

**PROJECT MANUAL AND SPECIFICATIONS
FOR
GOLDEN APARTMENTS**

2312 N GOLDEN AVENUE
SAN BERNARDINO, CA 92404



PREPARED FOR
Golden Apartments San Bernardino, L.P.
Managing General Partner: Housing Partners One, Inc.
715 E BRIER DRIVE
SAN BERNARDINO, CA 92408

May 25, 2018

Division	Section Title
DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS	
000101	PROJECT TITLE PAGE
000107	SEALS PAGE
000115	LIST OF DRAWING SHEETS
DIVISION 01 - GENERAL REQUIREMENTS	
010000	GENERAL REQUIREMENTS
011000	SUMMARY
012500	SUBSTITUTION PROCEDURES
012600	CONTRACT MODIFICATION PROCEDURES
013100	PROJECT MANAGEMENT AND COORDINATION
013300	SUBMITTAL PROCEDURES
014000	QUALITY REQUIREMENTS
014200	REFERENCES
016000	PRODUCT REQUIREMENTS
017300	EXECUTION
017700	CLOSEOUT PROCEDURES
019113	GENERAL COMMISSIONING REQUIREMENTS
DIVISION 02 - EXISTING CONDITIONS	
024119	SELECTIVE STRUCTURE DEMOLITION (NONHAZARDOUS MATERIALS)
DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES	
061000	ROUGH CARPENTRY
061063	EXTERIOR ROUGH CARPENTRY – fence, balcony, etc.
061600	SHEATHING
062023	INTERIOR FINISH CARPENTRY
DIVISION 07 - THERMAL AND MOISTURE PROTECTION	
071353	ELASTOMERIC SHEET WATERPROOFING
077100	ROOF SPECIALTIES
075423	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING
DIVISION 08 - OPENINGS	
085313	VINYL WINDOWS
087100b	DOOR HARDWARE
088300	MIRRORS
DIVISION 09 - FINISHES	
092400	PORTLAND CEMENT PLASTERING
092900	GYPSUM BOARD
096513	RESILIENT BASE AND ACCESSORIES
096519	RESILIENT TILE FLOORING - VCT
096816	SHEET CARPETING

099113 EXTERIOR PAINTING
099123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES

101400 SIGNAGE
102800 TOILET, BATH, AND LAUNDRY ACCESSORIES

DIVISION 11 - EQUIPMENT

113100 RESIDENTIAL APPLIANCES

DIVISION 12 - FURNISHINGS

122113 HORIZONTAL LOUVER BLINDS
123530 RESIDENTIAL CASEWORK
12362313 PLASTIC-LAMINATE-CLAD COUNTERTOPS

ELECTRICAL

160100 BASIC ELECTRICAL REQUIREMENTS
160500 BASIC BOX OUTLETS MATERIALS
161100 RACEWAYS, FITTINGS & SUPPORT
161200 LOW VOLTAGE WIRES
164200 SERVICE ENTRANCE
164290 SWITCHBOARDS AND PROTECTIVE DEVICES
164500 GROUNDING
164700 PANELBOARDS AND SIGNAL TERMINAL CABINETS
165090 LIGHTING
167220 FIRE ALARM

PLUMBING

220000 PLUMBING
220500 BASIC MATERIALS AND METHODS
221000 PIPING INSULATION

MECHANICAL

230000 MECHANICAL GENERAL
233100 PROVISIONS DUCTWORK
237200 PTAC SYSTEM HEAT PUMPS

APPENDIX

PRODUCT SELECTION

END OF TABLE OF CONTENTS

DOCUMENT 000101 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL VOLUME 1

- A. Golden Apartments, San Bernardino, L.P.
Housing Partner One, Inc.
San Bernardino, California
- B. Basis Architecture & Consulting, Inc.
PO Box 150539
San Rafael, California 94915
2130 4TH Street, Suite B
San Rafael, California 94901

Phone: (415) 457-6035
Fax: (415) 457-6036
- C. Date of Issue Log (Sections revised as noted in Table of Contents):
 - 1. May 23, 2018 (Draft ed.)
- D. Copyright 2017 Basis Architecture & Consulting Inc. All rights reserved.

END OF DOCUMENT 000101

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Charles Pick.
2. C-21406.
3. Responsible for Divisions 01-12 Sections except where indicated as prepared by other design professionals of record.

B. Structural Engineer:

1. Bashar Abdelfattah
2. C053024
3. Responsible for structural specifications; see drawings.

C. Civil Engineer/Landscape Architect:

1. Jimmy J. Fry
2. C040692
3. Responsible for civil/landscape specifications; see drawings.

D. Mechanical & Plumbing Engineer:

1. Ramiro Aguirre
2. M31763
3. Responsible for mechanical & plumbing specifications; see drawings.

E. Electrical Engineer

1. Chaouki Aboulhosn
2. E14083
3. Responsible for Electrical specifications; see drawings.

END OF DOCUMENT 000107

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Cover Sheet of the separately bound drawing set titled **Golden Apartments Renovation & Remodel**, as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 000115

SECTION 010000 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exterior and interior items commonly overlooked onsite but that are critical project requirements.
- B. Related Requirements:
 - 1. Divisions 02 through 12 Sections for specific requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXTERIOR

- A. Flashing: Ease corners to 45° maximum. Return all flashing, leaving no exposed sharp edges. Provide hemmed edges at all exposed edges. Slope all to drain.
- B. Verify acceptable tolerances for all cuts.
- C. When using sealants check manufacturer instructions for compatibility with materials in contact with sealant.
- D. Prime wood and metals before installation, all six sides, no exceptions.
- E. Do not caulk at top of head flashing.
 - 1. Inform painting subcontractors of this project requirement.
- F. Do not caulk at sills where retrofit windows are being installed.
 - 1. Inform painting subcontractors of this project requirement.
- G. Handrail extensions may not project into walkways or circulation areas where they would diminish the required clearances at the path of travel or otherwise. Where such conditions occur, a 90° or more return is required. Request clarification by Architect if conditions of plans are not clear.

3.2 INTERIOR

- A. All drywall in bathrooms shall be green board. Use cementitious tile backer where required by code at tubs.
- B. Lower window latch at disabled units, latch to be less than 48 inches above finish floor. Contact manufacturer at time of materials order to confirm compliance.

END OF SECTION 010000

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: Golden Apartments Renovation & Remodel.

1. Project Location: 2313 N. Golden Avenue, San Bernardino, CA 92404

B. Owner: Golden Apartments San Bernardino, LP. Managing General, Housing Partner One Inc.

1. Owner's Representative: Judy David
2. Address: 715 E Brier Drive, San Bernardino, California 92408.
3. Contact Telephone Number: (909) 332-6316.

C. Architect: Charles Pick; Basis Architecture & Consulting Inc.

1. Mailing Address: P.O. Box 150539, San Rafael, California 94915.
2. Physical Address: 2130 4th Street, Suite B, San Rafael, California 94901.
3. Contact Telephone Number: (415) 457-6035.

D. Mechanical & Plumbing Engineer: Ramiro Aguirre, AME Design Group Inc.

1. Address: 2062 Business Ctr. Drive Suite 250, Irvine California 92612.
2. Contact Telephone Number: (949) 553-0170

E. Electrical Engineer: Chaouki Aboulhosn, AME Design Group Inc.

1. Address: 2062 Business Ctr. Drive Suite 250, Irvine California 92612.
2. Contact Telephone Number: (949) 553-0170

- F. Civil Engineer: Todd Martinell, Ludwig Engineering.
 - 1. Address: 109 East Thrirs Street, San Bernardino, California 92410.
 - 2. Contact Telephone Number: (909) 884-8217.
- G. Structural Engineer: Bashar Abdelfattah, SCE-Sterling Consulting Services
 - 1. Address: 188 Technology Drive Suite #A, Irvine, California 92618.
 - 2. Contact Telephone Number: (415) 457-6035.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. General property rehabilitation project consisting of various interior and exterior repairs, system upgrades, site improvements, and accessibility improvements.
- B. Type of Contract.
 - 1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways, parking garage (if applicable), loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials unless cleared in advance with project team.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 COORDINATION WITH OCCUPANTS

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

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 2. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.6 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.

- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or forms acceptable to Architect.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail" or form acceptable to Architect.

1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Requests for Information (RFIs).
 - 2. Project meetings.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. Name of Project Manager
 - 7. RFI number, numbered sequentially.
 - 8. RFI subject.
 - 9. Specification Section number and title and related paragraphs, as appropriate.
 - 10. Drawing number and detail references, as appropriate.
 - 11. Field dimensions and conditions, as appropriate.
 - 12. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 13. Contractor's signature.

14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Use CSI Log Form 13.2B. Software log with not less than the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's and Construction Manager's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of record documents.
 - l. Use of the premises and existing building.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management and recycling.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.
 - y. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in

- planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
 3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement or agreement form acceptable to Owner and Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.

- n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Submit product schedule in the following format:
 - a. PDF electronic file.

- F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- K. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- L. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- Q. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- R. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

- T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of three previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

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

1.4 INFORMATIONAL SUBMITTALS

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

1.5 REPORTS AND DOCUMENTS

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

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
 - 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed unless otherwise indicated.
- K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 33.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

- C. **Manufacturer's Field Services:** Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- F. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Commissioning Authority's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 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 date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should 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 publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.

34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).

78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.

121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.

166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tilerroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.

2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 3. ICC - International Code Council; www.iccsafe.org.
 4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeia; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS - California Department of Health Services; (See CDPH).
 4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or

rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE & ENVIRONMENTAL PREFERENCE

- A. Locally available: Building materials, components, and systems found locally or regionally saving energy and resources in transportation to the project site will be given preference.
- B. Recycled Content: Products with identifiable recycled content, including postindustrial content with a preference for postconsumer content will be given preference.
- C. Natural, plentiful or renewable: Materials harvested from sustainably managed sources and preferably have an independent certification (e.g., certified wood) and are certified by an independent third party will be given preference.
- D. Durable: Materials that are longer lasting or are comparable to conventional products with long life expectancies will be given preference will be given preference.
- E. Low or non-toxic: Materials that emit few or no carcinogens, reproductive toxicants, or irritants as demonstrated by the manufacturer through appropriate testing will be given preference.
- F. Minimal chemical emissions: Products that have minimal emissions of Volatile Organic Compounds (VOCs) will be given preference.
- G. Low-VOC assembly: Materials installed with minimal VOC-producing compounds, or no-VOC mechanical attachment methods and minimal hazards will be given preference.
- H. Moisture resistant: Products and systems that resist moisture or inhibit the growth of biological contaminants in buildings will be given preference.
- I. Energy Efficiency: Materials, components, and systems that help reduce energy consumption in buildings and facilities will be given preference.
- J. Water Conservation: Products and systems that help reduce water consumption in buildings and conserve water in landscaped areas will be given preference.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:

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

C. Storage:

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

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 33. Sections for specific content requirements and particular requirements for submitting special warranties.

- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for limits on use of Project site.
 - 2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 INFORMATIONAL SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Certified Surveys: Submit two copies signed by land surveyor.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding.

Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

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

3.2 PREPARATION

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

3.3 CONSTRUCTION LAYOUT

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

5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

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

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.

- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading.
 - 2. Excessive internal or external pressures.
 - 3. Excessively high or low temperatures.
 - 4. Thermal shock.

5. Excessively high or low humidity.
6. Pollution and air contamination.
7. Water or ice.
8. Chemicals and solvents.
9. Light.
10. Radiation.
11. Puncture.
12. Abrasion.
13. Heavy traffic.
14. Soiling, staining, and corrosion.
15. Bacteria.
16. Rodent and insect infestation.
17. Combustion.
18. Electrical current.
19. High-speed operation.
20. Improper lubrication.
21. Unusual wear or other misuse.
22. Contact between incompatible materials.
23. Destructive testing.
24. Misalignment.
25. Excessive weathering.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft or vandalism.

3.8 STARTING AND ADJUSTING

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

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.
- D. Project Record Documents: Contractor's set of original plans with all markings indicating field changes and Change Orders to be submitted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 - 6. Advise Owner of changeover in heat and other utilities.
 - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: 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 to determine 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.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, 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. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. OPR and BoD documentation are included by reference for information only.

1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.
- B. Related Sections:
 - 1. Section 230800 "Commissioning of HVAC" for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.

1.3 DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of the Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

B. Members Appointed by Owner:

1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
2. Representatives of the facility user and operation and maintenance personnel.
3. Architect and engineering design professionals.

1.5 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documentation, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 3. Attend commissioning team meetings held on a variable basis.
 4. Integrate and coordinate commissioning process activities with construction schedule.
 5. Review and accept construction checklists provided by the CxA.
 6. Complete electronic construction checklists as Work is completed and provide to the Commissioning Authority on a weekly basis.
 7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
 8. Complete commissioning process test procedures.

1.7 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan.
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process test procedures.
- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to,

equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

- F. Prepare and maintain the Issues Log.
- G. Prepare and maintain completed construction checklist log.
- H. Witness systems, assemblies, equipment, and component startup.
- I. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 019113

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 DEFINITIONS

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

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference (if requested): Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Predemolition Photographs or Video (if requested): Submit before Work begins.
- C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, and templates.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
- 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 5. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

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

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

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

3.6 CLEANING

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

END OF SECTION 024119

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Shear wall panels.
3. Rooftop equipment bases and support curbs.
4. Wood blocking, cants, and nailers.
5. Wood furring and grounds.
6. Wood sleepers.
7. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.3 INFORMATIONAL SUBMITTALS

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

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

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Metal framing anchors.

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 or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. 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: AWWA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that 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.
- 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 crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 1. Framing for raised platforms.
 2. Framing for stages.
 3. Concealed blocking.
 4. Framing for non-load-bearing partitions.
 5. Framing for non-load-bearing exterior walls.
 6. Roof construction.
 7. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
 1. Application: All interior partitions.
 2. Species:

- a. Mixed southern pine; SPIB.
 - b. Northern species; NLGA.
 - c. Eastern softwoods; NeLMA.
 - d. Western woods; WCLIB or WWP.
- B. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 grade.
 - 1. Application: Framing other than interior partitions not indicated as load-bearing.
 - 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWP.
 - d. Spruce-pine-fir; NLGA.
 - e. Douglas fir-south; WWP.
 - f. Hem-fir; WCLIB or WWP.
 - g. Douglas fir-larch (north); NLGA.
 - h. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
- C. Exposed Framing: 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. Application: Exposed exterior and interior framing indicated to receive a stained or natural finish.
 - 2. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.
- B. 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.
- C. 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. Material: All-veneer product, glued-laminated wood or product made from any combination solid lumber, wood strands, and veneers.
 - 2. Thickness: As indicated in Drawings.

2.6 SHEAR WALL PANELS

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

2. Simpson Strong-Tie Co., Inc.
3. Weyerhaeuser Company.

B. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

1. Products shall contain no urea formaldehyde.

C. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized steel panel, steel top and bottom plates, and wood studs.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. 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.

2.7 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.
4. Cants.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Eastern softwoods; No. 2 Common grade; NeLMA.
2. Northern species; No. 2 Common grade; NLGA.
3. Western woods; Construction or No. 2 Common grade; WCLIB or WWP.

2.8 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, 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 or of Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.10 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. 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.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-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); G185 coating designation; and not less than 0.036 inch thick.
 1. Use for wood-preservative-treated lumber and where indicated.

2.11 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

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 WCD 1, "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. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- 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.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061063 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood fences.
2. Decorative assemblies such as wood trellises or arbors.

1.2 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For preservative-treated wood products, from ICC-ES.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.

1. Factory mark each item with grade stamp of grading agency.
2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 19 percent.
3. Timber: 19 percent.

2.2 LUMBER

- A. Dimension Lumber: Construction or No. 2 grade and any of the following species:
 - 1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWP.
 - 2. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWP.
 - 3. Mixed southern pine; SPIB.
 - 4. Redwood; RIS.
- B. Boards: Any of the following species and grades:
 - 1. Douglas fir, C & Btr finish or C Select; NLGA, WCLIB, or WWP.
 - 2. Hem-fir, C & Btr finish or C Select; NLGA, WCLIB, or WWP.
 - 3. Redwood, Heart B or Select Heart; RIS.
 - 4. Southern pine, B & B finish; SPIB.
 - 5. Western red cedar, Grade B; NLGA, WCLIB, or WWP.

2.3 POSTS

- A. Dimension Lumber Posts: Construction or No. 2 grade and any of the following species:
 - 1. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWP.
 - 2. Mixed southern pine; SPIB.
 - 3. Northern species; NLGA.
 - 4. Eastern softwoods; NeLMA.
 - 5. Western woods; WCLIB or WWP.
- B. Timber Posts: Balsam fir, Douglas fir-larch, Douglas fir-larch (North), eastern hemlock tamarack (North), hem-fir, southern pine, western hemlock, or western hemlock (North); No. 2, NeLMA, NLGA, SPIB, WCLIB, or WWP.

2.4 PRESERVATIVE TREATMENT

- A. Pressure treat boards and dimension lumber with waterborne preservative according to AWP U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
- B. Pressure treat timber with waterborne preservative according to AWP U1; Use Category UC4a.
- C. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 - 1. Do not use chemicals containing arsenic or chromium.
- D. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

1. For items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.

E. Application: Treat items indicated on Drawings and the following:

1. Framing members less than 18 inches above grade.
2. Sills and ledgers.
3. Members in contact with masonry or concrete.
4. Posts.
5. Decking.
6. Stair treads.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
1. Use fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329 unless otherwise indicated.
 2. For pressure-preservative-treated wood, use stainless-steel fasteners.
- B. Postinstalled Anchors: Stainless-steel, chemical or torque-controlled expansion anchors 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 according to ASTM E 488, conducted by a qualified independent testing and inspecting agency.
1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 METAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. R. H. Tamlyn & Sons LP.
 5. Simpson Strong-Tie Company, Inc.
 6. USP Structural Connectors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 coating designation. Use G185 coating designation for pressure-preservative-treated wood.

- C. Stainless-Steel Sheet: ASTM A 666, Type 304. Use Type 316 where subject to salt spray or immersion in salt water. Stainless-steel is acceptable for pressure-preservative-treated wood.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install metal framing anchors to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Apply copper naphthenate field treatment to comply with AWWPA M4, to cut surfaces of preservative-treated lumber. Does not apply to southern pine.
- F. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.

END OF SECTION 061063

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof and parapet sheathing.
2. Composite nail base insulated roof sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or GA-600, "Fire Resistance Design Manual."

2.2 WOOD PANEL PRODUCTS

- A. Certified Wood (*if required by project*): For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - 1. Plywood.
- B. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction, Use Category UC3b for exterior construction.
 - 1. Use treatment containing no arsenic or chromium.
 - 2. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A High Temperature (HT): Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use for roof sheathing and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use unless otherwise indicated.
 - 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is

indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.

- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

2.5 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
- B. Parapet Sheathing: As specified for roof sheathing.

2.6 COMPOSITE NAIL BASE INSULATED ROOF SHEATHING

- A. Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation with oriented strand board laminated to one face complying with ASTM C 1289, Type V.
 - 1. Polyisocyanurate-Foam Thickness: Per approved shop drawings submitted by Contractor.
 - 2. Oriented-Strand-Board Nominal Thickness: 7/16 inch.
- B. Vented, Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation complying with ASTM C 1289, Type II, Class 1, with oriented strand board adhered to spacers on one face.
 - 1. Oriented-Strand-Board Nominal Thickness: 7/16 inch.
 - 2. Spacers: Wood furring strips or blocks not less than 3/4 inch thick and spaced not more than 24 inches o.c.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.

PART 3 - EXECUTION

3.1 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. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate 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. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior trim.
 - 2. Shelving and clothes rods.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Samples: For each type of paneling.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: AHA A135.4.
- D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.

- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber and plywood indicated to receive a stained or natural finish, mark back of each piece.
- C. Application: Where indicated.

2.3 INTERIOR TRIM

- A. Softwood Lumber Trim:
 - 1. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr finish; NLGA, WCLIB, or WWPA.
 - 2. Maximum Moisture Content: 19 percent.
 - 3. Maximum Moisture Content: 10 percent.
- B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.
 - 1. Softwood Moldings: WMMPA WM 4, P grade.
 - a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
 - b. Maximum Moisture Content: 15 percent.
 - c. Maximum Moisture Content: 9 percent.
 - 2. Optional Material: Primed MDF.
- C. Molding Patterns: As indicated in Drawings.

2.4 SHELVING AND CLOTHES RODS

- A. Shelving: Made from one of the following materials, 3/4 inch thick.
 - 1. MDF with solid-wood front edge, free of added urea formaldehyde.
 - 2. MDO softwood plywood with solid-wood edge.
 - 3. Softwood Boards: Douglas fir-larch, Douglas fir south, or hem-fir; Prime or D finish; NLGA, WCLIB, or WWPA; or southern pine, C finish; SPIB; kiln dried.
- B. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
- C. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.
- D. Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried hardwood.

2.5 MOULDINGS

- A. Baseboard: Pre-primed finger joint 3/8" x 3-1/2"
- B. New Case: 102-O 5/8"x 1 5/8"

2.6 MISCELLANEOUS MATERIALS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 - 1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

- A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.3 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

3.4 SHELVING AND CLOTHES ROD INSTALLATION

- A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
- B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c.

- C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- D. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

END OF SECTION 062023

SECTION 070150.19 - PREPARATION FOR RE-ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof tear-off.
2. Partial roof tear-off.
3. Roof re-cover preparation.
4. Removal of base flashings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Temporary Roofing: Include Product Data and description of temporary roofing system. If temporary roof will remain in place, submit surface preparation requirements needed to receive permanent roof, and submit a letter from roofing membrane manufacturer stating acceptance of the temporary membrane and that its inclusion will not adversely affect the roofing system's resistance to fire and wind or its FM Global rating.

