ballasts: Compatible with electronic, standard magnetic, energy saving, and dimming AC ballasts, including those with end of lamp life shutdown circuits.

C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the fluorescent emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

D. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

E. Emergency Illumination Output:
   1. Luminaires with F32T8 Lamps: Operate two lamp(s) at a minimum of 1350 lumens unless otherwise indicated with indicated illumination evenly divided between the lamps.
   2. Luminaires with F28T5 Lamps: Operate one lamp(s) at a minimum of 1325 lumens unless otherwise indicated.
   3. Luminaires with F54T5HO Lamps: Operate one lamp(s) at a minimum of 1250 lumens unless otherwise indicated.

F. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status and field selectable audible alert.

H. Operating Temperature: From 32 degrees F to 122 degrees F unless otherwise indicated or required for the installed location.

I. Accessories:
   1. Provide compatible accessory remote combination test switch/indicator light for emergency luminaires located in in-accessible locations.

2.08 LAMPS

A. Lamps - General Requirements:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
   3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
   4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

B. Compact Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
   1. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
   2. Color Rendering Index (CRI): Not less than 80.
3. Average Rated Life: Not less than 10,000 hours for an operating cycle of three hours per start.

C. Linear Fluorescent Lamps: Wattage and bulb type as indicated, with base type as required for luminaire.
   1. T8 Linear Fluorescent Lamps:
      a. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
      b. Color Rendering Index (CRI): Not less than 80.
      c. Average Rated Life: Not less than 20,000 hours for an operating cycle of three hours per start.
   2. T5 Linear Fluorescent Lamps:
      a. Correlated Color Temperature (CCT): 3,500 K unless otherwise indicated.
      b. Color Rendering Index (CRI): Not less than 80.
      c. Average Rated Life: Not less than 20,000 hours for an operating cycle of three hours per start.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
   B. Verify that suitable support frames are installed where required.
   C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
   D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION
   A. Provide extension rings to bring outlet boxes flush with finished surface.
   B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION
   A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.
   B. Install products according to manufacturer's instructions.
   C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
   D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
   E. Suspended Ceiling Mounted Luminaires:
      1. Do not use ceiling tiles to bear weight of luminaires.
      2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
      3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
      4. Secure pendant-mounted luminaires to building structure.
      5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
      6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
   F. Recessed Luminaires:
      1. Install trims tight to mounting surface with no visible light leakage.
      2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
      3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
G. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
   2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

H. Install accessories furnished with each luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Fluorescent Luminaires Controlled by Dual-Level Switching: Connect such that each switch controls the same corresponding lamps in each luminaire.

K. Emergency Lighting Units:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

L. Exit Signs:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

M. Fluorescent Emergency Power Supply Units:
   1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
   2. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal ballast(s) in luminaire. Bypass local switches, contactors, or other lighting controls.

N. Remote Ballasts: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.

O. Identify luminaires connected to emergency power system in accordance with Section 26 05 53.

P. Install lamps in each luminaire.

Q. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL
   A. Inspect each product for damage and defects.
   B. Operate each luminaire after installation and connection to verify proper operation.
   C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
   D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING
   A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
   B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.
   C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING
   A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
3.07 CLOSEOUT ACTIVITIES
   A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
   B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION
   A. Protect installed luminaires from subsequent construction operations.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.
B. Ballasts.
C. Lamps.
D. Poles and accessories.
E. Luminaire accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.03 SUBMITTALS

A. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.
   3. Provide structural calculations for each pole proposed for substitution.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. Lamps: Include rated life and initial and mean lumen output.
   2. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

C. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
   2. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.
   3. Extra Fuses: Five percent of total quantity installed for each type, but not less than two of each type.
   4. Touch-Up Paint: 2 gallons, to match color of pole finish.

G. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.
1.04 QUALITY ASSURANCE
   A. Conform to requirements of NFPA 70.
   B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
   B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Subject to the requirements of this specification and the "Basis of Design", luminaires are not limited to any one manufacturer. Refer to drawings for "Basis of Design" products.

2.02 LUMINAIRE TYPES
   A. Furnish products as indicated in luminaire schedule included on the drawings.

2.03 LUMINAires
   A. Provide products that comply with requirements of NFPA 70.
   B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
   C. Provide products listed, classified, and labeled as suitable for the purpose intended.
   D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
   E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
   F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
   G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
   H. Recessed Luminaires:
      2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
      3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
   I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
   J. LED Luminaire Components: UL 8750 recognized or listed as applicable.
   K. Exposed Hardware: Stainless steel.

2.04 BALLASTS
   A. All Ballasts:
      1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
      2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
   B. Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
      1. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
      2. Total Harmonic Distortion: Not greater than 10 percent.
3. Power Factor: Not less than 0.95.
4. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
5. Thermal Protection: Listed and labeled as UL Class P, with automatic reset for integral thermal protectors.
7. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
8. Lamp Operating Frequency: Greater than 20 kHz, except as specified below.
10. Lamp Starting Method:
    a. T8 Lamp Ballasts: Instant start unless otherwise indicated.
    b. T5 Lamp Ballasts: Programmed start unless otherwise indicated.
    c. Compact Fluorescent Lamp Ballasts: Programmed start unless otherwise indicated.
11. Lamp Starting Temperature: Capable of starting standard lamp(s) at a minimum of 0 degrees F unless otherwise indicated.
12. Provide automatic restart capability to restart replaced lamp(s) without requiring resetting of power.
13. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
14. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.

C. High Intensity Discharge (HID) Ballasts: Unless otherwise indicated, provide electromagnetic ballasts complying with ANSI C82.4 and listed and labeled as complying with UL 1029.

1. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 5 percent.
2. Power Factor: Not less than 0.90 unless otherwise indicated.

2.05 LAMPS

A. Lamps - General Requirements:
1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

2.06 POLES

A. All Poles:
1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
2. Structural Design Criteria:
   a. Comply with AASHTO LTS.
   b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
   c. Dead Load: Include weight of proposed luminaire(s) and associated supports and accessories.
3. Material: Aluminum, unless otherwise indicated.
4. Shape: Square straight, unless otherwise indicated.
5. Finish: Match luminaire finish, unless otherwise indicated.
6. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
7. Unless otherwise indicated, provide with the following features/accessories:
   a. Top cap.
   b. Handhole.
   c. Anchor bolts with leveling nuts or leveling shims.
   d. Anchor base cover.
   e. Provision for pole-mounted weatherproof GFI receptacle where indicated.
   f. Brackets.

B. Metal Poles: Provide ground lug, accessible from handhole.

2.07 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
B. Verify that suitable support frames are installed where required.
C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION
A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION
A. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of luminaires provided under this section.
B. Install products according to manufacturer's instructions.
C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
E. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.
   2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
   3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
F. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
   2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
   3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet between supports.
   4. Install canopies tight to mounting surface.
   5. Unless otherwise indicated, support pendants from swivel hangers.
G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
H. Pole-Mounted Luminaires:
   1. Maintain the following minimum clearances:
b. Comply with utility company requirements.

2. Foundation-Mounted Poles:
   a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 30 00.
      1) Install anchor bolts plumb per template furnished by pole manufacturer.
      2) Position conduits to enter pole shaft.
   b. Install foundations plumb.
   c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
   d. Tighten anchor bolt nuts to manufacturer's recommended torque.

3. Grounding:
   a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.

4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

5. Install weather resistant GFI duplex receptacle with weatherproof cover as specified in Section 26 27 26 in designated poles.

I. Install accessories furnished with each luminaire.

J. Bond products and metal accessories to branch circuit equipment grounding conductor.

K. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION
SECTION 27 10 05
STRUCTURED CABLING FOR VOICE AND DATA

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Communications system design requirements.
B. Communications pathways.
C. Copper cable and terminations.
D. Communications identification.
E. Telecommunications service entrance to building(s).
F. Cabling and pathways inside building(s).
G. Grounding and bonding the telecommunications distribution system.

1.02 SUBMITTALS
A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
D. Manufacturer Qualifications.
E. Evidence of qualifications for installer.
F. Field Test Reports.
G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on contract drawings.