1.3 INFORMATIONAL SUBMITTALS

- A. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of new membrane roofing system.
- B. Reroofing Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.

2. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.
- B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

- A. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new membrane roofing system.
- B. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in FM Approval's "Approval Guide."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect existing membrane roofing system that is indicated not to be reroofed.
- B. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
- D. Verify that rooftop utilities and service piping have been shut off before beginning the Work.

3.2 ROOF TEAR-OFF

- A. General: Notify Owner each day of extent of roof tear-off proposed for that day.
- B. SRemove aggregate ballast from roofing membrane.
- C. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing using a power broom.

- D. Remove pavers and accessories from roofing membrane. Store and protect pavers and accessories for reuse. Discard cracked pavers.
- E. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
 - 1. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.
 - 2. Remove fasteners from deck.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of membrane roofing system.
- B. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or by pouring 1 pint of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if moisture condenses under the plastic sheet or if asphalt test sample foams or can be easily and cleanly stripped after cooling.
- C. If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
- D. If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.

3.4 TEMPORARY ROOFING MEMBRANE

- A. Install approved temporary roofing membrane over area to be reroofed.
- B. Remove temporary roofing membrane before installing new roofing membrane.

3.5 EXISTING BASE FLASHINGS

- A. Remove existing base flashings around parapets, curbs, walls, and penetrations.
 - 1. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.
- B. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings specified in Division 07 Section "Sheet Metal Flashing and Trim."
- C. Remove existing parapet sheathing and replace with new pressure-preservative exterior fire-retardant-treated plywood sheathing, 19/32 inch thick. If parapet framing has deteriorated, immediately notify Architect.
 - 1. Plywood parapet sheathing is specified in Division 06 Section "Sheathing."

3.6 DISPOSAL

- A. Collect and place demolished materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 070150.19

SECTION 071353 - ELASTOMERIC SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EPDM rubber sheet waterproofing.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference (if requested): Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET WATERPROOFING

- A. EPDM Rubber Sheet: ASTM D 6134, Type I, 60-mil- thick flexible sheet, unreinforced, formed from EPDM.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Carlisle Coatings & Waterproofing Inc.; Sure-Seal EPDM.

2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Concealed Sheet Flashing: Same material, construction, and thickness as sheet waterproofing or 60-mil- thick, uncured EPDM, as required by manufacturer.
- C. Exposed Sheet Flashing: 60-mil- thick EPDM, cured or uncured, as required by manufacturer.
- D. Bonding Adhesives: For bonding waterproofing sheets and sheet flashings to substrates and projections.
- E. Splicing Cement and Cleaner: Single-component butyl splicing cement and solvent-based splice cleaner.
 - 1. Butyl Gum Tape: 30-mil- thick-by-6-1/4-inch- wide, uncured butyl with polyethylene release film.
- F. Lap Sealant: Single-component sealant.
- G. Water-Cutoff Mastic: Butyl mastic sealant.
- H. Waterproofing and Sheet-Flashing Accessories: Provide sealants, pourable sealers, cone and vent flashings, inside and outside corner flashings, termination reglets, and other accessories recommended by waterproofing manufacturer for intended use.
- I. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately 1 inch wide, prepunched, with fasteners.
- J. Protection Course:
 - 1. Semirigid sheets of asphalt-impregnated organic mat, mineral surface, with a nominal thickness of 1/8 inch.
 - 2. Fan folded, with a core of extruded-polystyrene board insulation, a nominal thickness of 1/4 inch, and a compressive strength of not less than 8 psi.

2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 15 gpm per ft..
1. Products: Subject to compliance with requirements, provide the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRAIN 6200.
- B. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panels consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 sieve laminated to one side of the core; and with a horizontal flow rate not less than 2.8 gpm per ft..
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRAIN 9000 or CCW MiraDRAIN 9900.

2.4 INSULATION DRAINAGE PANELS

- A. Unfaced Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, 25-psi or Type VI, 40-psi minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DiversiFoam Products; CertiFoam 25 SL or CertiFoam 40 (with channel edges) Drainage Board.
 - b. Dow Chemical Company (The); Styrofoam Perimate.
- B. Unfaced Plaza-Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, 40-psi or Type VII, 60-psi minimum compressive strength; unfaced; fabricated with shiplapped, channel, or tongue-and-groove edges and with one side having ribbed drainage channels.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc.; Hydroguard.
 - b. DiversiFoam Products; CertiFoam Plaza Deck.
 - c. Dow Chemical Company (The); Styrofoam Ribbed Roofmate.
 - d. Owens Corning Insulating Systems LLC; Foamular 404 RB or Foamular 604 RB.

PART 3 - EXECUTION

3.1 FULLY ADHERED SHEET INSTALLATION

- A. Prepare surfaces and install fully adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions and recommendations in ASTM D 5843.
- B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
- C. Apply bonding adhesive to substrates at required rate and allow it to partially dry.
- D. Apply bonding adhesive to sheets and firmly adhere sheets to substrates. Do not apply bonding adhesive to splice area of sheet.
- E. Install fully adhered sheets and auxiliary materials to tie into existing waterproofing.
- F. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
- G. Horizontal Application: Apply sheets with side laps shingled with slope of deck where possible.
 - 1. Spread sealant bed over deck drain flange at deck drains and securely seal sheet waterproofing in place with clamping ring.

3.2 PARTIALLY ADHERED SHEET INSTALLATION

- A. Prepare surfaces and install partially adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions.
- B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
- C. Apply bonding adhesive to the following areas of substrates and to each sheet at required rate and allow to partially dry:
 - 1. Upper 25 percent of length of each sheet and 18 inches around perimeter of each sheet.
- D. Firmly adhere sheets to substrate. Do not apply bonding adhesive to splice area of sheet.
- E. Install partially adhered sheets and auxiliary materials to tie into existing waterproofing.
- F. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.

3.3 COMPARTMENTED, LOOSELY LAID SHEET INSTALLATION

- A. Prepare surfaces and install compartmented, loosely laid sheets over entire area to receive waterproofing according to manufacturer's written instructions.
- B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
- C. Apply continuous beads of water-cutoff mastic, of size recommended in writing by waterproofing manufacturer, to substrates in a 60-by-60-inch grid pattern before installing sheet.
- D. Apply sheets with side laps shingled with slope of deck where possible.
- E. Spread sealant bed over deck drain flange at deck drains and securely seal sheet waterproofing in place with clamping ring.
- F. Install compartmented, loosely laid sheets and auxiliary materials to tie into existing waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.

3.4 SEAM INSTALLATION

- A. Cement Splice: Clean splice areas, apply splicing cement and in-seam sealant, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to produce a splice not less than 6 inches wide and to ensure a watertight seam installation. Apply lap sealant and seal edges of sheet terminations.
- B. Cement and Tape Splice: Clean splice areas, apply splicing cement and butyl gum tape, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal edges of sheet terminations.

3.5 SHEET FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to waterproofing manufacturer's written instructions.
- B. Form wall flashings using exposed sheet flashing.
- C. Extend deck sheet waterproofing to form wall flashings.
 - 1. Flash penetrations and field-formed inside and outside corners with uncured sheet flashing.
 - 2. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight installation. Apply lap sealant and seal edges of sheet flashing terminations.

- D. Cover expansion joints and discontinuous deck-to-wall or deck-to-deck joints by extending deck sheet waterproofing over joints.
- E. Terminate and seal top of sheet flashings with mechanically anchored termination bars.

3.6 PROTECTION COURSE INSTALLATION

- A. Install protection course over waterproofing membrane according to manufacturer's written instructions and before beginning subsequent construction operations. Minimize exposure of membrane.
 - 1. Molded-sheet drainage panels or insulation drainage panels may be used in place of a separate protection course for vertical applications when approved by waterproofing manufacturer.

3.7 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install protection course before installing drainage panels.

3.8 INSULATION DRAINAGE-PANEL INSTALLATION

- A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.9 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071353

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copings.
 - 2. Roof-edge flashings.
 - 3. Roof-edge drainage systems.

1.2 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install copings and/or roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification required by local jurisdiction. Identify materials with FM Approvals' markings.
- B. SPRI Wind Design Standard: Manufacture and install copings and/or roof-edge flashings tested according to SPRI ES-1 and capable of resisting the existing design pressures.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
- B. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304.
- C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepainted by the coil-coating process to comply with ASTM A 755. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2.2 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304.
- D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
- C. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 or ASTM F 2329.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
 - 1. Coping-Cap Material: Formed aluminum, thickness as required to meet performance requirements, not less than 0.040 inch (1.0 mm) thick.

- a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
2. Coping-Cap Material: Zinc-coated steel, nominal thickness as required to meet performance requirements, not less than 0.028 inch (0.7 mm) thick.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Special Fabrications: As shown in Drawings.
5. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
6. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

2.6 ROOF-EDGE FLASHINGS

- A. Canted Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.
 1. Fascia Cover: Fabricated from the following exposed metal:
 - a. Formed Aluminum: Thickness as required to meet performance requirements, not less than 0.040 inch (1.0 mm) thick.
 - b. Zinc-Coated Steel: Nominal thickness as required to meet performance requirements, not less than 0.28 inch (0.7 mm) thick.
 2. Corners: Factory mitered and welded.
 3. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
 4. Special Fabrications: As shown in Drawings.
 5. Fascia Accessories: As shown in Drawings.
- B. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet, with a horizontal flange and vertical leg fascia terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.
 1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: Thickness as required to meet performance requirements, not less than 0.40 inch (1.0 mm) thick.
 - b. Stainless Steel: Thickness as required to meet performance requirements, not less than 0.0250 inch (0.65 mm) thick.
 - c. Zinc-Coated Steel: Nominal thickness as required to meet performance requirements, not less than 0.034 inch (0.85 mm) thick.
 2. Corners: Factory mitered and soldered or continuously welded.
 3. Accessories: Fascia extenders with continuous hold-down cleats.