1.03 COORDINATION
A. Contractor shall coordinate all service entrance and branch cabling requirements with owner and service provider prior to rough-in and installation.
B. Contractor is responsible for all horizontal cabling and outlets. Products must meet the performance requirements of the owner and provider.
C. Service backbone cabling is by the provider. Contractor shall confirm raceway/pathway requirements with owner/supplier prior to rough-in.

1.04 QUALITY ASSURANCE
A. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened packaging until ready for installation.
B. Keep stored products clean and dry.

1.06 WARRANTY
A. Correct defective Work within a 2 year period after Date of Substantial Completion.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cabling:
   1. 3M Communications Technologies: solutions.3m.com.

2.02 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA-568 (cabling) and TIA-569 (pathways), latest editions (commercial standards).
   3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   4. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.

B. System Description:
   1. Building Entrance: By others.
   2. Horizontal Cabling: Copper.
   3. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

A. Conduit: As specified in Section 26 05 34; provide pull cords in all conduit.
B. Cable Trays: As specified in Section 26 05 36.

2.04 COPPER CABLE AND TERMINATIONS

A. Copper Backbone Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 100 pairs formed into 25-pair binder groups; covered with gray thermoplastic jacket and complying with all relevant parts of and addenda to latest editions of TIA/EIA-568 and ICEA S-90-661, and UL 444.
   1. In locations other than in plenums, provide NFPA 70 type CMR riser-rated or type CMP plenum-rated cable.
   2. In plenums, provide NFPA 70 type CMP plenum-rated cable.
   3. Provide cable having conductors twisted at minimum rate of two per foot; actual length and frequency of twists at manufacturer's option.
   4. Color code conductors in accordance with ICEA S-90-661.

B. Copper Horizontal Cable: TIA/EIA-568 Category 6 solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted pairs; covered with blue jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
   1. In locations other than in plenums, provide NFPA 70 type CMG general purpose, CMR riser-rated, or type CMP plenum-rated cable.
   2. In plenums, provide NFPA 70 type CMP plenum-rated cable.

C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

D. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.
2. Voice and Data Jacks:  8-position modular jack, color-coded for both T568A and T568B wiring configurations.

2.05 IDENTIFICATION PRODUCTS
A. Comply with TIA-606.

2.06 ENCLOSURES
A. Backboards:  Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
   1. Do not paint over UL label.
B. Equipment Racks and Cabinets:  CEA-310 standard 19 inch wide component racks.
C. Outlet Boxes:  For flush mounting in walls; depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
   2. Labels:  Comply with TIA/EIA-606 using encoded identifiers; label each jack on the face plate as to its function with a unique numerical identifier.

PART 3 EXECUTION
3.01 INSTALLATION - GENERAL
A. Comply with latest editions and addenda of TIA-568 (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
B. Comply with latest editions and addenda of TIA-570, TIA-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
C. Comply with Communication Service Provider requirements.
D. Grounding and Bonding:  Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS
A. Underground Service Entrance:  Install conduit at least 18 inches below finish grade; encase in at least 3 inches thick concrete for at least 60 inches out from the building line.
B. Install pathways with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 5 inches from fluorescent and high frequency lighting fixtures.
   4. 6 inches from flues, hot water pipes, and steam pipes.
C. Conduit, in Addition to Requirements of Section 26 05 34:
D. Conduit:
   1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
   2. Leave pull cords in place where cables are not initially installed.
   3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
      a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
      b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
      c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
      d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.
E. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 26 05 37 as required for installation of telecommunications outlets provided under this section.
      a. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
b. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
c. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
d. Locate outlet boxes so that wall plate does not span different building finishes.
e. Locate outlet boxes so that wall plate does not cross masonry joints.

F. Grounding and Bonding: Perform in accordance with ANSI/J-STD-607 and NFPA 70.

G. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings in accordance with Section 07 84 00.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.
   2. At Outlets - Copper: 12 inches.

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
   3. Use T568B wiring configuration.
   4. Copper Cabling Not in Conduit: Use only type CMP plenum-rated cable as specified.