- C. Aluminum Finish: Two-coat fluoropolymer.
 - 1. Color: As selected by Architect from manufacturer's full range.
- D. Stainless-Steel Finish: No. 2B (bright, cold rolled).
- E. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.7 ROOF-EDGE DRAINAGE SYSTEMS

- A. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
 - 1. Fabricate from **[the same metal as metal roofing panels, of]** one of the following exposed metals:
 - a. Formed Aluminum: 0.040 inch thick.
 - b. Zinc-Coated Steel: Nominal 0.034-inch thickness.
 - 2. Gutter Profile: Rectangular box bead with back edge elevated at least 1 inch (25 mm) above front gutter rim.
 - 3. Corners: Factory mitered and soldered or continuously welded.
 - 4. Gutter Supports: Gutter brackets and flat stock straps with finish matching the gutters.
- B. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Formed Aluminum: 0.040 inch thick.
 - 2. Extruded Aluminum: 0.125 inch thick.
 - 3. Zinc-Coated Steel: Nominal 0.034-inch thickness.
- C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scuppers.
 - 1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.032 inch thick.
 - b. Zinc-Coated Steel: Nominal 0.028-inch thickness.
- D. Aluminum Finish: Two-coat fluoropolymer.
 - 1. Color: As selected by Architect from manufacturer's full range.
- E. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 4. Torch cutting of roof specialties is not permitted.
 5. Install underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches. Roll laps of self-adhering sheet underlayment with roller; cover within 14 days.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 1. Coat concealed side of stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for

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

3.2 COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to meet performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.3 ROOF-EDGE FLASHING INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and solder to make watertight. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering (*does not apply to stainless steel or to painted or coated steel and aluminum*).
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.

- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 085313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Tubular extruded poly vinyl chloride (PVC) windows.

1.2 REGULATORY REQUIREMENTS

- A. Energy Ratings: Provide windows that qualify for the EPA/DOE ENERGY STAR product labeling program (Energy Star Rated).

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum five years experience in producing vinyl windows of the type(s) specified.
 - 2. Member AAMA, NFRC, SIGMA.
- B. Certifications for insulated glass windows:
 - 1. AAMA: Windows shall be Gold Label certified with label attached to frame per AAMA requirements.
 - 2. NFRC: Windows shall be NFRC certified with temporary U-factor label applied to glass and an NFRC tab added to permanent AAMA frame label.

- C. Mockups: Build mockups to verify assembly with adjacent materials and to demonstrate aesthetic effects and set quality standards for installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
 - 1. Lifetime guarantee to original owner.
 - 2. Transferability:
 - a. Permit unlimited transfer of ownership in first five years.
 - b. Upon first transfer of ownership, guarantee period shall become five years from date of original purchase.
 - 3. Guarantee windows against defects in materials and workmanship including costs for parts and labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Milgard® Tuscany™ series.

2.2 PRODUCT TYPE

- A. Exterior flange (retrofit).type windows, or as indicated in Drawings.

2.3 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Minimum Performance Class: LC.
 - 2. Minimum Performance Grade:
 - a. 25 for operable windows larger than 6050 square inches.
 - b. 35 for operable windows 6050 square inches and smaller.
 - c. 40 for picture windows.
- B. Forced-Entry Resistance: Comply with CAWM 301-90.

- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor as indicated below for specific climate zone.
1. Northern Climate Zone: 0.30 Btu/sq. ft. x h x deg F
 2. North-Central Climate Zone: 0.32 Btu/sq. ft. x h x deg F
 3. South-Central Climate Zone: 0.35 Btu/sq. ft. x h x deg F
 4. Southern Climate Zone: 0.60 Btu/sq. ft. x h x deg F
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC as indicated below for specific climate zone.
1. North-Central Climate Zone: 0.40
 2. South-Central Climate Zone: 0.30
 3. Southern Climate Zone: 0.27
- E. Emergency Egress at Bedrooms: Where replacing windows in the bedrooms, they must comply with emergency egress requirements.
1. Every bedroom below the fourth story shall have at least one operable window or door approved for emergency escape or rescue. The emergency window or door shall be operable from the inside to provide a full, clear opening without the use of separate tools.
 2. The minimum net clear opening for emergency escape is 5.7 square feet.
 - a. Exception: The minimum area for grade floor openings is 5.0 square feet. To qualify as a grade floor opening the maximum sill height cannot be more than 44" above or below the finished exterior ground level adjacent to the opening.
 3. The minimum net clear opening height dimension shall be 24 inches.
 4. The minimum net clear opening width dimension shall be 20 inches.
 5. The finished window sill height shall not be more than 44 inches above the finished floor.

2.4 VINYL WINDOWS

- A. Operating Types: Horizontal sliding windows and fixed (picture) windows.
- B. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.
1. Exterior Finish: Integral color, Tan or White.
 2. Interior Finish: Integral color, match exterior.
 3. Gypsum Board Returns: Provide at interior face of frame.
 4. Interior Trim: Provide painted wood quarter-round molding.
 - a. Peel-and-stick vinyl trim will be accepted with additional adhesive sealant.
- C. Insulating-Glass Units: ASTM E 2190.
1. Glass: ASTM C 1036, Type 1, Class 1, q3.
 - a. Plain glass.

- b. Tempered glass in hazardous locations subject to human impact shall comply with current UBC.
 - c. Laminated glass (if any) for reducing sound transmission ratings where specified on the drawings.
 - d. Obscure glass in bathrooms, and in style specified on the drawings.
- 2. Lites: Two.
- 3. Filling: Fill space between glass lites with argon.
- 4. Low-E Coating.
- D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- E. Hardware, General: Manufacturer's standard corrosion-resistant material sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: Satin Nickel As selected by Architect from manufacturer's full range.
- F. Projected Window Hardware:
 - 1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
 - a. Type and Style: As selected by Architect from manufacturer's full range of types and styles.
 - 2. Hinges: Manufacturer's standard type for sash weight and size indicated, unless otherwise indicated in Drawings.
 - 3. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 29 inches (735 mm) tall and two arms on taller sashes.
 - 4. Limit Devices: Concealed friction adjuster, adjustable stay bar or concealed support arms with adjustable, limited, hold-open limit devices designed to restrict sash opening.
 - a. Limit clear opening to 4 inches (100 mm) for ventilation; with custodial key release where required by building code.
 - 5. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches (1500 mm) above floor; one pole operator and pole hanger per room that has operable windows more than 72 inches (1800 mm) above floor.
- G. Horizontal-Sliding Window Hardware:
 - 1. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.
 - 2. Locks and Latches: Operated from the inside only.

- a. Accessible Locations: Latches for windows indicated on Drawings to be in an accessible location to be mounted less than 48" A.F.F.
- 3. Roller Assemblies: Low-friction design.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.5 ACCESSORIES

- A. Sealants: Complying with Division 07 Section "Joint Sealants" and accepted in writing by window manufacturer for compatibility.

2.6 INSECT SCREENS

- A. General: Fabricate insect screens to fully integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: Full, outside for sliding sashes.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201. Cambered formed aluminum with rigid plastic corner keys.
 - 1. Finish for Exterior Screens: Matching color and finish of cladding.
- C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh complying with ASTM D 3656.
 - 1. Mesh Color: Charcoal.

2.7 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze vinyl windows in the factory. Units shall be reglazeable without dismantling sash framing.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide

mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.

- E. Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.8 SOURCE QUALITY CONTROL

- A. Inspect windows in accordance with manufacturer's Quality Control Program as required by AAMA Gold Label certification.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
 - 1. Verify that framing complies with AAMA 2400.
 - 2. Verify that fasteners in framed walls are fully driven and will not interfere with window installation.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
 - 1. Provide continuous shim support along full length of sill.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085313

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors.
2. Cylinders for door hardware specified in other Sections.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Thresholds and weather stripping to be installed under other Sections.
2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Details of electrified door hardware.

C. Samples: For each exposed product and for each color and texture specified.

D. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hardware: Manufacturer's extra materials.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- C. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- D. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC/ANSI A117.1 and HUD's "Fair Housing Accessibility Guidelines".
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high and 3/4 inch (19 mm) high for exterior sliding doors.

4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the leading edge of the door.
5. Lockset: lockset function shall not require two hands to operate, one to operate the keyed latch and the other to open the door at the same time.
6. Pocket door hardware must be exposed on both sides when door is open; permanent bumper required at interior of pocket to expose hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.
 - c. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 HARDWARE, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for doors, doorways, and gates.
- B. Finish: Satin Nickel
- C. Outswing Entry Doors: Tamper proof hinges

2.2 HINGES

- A. Hinges: BHMA A156.1.

2.3 SELF-CLOSING HINGES AND PIVOTS

- A. Self-Closing Hinges and Pivots: BHMA A156.17.

2.4 CENTER-HUNG AND OFFSET PIVOTS

- A. Center-Hung and Offset Pivots: BHMA A156.4.

2.5 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- B. Pin-and-Barrel-Type Hinges.
- C. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

2.6 MECHANICAL LOCKS AND LATCHES

- A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- B. Bored Locks: BHMA A156.2.
 - 1. Security Grade:
 - a. Building entrances serving more than two families: Grade 1; Series 4000.
 - b. Living unit entrances serving one or two families: Grade 2; Series 4000.
 - c. Doors within living units: Grade 3; Series 4000.
- C. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.

2.7 AUXILIARY LOCKS

- A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.
- B. Mortise Auxiliary Locks: BHMA A156.5; Grade 1; with strike that suits frame.
- C. Narrow Stile Auxiliary Locks: BHMA A156.5; Grade 1; with strike that suits frame.

- D. Push-Button Combination Locks: BHMA A156.5; cylindrical; Grade 1; lock opens by entering a one- to five-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.

2.8 EXIT LOCKS AND EXIT ALARMS

- A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

2.9 SURFACE BOLTS

- A. Surface Bolts: BHMA A156.16.

2.10 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

2.11 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

2.12 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.

2.13 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
- B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide construction master keys as designated by Owner.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide construction master keys as designated by Owner.

2.14 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.

- b. Re-key Owner's existing master key system into new keying system.
 - 2. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Brass.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.

2.15 KEY CONTROL SYSTEM

- A. Key Control Cabinet: Provide key control cabinet as determined by Owner.
 - 1. BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 - a. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
 - b. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.

2.16 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; brass or stainless steel body as selected by Owner.

2.17 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

2.18 SURFACE CLOSERS

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

2.19 CONCEALED CLOSERS

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

2.20 CLOSER HOLDER RELEASE DEVICES

- A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system or loss of power.

2.21 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

2.22 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.

2.23 DOOR GASKETING

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

2.24 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.25 SLIDING DOOR HARDWARE

- A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.

2.26 FOLDING DOOR HARDWARE

- A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.

2.27 METAL PROTECTIVE TRIM UNITS

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

2.28 PLASTIC PROTECTION PLATES

- A. Plastic Protection Plates: BHMA A156.6; fabricated with four sides beveled; rigid plastic; 0.060-inch- (1.5-mm-) thick, PVC or acrylic-modified vinyl plastic.

2.29 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.

2.30 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:

- 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.31 FINISHES

- A. Provide finishes complying with BHMA A156.18 as selected by Owner.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
- C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30

inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

- F. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- G. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
- H. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- I. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- J. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- K. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- L. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- M. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- N. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.2 DOOR HARDWARE SCHEDULE

- A. Locations: As indicated on Drawings; each to have the following:

Item	Manufacturer	Product
Locksets, Latch Sets, and Dead Bolts	Schlage	-
Latch Sets, at Interiors (Disabled Accessible locations)	Schlage	F series, Elan lever style
Pocket Door with privacy function (Disabled Accessible locations)	Trimco	1069L
Door Stops and Holders	Ives, Better Home Products	-
Butts	Hager, McKinney, Lawrence	-
Thresholds	Pemko	Ultra
Door Gasketing	Pemko	-
Exit Device	Von Duprin	-
Closer	Norton, LCN	-
Viewer, at Unit Entry Doors	Ives	700 U700, 701 U701

END OF SECTION 087100

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors.
 - c. Folding doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Thresholds and weather stripping to be installed under other Sections.
2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Details of electrified door hardware.

C. Samples: For each exposed product and for each color and texture specified.

D. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

- 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Door Hardware: Manufacturer's extra materials.
 2. Electrical Parts: Manufacturer's extra materials.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 1. For door hardware, an Architectural Hardware Consultant (AHC).
- C. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
- E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

- G. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the 2010 ADA Standards for Accessible Design, ANSI A117.1 and HUD's "Fair Housing Accessibility Guidelines".
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high and 3/4 inch (19 mm) high for exterior sliding doors.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- I. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.
 - d. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
 - 2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

- A. Hinges: BHMA A156.1.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Bommer Industries, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Hager Companies.
 - e. IVES Hardware; an Ingersoll-Rand company.
 - f. Lawrence Hardware Inc.
 - g. McKinney Products Company; an ASSA ABLOY Group company.
 - h. PBB, Inc.
 - i. Stanley Commercial Hardware; Div. of The Stanley Works.

2.3 SELF-CLOSING HINGES AND PIVOTS

- A. Self-Closing Hinges and Pivots: BHMA A156.17.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Bommer Industries, Inc.
 - c. Cal-Royal Products, Inc.

- d. Hager Companies.
- e. Lawrence Hardware Inc.
- f. McKinney Products Company; an ASSA ABLOY Group company.
- g. PBB, Inc.
- h. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 CENTER-HUNG AND OFFSET PIVOTS

A. Center-Hung and Offset Pivots: BHMA A156.4.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - b. IVES Hardware; an Ingersoll-Rand company.
 - c. Rixson Specialty Door Controls; an ASSA ABLOY Group company.

2.5 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Pin-and-Barrel-Type Hinges:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Ingersoll-Rand company.
 - c. Lawrence Hardware Inc.
 - d. Markar Architectural Products, Inc.; a subsidiary of Adams Rite Manufacturing Co.
 - e. McKinney Products Company; an ASSA ABLOY Group company.
 - f. Select Products Limited.
 - g. Zero International.

C. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Bommer Industries, Inc.
 - b. Cal-Royal Products, Inc.
 - c. Hager Companies.
 - d. IVES Hardware; an Ingersoll-Rand company.

- e. McKinney Products Company; an ASSA ABLOY Group company.
- f. Select Products Limited.
- g. Stanley Commercial Hardware; Div. of The Stanley Works.
- h. Zero International.

2.6 MECHANICAL LOCKS AND LATCHES

- A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- B. Bored Locks: BHMA A156.2.
 - 1. Security Grade:
 - a. Building entrances serving more than two families: Grade 1; Series 4000.
 - b. Living unit entrances serving one or two families: Grade 2; Series 4000.
 - c. Doors within living units: Grade 3; Series 4000.
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division, an Ingersoll-Rand company or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Corbin Russwin Architectural Hardware; n ASSA ABLOY Group Company.
 - e. Falcon Lock; An Ingersoll-Rand Company.
 - f. K2 Commercial Hardware; a Black & Decker Corp. company.
 - g. Marks USA.
 - h. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
 - i. PDQ Manufacturing.
 - j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - k. Weiser Lock Corp.; a Black & Decker Corp. company.
 - l. Yale Security Inc.; an ASSA ABLOY Group company.
- C. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division, an Ingersoll-Rand company or comparable product by one of the following:

- a. Accurate Lock & Hardware Co.
- b. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
- c. Arrow USA; an ASSA ABLOY Group company.
- d. Best Access Systems; Div. of Stanley Security Solutions, Inc.
- e. Cal-Royal Products, Inc.
- f. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
- g. Falcon Lock; an Ingersoll-Rand company.
- h. Marks USA.
- i. PDQ Manufacturing.
- j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
- k. Yale Security Inc.; an ASSA ABLOY Group company.

2.7 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Falcon Lock; an Ingersoll-Rand company.
 - e. Hager Companies.
 - f. K2 Commercial Hardware; a Black & Decker Corp. company.
 - g. Marks USA.
 - h. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
 - i. PDQ Manufacturing.
 - j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - k. Weiser Lock Corp.; a Black & Decker Corp. company.
 - l. Yale Security Inc.; an ASSA ABLOY Group company.

B. Mortise Auxiliary Locks: BHMA A156.5; Grade 1; with strike that suits frame.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Accurate Lock & Hardware Co.
 - b. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - c. Arrow USA; an ASSA ABLOY Group company.
 - d. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - f. Yale Security Inc.; an ASSA ABLOY Group company.

C. Narrow Stile Auxiliary Locks: BHMA A156.5; Grade 1; with strike that suits frame.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Accurate Lock & Hardware Co.
 - b. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
- D. Push-Button Combination Locks: BHMA A156.5; cylindrical; Grade 1; lock opens by entering a one- to five-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Kaba Ilco Corp.; a Kaba Group company.

2.8 ELECTROMAGNETIC LOCKS

- A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Door Controls International, Inc.
 - b. Dortronics Systems, Inc.
 - c. DynaLock Corp.
 - d. Rutherford Controls Int'l. Corp.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.
 - f. Security Door Controls.
- B. Delayed-Egress Electromagnetic Locks: BHMA A156.24, electrically powered, with electromagnet attached to frame and armature plate attached to door; depressing push bar for more than 3 seconds initiates irreversible alarm and 15-second delay for egress. When integrated with fire alarm, fire alarm voids 15-second delay.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Door Controls International, Inc.
 - b. Doorguard Systems, Inc.
 - c. DynaLock Corp.
 - d. Rutherford Controls Int'l. Corp.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.

2.9 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; mortise latchbolt; with strike that suits frame.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - b. Brink, R. R., Locking Systems, Inc.
 - c. DynaLock Corp.
 - d. Marks USA.
 - e. Rutherford Controls Int'l. Corp.
 - f. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - g. Security Door Controls.
 - h. Yale Security Inc.; an ASSA ABLOY Group company.

2.10 SELF-CONTAINED ELECTRONIC LOCKS

- A. Self-Contained Electronic Locks: BHMA A156.25, mortise; with internal, battery-powered, self-contained electronic locks; consisting of complete lockset, motor-driven lock mechanism, and actuating device; enclosed in zinc-dichromate-plated, wrought-steel case, and strike that suits frame. Provide key override, low-battery detection and warning, LED status indicators, and ability to program at the lock.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - b. Kaba Ilco Corp.; a Kaba Group company.
 - c. Marks USA.
 - d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - e. Yale Security Inc.; an ASSA ABLOY Group company.

2.11 EXIT LOCKS AND EXIT ALARMS

- A. Exit Locks and Alarms: BHMA A156.29, Grade 1.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Detex Corporation.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.12 SURFACE BOLTS

- A. Surface Bolts: BHMA A156.16.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Burns Manufacturing Incorporated.
- b. Don-Jo Mfg., Inc.
- c. Door Controls International, Inc.
- d. IVES Hardware; an Ingersoll-Rand company.
- e. Trimco.

2.13 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Burns Manufacturing Incorporated.
 - c. Don-Jo Mfg., Inc.
 - d. Door Controls International, Inc.
 - e. Hiawatha, Inc.
 - f. IVES Hardware; an Ingersoll-Rand company.
 - g. Trimco.

2.14 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Cal-Royal Products, Inc.
 - b. Door Controls International, Inc.
 - c. IVES Hardware; an Ingersoll-Rand company.
 - d. Trimco.

2.15 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Arrow USA; an ASSA ABLOY Group company.
 - c. Cal-Royal Products, Inc.
 - d. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - e. Detex Corporation.
 - f. Door Controls International, Inc.

- g. DORMA Architectural Hardware; Member of The DORMA Group North America.
- h. Dor-O-Matic; an Ingersoll-Rand company.
- i. K2 Commercial Hardware; a Black & Decker Corp. company.
- j. Monarch Exit Devices & Panic Hardware; an Ingersoll-Rand company.
- k. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc.
- l. Rutherford Controls Int'l. Corp.
- m. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
- n. Von Duprin; an Ingersoll-Rand company.
- o. Yale Security Inc.; an ASSA ABLOY Group company.

2.16 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product from Schlage Commercial Lock Division; an Ingersoll-Rand company or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. ASSA, Inc.; An ASSA ABLOY Group Company.
 - c. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - d. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - e. Falcon Lock; an Ingersoll-Rand company.
 - f. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
 - g. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - h. Yale Security Inc.; an ASSA ABLOY Group company.
- B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.17 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. No Master Key System: Only change keys operate cylinder.
 - 2. Master Key System: Change keys and a master key operate cylinders.
 - 3. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - 4. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
 - 5. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.

- b. Re-key Owner's existing master key system into new keying system.
- 6. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Brass.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.
 - d. Great-Grand Master Keys: Five.

2.18 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. American Key Boxes and Cabinets.
 - b. GE Security, Inc.
 - c. HPC, Inc.
 - d. Lund Equipment Co., Inc.
 - e. MMF Industries.
 - f. Tri Palm International.
 - 2. Multiple-Drawer Cabinet: Cabinet with drawers equipped with key-holding panels and key envelope storage, and progressive-type ball-bearing suspension slides. Include single cylinder lock to lock all drawers.
 - 3. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
 - 4. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.

2.19 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; brass or stainless steel body with scheduled finish, unless otherwise indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

- a. Burns Manufacturing Incorporated.
- b. Don-Jo Mfg., Inc.
- c. Forms + Surfaces.
- d. Hager Companies.
- e. Hiawatha, Inc.
- f. IVES Hardware; an Ingersoll-Rand company.
- g. Rockwood Manufacturing Company.
- h. Trimco.

2.20 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

2.21 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - c. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - d. Dor-O-Matic; an Ingersoll-Rand company.
 - e. K2 Commercial Hardware; a Black & Decker Corp. company.
 - f. LCN Closers; an Ingersoll-Rand company.
 - g. Norton Door Controls; an ASSA ABLOY Group company.
 - h. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - i. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - j. Yale Security Inc.; an ASSA ABLOY Group company.

2.22 CONCEALED CLOSERS

- A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written

recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - b. LCN Closers; an Ingersoll-Rand company.
 - c. Norton Door Controls; an ASSA ABLOY Group company.
 - d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.23 CLOSER HOLDER RELEASE DEVICES

- A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system or loss of power.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - b. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - c. LCN Closers; an Ingersoll-Rand company.
 - d. Norton Door Controls; an ASSA ABLOY Group company.
 - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - f. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.24 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Architectural Builders Hardware Mfg., Inc.
 - b. Baldwin Hardware Corporation.
 - c. Burns Manufacturing Incorporated.
 - d. Cal-Royal Products, Inc.
 - e. Don-Jo Mfg., Inc.
 - f. Door Controls International, Inc.
 - g. Hager Companies.
 - h. Hiawatha, Inc.
 - i. IVES Hardware; an Ingersoll-Rand company.