D. Identification:
   1. Use wire and cable markers to identify cables at each end.

E. Field-Installed Labels: Comply with TIA/EIA-606 using encoded identifiers.
   1. Cables: Install color coded labels on both ends.
   2. Outlets: Label each jack on its face plate as to its type and function, with a unique numerical identifier.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

D. Testing - Copper Cabling and Associated Equipment:
   1. Test backbone cables after termination but before cross-connection.
   2. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
   3. Test operation of shorting bars in connection blocks.
   4. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
   5. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION
SECTION 28 31 00
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.
B. Transmitters for communication with supervising station.
C. Maintenance of fire alarm system under contract for specified warranty period.

1.02 REFERENCE STANDARDS

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.
C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
D. NFPA 70 - National Electrical Code.
E. NFPA 72 - National Fire Alarm and Signaling Code.

1.03 SUBMITTALS

A. Proposal Documents: Submit the following with cost/time proposal:
   1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
   2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
   3. Certification by Contractor that the system design will comply with the contract documents.

B. Evidence of designer qualifications.

C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.
   2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
   3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
   4. System zone boundaries and interfaces to fire safety systems.
   5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
   6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
   7. List of all devices on each signaling line circuit, with spare capacity indicated.
   8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
   9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
   10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
   11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
   12. Certification by Contractor that the system design complies with the contract documents.

D. Evidence of installer qualifications.

E. Evidence of instructor qualifications; training lesson plan outline.
F. Evidence of maintenance contractor qualifications, if different from installer.

G. Inspection and Test Reports:
   1. Submit inspection and test plan prior to closeout demonstration.
   2. Submit documentation of satisfactory inspections and tests.
   3. Submit NFPA 72 "Inspection and Test Form," filled out.

H. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
   1. Complete set of specified design documents, as approved by authority having jurisdiction.
   2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
   3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
   4. List of recommended spare parts, tools, and instruments for testing.
   5. Replacement parts list with current prices, and source of supply.
   6. Detailed troubleshooting guide and large scale input/output matrix.
   7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
   8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

I. Project Record Documents: Have one set available during closeout demonstration:
   1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
   2. "As installed" wiring and schematic diagrams, with final terminal identifications.
   3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

J. Closeout Documents:
   1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
   2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

K. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
   1. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.
   2. In addition to the items in quantities indicated in PART 2, furnish the following:
      a. All tools, software, and documentation necessary to modify the fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, circuits, and zones, and changes to system description, operation, and evacuation and instructional messages.
      b. One copy, on CD-ROM, of all software not resident in read-only-memory.
      c. Extra Fuses: Two for each installed fuse; store inside applicable control cabinet.

1.04 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.

2. Installer Personnel: At least 2 years of experience installing fire alarm systems.

3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

4. Contract maintenance office located within 50 miles of project site.

5. Certified in the State in which the Project is located as fire alarm installer.

C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

1.05 WARRANTY

A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units: Provided their products meet or exceed the performance of the basis of design product, products of the following are acceptable:


4. Provide all control units made by the same manufacturer.

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:

1. Provide all components necessary, regardless of whether shown in the contract documents or not.

2. Protected Premises: Entire building shown on drawings.

3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:

   a. ADA Standards.
   b. The requirements of local Authority Having Jurisdiction.
   c. The requirements of the local authority having jurisdiction.
   d. Applicable local codes.
   e. The contract documents (drawings and specifications).
   g. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.

4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.

5. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.

6. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.

7. Master Control Unit (Panel): New, located at supervising station.

8. Two-Way Telephone: Provide two-way telephone service for the use of the fire service and others; provide jacks and two portable handsets.
B. Supervising Stations and Fire Department Connections:
   1. Public Fire Department Notification: By on-premises supervising station.
      transmitter (DACT), 2 telephone lines.

C. Circuits:
   1. Initiating Device Circuits (IDC): Class B, Style A.
   2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
   3. Notification Appliance Circuits (NAC): Class B, Style W.

D. Spare Capacity:
   1. Initiating Device Circuits: Minimum 25 percent spare capacity.
   3. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring
      additional components other than plug-in control modules.

E. Power Sources:
   1. Primary: Dedicated branch circuits of the facility power distribution system.
   2. Secondary: Storage batteries.
   3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.

2.03 FIRE SAFETY SYSTEMS INTERFACES

A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
   1. Elevator shut-down control circuits.