- j. Rockwood Manufacturing Company.
- k. Stanley Commercial Hardware; Div. of The Stanley Works.
- l. Trimco.

2.25 ELECTROMAGNETIC STOPS AND HOLDERS

- A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit, floor-mounted electromagnet single unit, or floor-mounted electromagnet double unit as scheduled, with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Architectural Builders Hardware Mfg., Inc.
 - b. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.26 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Architectural Builders Hardware Mfg., Inc.
 - b. Glynn-Johnson; an Ingersoll-Rand company.
 - c. Rockwood Manufacturing Company.
 - d. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.27 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product Pemko Manufacturing Co.; an ASSA ABLOY Group company or comparable product by one of the following:
 - a. Hager Companies.
 - b. M-D Building Products, Inc.
 - c. National Guard Products.
 - d. Reese Enterprises, Inc.
 - e. Sealeze; a unit of Jason Incorporated.
 - f. Zero International.

2.28 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product by Pemko Manufacturing Co.; an ASSA ABLOY Group company as indicated on Drawings or comparable product by one of the following:
 - a. Hager Companies.
 - b. M-D Building Products, Inc.
 - c. National Guard Products.
 - d. Reese Enterprises, Inc.
 - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - f. Sealeze; a unit of Jason Incorporated.
 - g. Zero International.

2.29 SLIDING DOOR HARDWARE

- A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cox, Arthur, & Sons, Inc.
 - b. Hager Companies.
 - c. Henderson, PC Inc.
 - d. Johnson, L. E., Products, Inc.
 - e. Stanley Commercial Hardware; Div. of The Stanley Works.

2.30 FOLDING DOOR HARDWARE

- A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cox, Arthur, & Sons, Inc.
 - b. Hager Companies.
 - c. Henderson, PC Inc.
 - d. Johnson, L. E., Products, Inc.
 - e. Stanley Commercial Hardware; Div. of The Stanley Works.

2.31 METAL PROTECTIVE TRIM UNITS

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

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

2.32 PLASTIC PROTECTION PLATES

- A. Plastic Protection Plates: BHMA A156.6; fabricated with four sides beveled; rigid plastic; 0.060-inch- (1.5-mm-) thick, PVC or acrylic-modified vinyl plastic.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Floor Products Co., Inc.
 - b. Burns Manufacturing Incorporated.
 - c. Don-Jo Mfg., Inc.
 - d. Hiawatha, Inc.
 - e. IPC Door and Wall Protection Systems, Inc.; Div. of InPro Corporation.
 - f. Korogard Wall Protection Systems; Div. of RJF International Corporation.
 - g. Pawling Corporation.
 - h. Rockwood Manufacturing Company.
 - i. Tepromark International, Inc.
 - j. Trimco.

2.33 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Cal-Royal Products, Inc.
 - c. Don-Jo Mfg., Inc.
 - d. Hager Companies.
 - e. Rockwood Manufacturing Company.
 - f. Stanley Commercial Hardware; Div. of The Stanley Works.
 - g. Trimco.

2.34 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:
 - a. DynaLock Corp.
 - b. GE Security, Inc.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.
 - f. Security Door Controls.

2.35 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.36 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
- C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 4. 2010 ADA Standards for Accessible Design.
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- F. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).
- G. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
 - H. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 - I. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room as directed by Owner. Verify location with Architect.
 1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
 - J. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
 - K. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
 - L. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - M. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 - N. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
 - O. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- 3.2 FIELD QUALITY CONTROL
- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
- 3.3 DOOR HARDWARE SCHEDULE

Locations: As indicated on Drawings; each to have the following:

Item	Manufacturer	Product
Locksets, Latch Sets, and Dead Bolts	Schlage	-
Latch Sets, at Interiors	Schlage	F series, Elan lever style
Door Stops and Holders	Ives, Better Home Products	-
Butts	Hager, McKinney, Lawrence	-
Thresholds	Pemko	Ultra
Door Gasketing	Pemko	-
Exit Device	Von Duprin	-
Closer	Norton, LCN	-
Viewer, at Unit Entry Doors	Ives	700 U700, 701 U701

END OF SECTION 087100

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.
2. Film-backed glass mirrors qualifying as safety glazing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Samples:
1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 2. Mirror Clips: Full size.
 3. Mirror Trim: 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

- A. Preconstruction test reports.
- B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with GANA's "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- C. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
1. Warranty Period: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

- A. Glass Mirrors, General: ASTM C 1503.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Arch Aluminum & Glass Co., Inc.
 - b. Avalon Glass and Mirror Company.
 - c. Binswanger Mirror; a division of Vitro America, Inc.
 - d. D & W Incorporated
 - e. Donisi Mirror Company.
 - f. Gardner Glass, Inc.
 - g. Gilded Mirrors, Inc.
 - h. Guardian Industries.
 - i. Head West.
 - j. Independent Mirror Industries, Inc.
 - k. Lenoir Mirror Company.
 - l. Maran-Wurzell Glass & Mirror.
 - m. National Glass Industries.
 - n. Stroupe Mirror Co., Inc.
 - o. Sunshine Mirror; Westshore Glass Corp.
 - p. Virginia Mirror Company, Inc.
 - q. Walker Glass Co., Ltd.
- B. Clear Glass: Mirror Select Quality.
1. Nominal Thickness: 6.0 mm.

2.2 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Approved by mirror manufacturer.

- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.
 - 1. Adhesive shall have a VOC content of not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Products:
 - a. Gunter; Premier.
 - b. Franklin International; Titebond VOC-Compliant Heavy Duty Construction Adhesive
- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - 1. Finish: Clear bright anodized.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation.

2.4 FABRICATION

- A. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- B. Mirror Edge Treatment: Flat polished. Seal edges of mirrors with edge sealer.
- C. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
 - 1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

2. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.
- B. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.
 - C. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
 - D. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - E. Protect mirrors from breakage and contaminating substances resulting from construction operations.
 - F. Do not permit edges of mirrors to be exposed to standing water.
 - G. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
 - H. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior portland cement plasterwork (stucco) on metal lath.
2. Stucco finish coat applied to existing plasterwork.
3. Foam build-outs with EIFS base coat and reinforcing mesh.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
- C. Samples: For each type of factory-prepared finish coat indicated.

1.3 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- C. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - 1. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd.
- B. Wire-Fabric Lath:
 - 1. Welded-Wire Lath: ASTM C 933; self-furring, 1.95 lb/sq. yd.
 - 2. Woven-Wire Lath: ASTM C 1032; self-furring, with stiffener wire backing, 1.4 lb/sq. yd.
- C. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper.
 - 1. Provide paper-backed lath unless otherwise indicated.

2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
 - 1. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.
 - 2. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - 3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - 4. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
 - a. Small-nose style; use unless otherwise indicated.
 - 5. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
 - 6. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - 7. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 - 8. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.
- C. Plastic Accessories: Fabricated from high-impact PVC.
 - 1. Cornerbeads: With perforated flanges.

- a. Small-nose style; use unless otherwise indicated.
2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - a. Square-edge style; use unless otherwise indicated.
3. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
4. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged 1/2-inch- wide reveal; with perforated concealed flanges.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.
- G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- H. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants"
 1. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- I. Insulation Adhesive: Insulation manufacturer's standard formulation designed for indicated use; compatible with substrate; with VOC content of 50 g/L or less and complying with one of the following:
 1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, and polymer-based adhesive specified for base coat.

2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by insulation manufacturer.
- J. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation (EPS): Comply with ASTM C 578, Type I; and with insulation manufacturer's requirements for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks.
 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E 84.
 3. Foam Build-Outs: Provide with profiles and dimensions indicated on Drawings.
- K. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other insulation and plaster materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E 2098 and the following:
1. Detail Reinforcing Mesh: Not less than 4.0 oz./sq. yd. (136 g/sq. m).

2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
1. Color for Finish Coats: Gray, except as otherwise noted.
- B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- C. Sand Aggregate: ASTM C 897.
- D. EIFS Waterproof Adhesive/Base-Coat Materials: Insulation manufacturer's standard waterproof formulation; with VOC content of 50 g/L or less and complying with one of the following:
1. Job-mixed formulation of portland cement complying with ASTM C 150/C 150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
- E. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
1. Color: As selected by Architect from manufacturer's full range.
- F. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.

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

2.5 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- B. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber per cu. Yd of cementitious materials.
- C. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.3 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063.
 1. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.4 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:

1. Install cornerbead at interior and exterior locations.
- C. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft.
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
 2. At distances between control joints of not greater than 18 feet o.c.
 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 4. Where control joints occur in surface of construction directly behind plaster.
 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.
- D. Insulation Foam Build-Outs: Adhesively attach insulation to substrate in compliance with ASTM C 1397 and the following:
1. Plaster: Apply adhesive by ribbon-and-dab method.
 2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
 3. Allow adhered insulation to remain undisturbed for not less than 24 hours, before beginning rasping and sanding insulation or before applying base coat and reinforcing mesh.

3.5 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
- B. Bonding Compound: Apply on unit masonry and concrete plaster bases.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry, on concrete; 3/4-inch thickness.
1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.
 4. Plastic cement mixes.
 5. Portland and plastic cement mixes.
- D. Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork, 3/8 inch thick on concrete masonry, 1/4 inch thick on concrete.
1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.
 4. Plastic cement mixes.

5. Portland and plastic cement mixes.

- E. EIFS Waterproof Adhesive/Base Coat: Over foam build-outs, apply in minimum thickness recommended in writing by EIFS manufacturer.
- F. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.
- G. Plaster Finish Coats: Apply to provide Owner's preference.
- H. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.

3.6 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

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

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

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

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

- C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 - 1. Thickness: 1/2 inch.
 - 2. Long Edges: Tapered.
- D. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1, Level 2, or Level 3, as indicated.
 - 1. Core: As indicated on Drawings.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10.
- E. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: As indicated.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10.

2.3 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Core: As indicated.

2.4 TILE BACKING PANELS

- A. Water-Resistant Cementitious Backing Board:
 - 1. Dura-Rock .
 - 2. Hardibacker.

2.5 TRIM ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 - 1. Provide cornerbead at outside corners unless otherwise indicated.
 - 2. Provide LC-bead (J-bead) at exposed panel edges.
 - 3. Provide control joints where indicated.
- B. Exterior Trim: ASTM C 1047.
 - 1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
- C. Aluminum Trim: ASTM B 221, Alloy 6063-T5. Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.7 AUXILIARY MATERIALS

- A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).
- D. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90, and complying with requirements of Division 07 Section "Joint Sealants".
 - 1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- F. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

2.8 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
 - b. National Gypsum Company; Perfect Spray EM Texture.
 - c. USG Corporation; BEADEx FasTex Wall and Ceiling Spray Texture.
 - 2. Texture: Match existing.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Comply with ASTM C 840.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 - 1. Aluminum Trim: Install in locations indicated on Drawings.
 - 2. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient stair accessories.
 - 3. Resilient molding accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient base and stair accessories shall comply with requirements of FloorScore certification.
- B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 THERMOPLASTIC-RUBBER BASE

- A. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style B, Cove: Provide in all areas.
- B. Thickness: 0.125 inch.
- C. Height: 4 inches.
- D. Lengths: Coils in manufacturer's standard length.

- E. Outside Corners: Job formed.
- F. Inside Corners: Job formed.
- G. Colors: Match existing.

2.3 VINYL BASE

- A. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style B, Cove: Provide in all areas.
- B. Minimum Thickness: 0.080 inch.
- C. Height: 4 inches.
- D. Lengths: Coils in manufacturer's standard length.
- E. Outside Corners: Job formed.
- F. Inside Corners: Job formed.
- G. Colors: Match existing.

2.4 RUBBER STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Stair Treads: ASTM F 2169.
 - 1. Type: TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
 - 2. Class: 2 (pattern; embossed, grooved, or ribbed).
 - 3. Group: 1 (embedded abrasive strips) or 2 (with contrasting color for the visually impaired).
 - a. Provide contrasting strip or color at first tread and top landing at all interior stairs.
 - 4. Nosing Style: Match existing.
 - 5. Nosing Height: Match existing.
 - 6. Thickness: 1/4 inch and tapered to back edge.
 - 7. Size: Lengths and depths to fit each stair tread in one piece.
 - 8. Integral Risers: Smooth, flat; in height that fully covers substrate.

- C. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- D. Locations: Provide rubber stair accessories in areas indicated.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.5 RUBBER MOLDING ACCESSORY

- A. Description: Rubber cap for cove carpet, cap for cove resilient flooring, carpet edge for glue-down applications, nosing for carpet, nosing for resilient flooring, reducer strip for resilient flooring, joiner for tile and carpet, transition strips.
- B. Profile and Dimensions: As indicated in Drawings.
- C. Locations: Provide rubber molding accessories in areas indicated.
- D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.6 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 2. Tightly adhere to substrates throughout length of each piece.
 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 1. Apply two or more coat(s) as recommended by manufacturer.
- C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL COMPOSITION FLOOR TILE – High Traffic and Common Areas.

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc; Standard EXCELON® Imperial® Texture.
 - 2. Armstrong World Industries, Inc; Standard EXCELON® Imperial® Texture Classics.
 - 3. Armstrong World Industries, Inc; Standard EXCELON® MultiColor™.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 VINYL COMPOSITION FLOOR TILE – Residential Unit Interiors.

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc; Standard EXCELON® Imperial® Texture.
 - 2. Armstrong World Industries, Inc; Standard EXCELON® Imperial® Texture Classics.
 - 3. Armstrong World Industries, Inc; Standard EXCELON® MultiColor™.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 3/32- or 0.125- inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 - 1. Adhesives shall comply with the following limits for VOC content:
 - a. Vinyl Composition Tile Adhesives: 50 g/L or less.

2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.

- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coats.
- C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096816 - SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes woven carpet and carpet cushion.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference as needed.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: If needed, show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Seam locations, types, and methods.
 - 4. Pile direction.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warrant: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced Installer who is certified by the International Certified Floorcovering Installers.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet and carpet cushion identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.8 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.9 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, excess static discharge, buckling, and delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty includes consequent removal and replacement of carpet and accessories.
 - 2. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 3. Failure includes, but is not limited to, permanent indentation or compression.
 - 4. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WOVEN CARPET

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mohawk Group (The); Mohawk Carpet, LLC.
 - 2. Shaw Industries, Inc.
- B. Color: As selected by Client and Architect from manufacturer's full range.
- C. Pattern: As selected by Client and Architect.
- D. Performance Characteristics: As follows:
 - 1. Appearance Retention Rating: **Moderate traffic, 2.5**

2. Emissions: Provide carpet that complies with testing and product requirements of CRI's "Green Label Plus" program.

2.2 CARPET CUSHION

- A. Carpet cushion to meet or exceed recommendation by carpet manufacturer.
- B. Traffic Classification: CCC **Class I, moderate** traffic.
- C. Performance Characteristics: As follows:
 1. Emissions: Provide carpet cushion that complies with testing and product requirements of CRI's "Green Label" program.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet and carpet cushion manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
 1. Use adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Preparation: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.
- E. Installation: Comply with CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for the following:

1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
 2. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installations."
 3. Stair Installation: Comply with CRI 104, Section 13, "Carpet on Stairs" for stretch-in or glue-down installation.
- F. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- G. Do not bridge building expansion joints with carpet.
- H. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- I. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- K. If applicable: Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
- L. If applicable: Comply with carpet cushion manufacturer's written recommendations. Perform the following operations immediately after installing carpet:
1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 2. Remove yarns that protrude from carpet surface.
 3. Vacuum carpet using commercial machine with face-beater element.
- M. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 096816

SECTION 099113-EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Galvanized metal.
 - 5. Wood.
 - 6. Fiber-cement siding and trim.
 - 7. Exterior gypsum board.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants".
 - 2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.2 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than five (5) gallons of each material and color applied, in containers, properly labeled and sealed.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. PPG PAINTS (Glidden Paints).
 - 2. Sherwin-Williams.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction, not to exceed the following limits:
 - 1. For Non-Flat: 150g/l or less.
 - 2. For Flat: 50 g/l or less.
- C. Colors: As selected by Owner.

2.3 BLOCK FILLERS

- A. Block Filler for CMU Substrates:
 - 1. PPG PAINTS: 3010 Block Filler OR 6-15 Speedhide Int/Ext Hi Fill Block Filler

2.4 PRIMERS/SEALERS

- A. Prime Coat for Concrete Substrates:
 - 1. PPG PAINTS: 6001 Hydrosealer Exterior WB Multipurpose Primer Sealer
- B. Prime Coat for Gypsum Board Substrates:

1. PPG PAINTS: Seal Grip Int/Ext Acrylic Universal Primer/Sealer

2.5 METAL PRIMERS

- A. Primer, Ferrous Metal: Etch surfaces with Vinyl Wash prior to priming.
 1. PPG PAINTS: 90-912 Pitt-Tech Plus Int/Ext DTM Industrial Primer
- B. Primer, Galvanized: Prepare surfaces with Jasco Prep n Prime One Coat prior to priming.
 1. PPG PAINTS: 90-912 Pitt-Tech Plus Int/Ext DTM Industrial Primer

2.6 WOOD PRIMERS

- A. Primer for Wood and Fiber-Cement Substrates: Use factory primed products indicated in other sections, or field prime with the following.
 1. PPG PAINTS: 6001 Hydrosealer Exterior WB Multi-purpose Primer/Sealer

2.7 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1):
 1. PPG PAINTS: 2200V Fortis 350 100% Acrylic Ext Flat
- B. Eggshell Acrylic Finish (Gloss Level 4):
 1. PPG PAINTS: 2402V Fortis 350 100% Acrylic Ext Egg
- C. Latex, Exterior Semi-Gloss (Gloss Level 5): 100 percent acrylic premium paint.
 1. PPG PAINTS: 2406V Fortis 350 100% Acrylic Ext Semi-Gloss

2.8 ACCESSORIES

- A. Joint Sealant: Refer to Section 079200 for interior and exterior Joint Sealant specifications.

2.9 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer

- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. General: Paint exposed surfaces, new and existing, unless otherwise indicated.
 - 1. Paint the back side of access panels.
 - 2. Color-code mechanical piping in accessible ceiling spaces.
 - 3. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- B. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

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

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Non-traffic Surfaces:
 - 1. Eggshell Acrylic Finish:
 - a. Prime Coat: One coat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior eggshell (Gloss Level 4). 20 mil wet film thickness.
 - d.
- B. CMU Substrates:
 - 1. Eggshell Acrylic Finish:
 - a. Prime Coat: Block filler, as recommended in writing by topcoat manufacturer for exterior use on concrete unit masonry surfaces with topcoat indicated.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior eggshell (Gloss Level 4).
- C. Cement Plaster (Stucco):
 - 1. Flat Acrylic Finish:

- a. Prime Coat: As recommended in writing by topcoat manufacturer for exterior use on concrete unit masonry surfaces with topcoat indicated.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex Flat.

D. Ferrous Metal Substrates:

1. Semi Gloss 100% Acrylic Finish:

- a. Prime Coat: Primer, ferrous metal, as recommended in writing by topcoat manufacturer for exterior use on ferrous-metal substrates with topcoat indicated.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

E. Galvanized-Metal Substrates:

1. Latex System:

- a. Prime Coat: Preparation and primer, galvanized metal.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

F. Wood and Fiber Cement Substrates:

1. Semi Gloss 100% Acrylic Finish:

- a. Prime Coat: Wood primer.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

G. Gypsum Board Substrates:

1. Flat 100% Acrylic Finish: At soffits.

- a. Prime Coat: Primer/Sealer.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior flat (Gloss Level 1).

END OF SECTION

SECTION 099123-INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel.
 - 2. Cast iron.
 - 3. Galvanized metal.
 - 4. Aluminum (not anodized or otherwise coated).
 - 5. Concrete unit masonry (CMU).
 - 6. Wood.
 - 7. Gypsum board.
 - 8. Cotton or canvas insulation covering.
 - 9. ASJ insulation covering.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants".
 - 2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.2 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than five (5) gallons of each material and color applied, in containers, properly labeled and sealed.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. PPG PAINTS (makers of Glidden Paints).
 - 2. Kelly-Moore Paints.
 - 3. Sherwin-Williams.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction, not to exceed the following limits:
 - 1. For Non-Flat: 150g/l or less.
 - 2. For Flat: 50 g/l or less.
- C. Colors: White, except as otherwise selected by Owner.