B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
   1. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
   2. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
   3. Duct smoke detectors.

C. Elevators:
   1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire
      fighters' service.
   2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway
      sprinkler activation.

D. Doors:
   1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in
      smoke zone on either side of door, upon alarm from manual pull station on same floor, and
      upon sprinkler activation on same floor.
   2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm
      initiating device or suppression system in smoke zone that doors serve as egress from.

2.04 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface
      mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in
      operation and maintenance data.

B. Fire Alarm Control Units, Initiating Devices, and Notification Appliances: Analog, addressable
   type; listed, classified, and labeled as suitable for the purpose intended.

C. Master Control Unit: As specified for Basis of Design above, or equivalent.

D. Remote Annunciators: .

E. Initiating Devices:
         shall be finished in red with molded, raised-letter operating instructions in contrasting
FIRE DETECTION AND ALARM

1. Color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   1) Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
   2) Station Reset: Key- or wrench-operated switch.

2. Smoke Detectors:
   a. General Requirements for System Smoke Detectors:
      1) UL 268 covers detectors that are part of a fire-alarm system and detectors intended solely for control of releasing devices such as door holders and dampers.
      2) Comply with UL 268; operating at 24-V dc, nominal.
      3) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
      4) Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
      5) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
      6) Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
      7) Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
         a) Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
         b) Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
      c) Provide multiple levels of detection sensitivity for each sensor.
   b. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
      1) An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
         a) Primary status.
         b) Device type.
         c) Present average value.
         d) Present sensitivity selected.
         e) Sensor range (normal, dirty, etc.).
   c. Provide 3 extra.

3. Duct Smoke Detectors:
   a. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
   b. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
      1) Primary status.
      2) Device type.
      3) Present average value.
      4) Present sensitivity selected.
      5) Sensor range (normal, dirty, etc.).
   c. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
   d. Each sensor shall have multiple levels of detection sensitivity.
e. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

f. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

4. Heat Detectors:  
   a. Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
      1) Mounting: Twist-lock base interchangeable with smoke-detector bases.
      2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
   b. Provide 1 extra.

5. Addressable Interface Devices:  
   a. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
   b. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or to circuit-breaker shunt trip for power shutdown.

6. Single-Station Smoke Detectors:  
   a. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device.
   b. Auxiliary Relays: One Form A and one Form C, both rated at 0.5 A.
   c. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at 10 feet (3 m) according to UL 464.
   e. Heat sensor, 135 deg F (57 deg C) combination rate-of-rise and fixed temperature.
   f. Test Switch: Push to test; simulates smoke at rated obscuration.
   g. Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.
   h. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
   i. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
   j. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
   k. Provide 2 extra.

F. Notification Appliances:  
   1. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
      a. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

2. Horns:  
   a. Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
   b. Provide 3 extra.

3. Strobes:  
   a. Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
   b. Rated Light Output:
1) 15/30/75/110 cd, selectable in the field.

c. Mounting: Wall mounted unless otherwise indicated on drawings.

d. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.

e. Flashing shall be in a temporal pattern, synchronized with other units.

f. Strobe Leads: Factory connected to screw terminals.

g. Mounting Faceplate: Factory finished, red.
h. Provide 3 extra.

G. Magnetic Door Holders:
1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
   a. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
   b. Wall-Mounted Units: Flush mounted unless otherwise indicated.
   c. Retain one of two subparagraphs below.
   d. Rating: 120-V ac.


H. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.

I. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.

J. Locks and Keys: Deliver keys to Owner.

K. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
   1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
   2. Provide one for each control unit where operations are to be performed.
   3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
   4. Provide extra copy with operation and maintenance data submittal.

L. Storage Cabinet for Spare Parts and Tools: Steel with baked enamel finish, size appropriate to quantity of parts and tools.
   1. Padlock eye and hasp for lock furnished by Owner.
   2. Locate as directed by Owner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.03 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.

B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
   1. Initial Training: 1 session pre-closeout.

C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.

D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.04 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

3.05 MAINTENANCE

A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.

C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   3. Record keeping required by NFPA 72 and authorities having jurisdiction.

D. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 2 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
G. Comply with Owner’s requirements for access to facility and security.

END OF SECTION