2.3 PRIMERS/SEALERS

- A. Block Filler for CMU Substrates: PPG PAINTS: 3010 Block Filler or 6-15 Hi Fill Block Filler Kelly-Moore Paints; 521 Acrylic Block Filler.
- B. Primer Sealer, Interior, Premium Low Odor/VOC: PVA primer sealer recommended in writing by topcoat manufacturer. PPG PAINTS 17-521 Seal Grip Interior Primer

- C. Primer, Interior, Premium Waterborne Alkyd: Waterborne alkyd primer recommended in writing by topcoat manufacturer. PPG PAINTS 17-521 Seal Grip Interior Primer
- D. Primer, Latex, for Interior Wood: PVA primer sealer recommended in writing by topcoat manufacturer. PPG PAINTS 17-521 Seal Grip Interior Primer
- E. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

- A. Primer, Rust-Inhibitive, Water Based: Recommended in writing by topcoat manufacturer.
PPG PAINTS: 90-912 Pitt-Tech Plus Int/Ext DTM Industrial Primer
- B. Primer, Galvanized, Water Based: Recommended in writing by topcoat manufacturer.
PPG PAINTS: 90-912 Pitt-Tech Plus Int/Ext DTM Industrial Primer

2.5 WATER-BASED PAINTS

- A. Latex, Interior, Premium Low Odor/VOC, Flat (Gloss Level 1):
 - 1. PPG PAINTS: 9-100 Pure Performance Int Zero VOC Flat
 - 2. Kelly-Moore Paints; 1500 Enviro-Cote Interior Acrylic Flat Wall Paint.
- B. Latex, Interior, Premium Low Odor/VOC, Semi-Gloss (Gloss Level 5):
 - 1. PPG PAINTS: 9-500 Pure Performance Int Zero VOC Semi-Gloss
 - 2. Kelly-Moore Paints; 1520 Enviro-Cote Interior Acrylic Semi-Gloss Enamel.
- C. Waterborne Alkyd Enamel, Interior, Premium, low-VOC, Satin to Semi-Gloss (Gloss Level 4 to 5): Scrubbable.
 - 1. PPG PAINTS: 6-1510 Speedhide WaterBorne Alkyd, low VOC Semi-Gloss
 - 2. Kelly-Moore Paints; 1930 KM Professional Water-Oil Hybrid Semi-Gloss Enamel.

2.6 ACCESSORIES

- A. Joint Sealant: Refer to Section 079200 for interior and exterior Joint Sealant specifications.

2.7 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Wood: 15 percent.
 2. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 1. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 - a. Do not use brushes except where the use of other applicators is not practical.
 - b. Use rollers for finish coat on interior walls and ceilings.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

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

3.6 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
 - 1. Eggshell Acrylic Finish:
 - a. Prime Coat: Block filler, as recommended in writing by topcoat manufacturer for interior use on concrete unit masonry surfaces with topcoat indicated.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, premium low odor/VOC, eggshell (Gloss Level 4).
- B. Steel Substrates:
 - 1. Premium Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, rust-inhibitive, water based, recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: Latex, interior, premium low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, premium low odor/VOC, semi-gloss (Gloss Level 5).
- C. Galvanized-Metal Substrates:
 - 1. Premium Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, galvanized, water based, recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, premium low odor/VOC, semi-gloss, (Gloss Level 5).
- D. Wood Substrates: Including wood trim, architectural woodwork, doors, wood-based panel products.
 - 1. Premium Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, latex, for interior wood.
 - b. Intermediate Coat: Latex, interior, premium low odor/VOC, matching topcoat.

- c. Topcoat: Latex, interior, premium low odor/VOC, (Gloss Level 2) at wood taped flush with adjacent gypsum board surfaces.
- d. Topcoat: Latex, interior, premium low odor/VOC, semi-gloss (Gloss Level 5), except as otherwise noted.

E. Gypsum Board and Textured Substrates:

1. Premium Low-Odor/VOC Latex System:

- a. Prime Coat: Primer sealer, interior, premium low odor/VOC.
- b. Intermediate Coat: Latex, interior, premium low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, premium low odor/VOC, flat (Gloss Level 1) at soffits and ceilings.
- d. Topcoat: Latex, interior, premium low odor/VOC, eggshell (Gloss Level 4), except as otherwise noted.

2. Waterborne Alkyd Enamel System (Scrubbable Paint): Provide at walls and ceilings at wet and high-humidity areas.

- a. Prime Coat: Primer, Interior, Premium Waterborne Alkyd.
- b. Intermediate Coat: Waterborne Alkyd Enamel, Interior, Premium, low-VOC, Satin to Semi-Gloss, matching topcoat.
- c. Topcoat: Waterborne Alkyd Enamel, Interior, Premium, low-VOC, Satin to Semi-Gloss.

END OF SECTION

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. Panel signs.

1.2 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples: For each sign type and for each color and texture required.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- D. Steel:
 - 1. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B, exposed or electrolytic zinc-coated, ASTM A 591/A 591M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
 - 2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.
 - a. Where directed by Architect, use Type 316.
 - 3. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi minimum yield strength.
 - 4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- E. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- F. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 PANEL SIGNS

- A. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - 1. Laminated, Etched Photopolymer: Raised graphics with Braille 1/32 inch above surface with contrasting colors as selected by Architect from manufacturer's full range and laminated to acrylic back.
 - 2. Laminated, Sandblasted Polymer: Raised graphics with Braille 1/32 inch above surface with contrasting colors as selected by Architect from manufacturer's full range and laminated to acrylic back.
 - 3. Edge Condition: Square cut.

4. Corner Condition: Rounded to radius indicated.
 5. Mounting: Unframed.
 - a. Wall mounted with concealed anchors magnetic tape or two-face tape.
 - b. Manufacturer's standard anchors for substrates encountered.
 6. Color: As selected by Architect from manufacturer's full range.
 7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- B. Laminated Interior and Exterior Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.
1. Surface Finish: Mat, Beaded, Gloss, or UV resistant, for outdoor.
 2. Edge Condition: Square cut.
 3. Corner Condition: Square or Rounded to radius indicated.
 4. Thickness: 1/4 inch.
- C. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.
- D. Changeable Message Inserts: If directed by Owner, fabricate signs to allow insertion of changeable messages in the form of transparent covers with paper inserts printed by Owner.
1. Furnish insert material and software for creating text and symbols for PC-Windows and Macintosh computers for Owner production of paper inserts.
 2. Furnish insert material cut-to-size for changeable message insert.
- E. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
1. Panel Material: Opaque acrylic sheet or Photopolymer.
 2. Raised-Copy Thickness: Not less than 1/32 inch.

2.3 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of

exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.

2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) polished (buffed) or nonspecular as fabricated mechanical finish, complying with AAMA 611.

2.6 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs and accessories as indicated in drawings and in accordance with the ADA-ABA Accessibility Guidelines and ICC/ANSI A117.
- B. Locate signs and accessories using mounting methods of types described and complying with manufacturer's written instructions.
 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- C. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 2. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.

3. Shim Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 4. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 5. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
- D. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

END OF SECTION 101400

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Under-lavatory guards.

1.2 ACTION SUBMITTALS

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

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation.
 3. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- B. Toilet Tissue (Single Roll) Dispenser:
1. Basis-of-Design Product: Bobrick B-6857.
 2. Description: Single-roll dispenser.
 3. Mounting: Surface mounted.
 4. Operation: Non-control delivery with theft-resistant spindle.
 5. Capacity: Designed for up to 5-1/2 inch diameter tissue rolls.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Toilet Tissue (Double Roll) Dispenser:
1. Basis-of-Design Product: Bobrick B-6867.
 2. Description: Two-roll dispenser.
 3. Mounting: Surface mounted.
 4. Operation: Non-control delivery with theft-resistant spindle.
 5. Capacity: Designed for up to 5-1/2 inch diameter tissue rolls.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- D. Paper Towel (Folded) Dispenser:
1. Basis-of-Design Product: Bobrick 262.
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 400 C-fold or 525 multifold towels.
 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 5. Lockset: Tumbler type.
 6. Refill Indicators: Pierced slots at sides or front.
- E. Paper Towel (Roll) Dispenser: Do not provide in public restrooms.
- F. Waste Receptacle:
1. Basis-of-Design Product: Bobrick.
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 2 gal.
 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 5. Liner: Reusable vinyl liner.
 6. Lockset: Tumbler type for waste-receptacle.
- G. Combination Towel (Folded) Dispenser/Waste Receptacle:

1. Basis-of-Design Product: Bobrick B-3699.
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Surface mounted.
4. Minimum Towel-Dispenser Capacity: 400 C-fold or 525 multifold towels.
5. Minimum Waste-Receptacle Capacity: 2 gal.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment.

H. Grab Bar:

1. Basis-of-Design Product: Bobrick.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/4 inches or 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

I. Seat-Cover Dispenser:

1. Basis-of-Design Product: Bobrick B-221.
2. Mounting: Surface mounted.
3. Minimum Capacity: 250 seat covers.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

J. Mirror Unit:

1. Basis-of-Design Product: Bobrick B-292, or Integral Shelf Combination Bobrick B-165.
2. Frame: Stainless-steel angle, 0.05 inch thick.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Size: 24 inches by 36 inches minimum and as indicated in Drawings.

K. Shelf:

1. Basis-of-Design Product: Bobrick B-295.
2. Stainless-steel Type 304, 18-gauge.
3. Front edge hemmed for safety.

L. Robe Hook:

1. Basis-of-Design Product: Bobrick B-232x24.
2. Description: 3-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.2 PRIVATE-USE BATHROOM ACCESSORIES

A. Toilet Tissue Dispenser:

1. Basis-of-Design Product: Bobrick B-6857.
2. Description: Single-roll dispenser.
3. Mounting: Surface mounted.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

B. Shower Curtain Rod:

1. Outside Diameter: 1 inch.
2. Mounting: Flanges with concealed fasteners.
3. Rod Material and Finish: Stainless steel, No. 4 finish (satin).
4. Flange Material and Finish: Stainless steel, No. 4 finish (satin).

C. Medicine Cabinet:

1. Basis-of-Design Product: Zaca SpaceCab Regulus
2. Mounting: Match existing.
3. Size: 16 by 26 inches.
4. Door: Framed mirror door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch.
5. Shelves: Three minimum, adjustable.
6. Material and Finish:
 - a. Mirror Frame: Chrome.

D. Robe Hook:

1. Basis-of-Design Product: Bobrick B-232x24.
2. Description: 3-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

E. Towel Bar:

1. Basis-of-Design Product: Bobrick B-673x24.
2. Description: 3/4-inch- square tube with rectangular end brackets.
3. Mounting: Flanges with concealed fasteners.
4. Length: 24 inches.
5. Material and Finish: Stainless steel, No. 7 finish (polished).

F. Interior Molding At Tub Apron:

1. Basis-of-Design Product: Timbron® Streamline Base LTIM 726.

2. Description: Recycled plastic molding. Protects flooring from water-intrusion at front of tub by providing a barrier.
3. Material and Finish: Molded plastic, 2 inch height minimum.

2.3 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by Truebro by IPS Corporation, or comparable by one of the following:
 1. IPS Corporation.
 2. Plumberex Specialty Products, Inc.
- B. Underlavatory Guard 1:
 1. Basis-of-Design Product: Lav Guard® 2.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.
 4. Location: Required. Install at all open piping locations.
- C. Underlavatory Guard 2:
 1. Basis-of-Design Product: Lav Shield®.
 2. Description: Total enclosure for supply and drain piping assemblies at wall-mounted lavatories that prevent direct contact with and burns from piping.
 3. Material and Finish: Antimicrobial, molded plastic, white.
 4. Location: Not required. Install at wall mounted lavatories in lieu of Lav Guard 2 at Owner's discretion.
- D. Underlavatory Guard 3:
 1. Basis-of-Design Product: Basin Guard®.
 2. Description: Front shield for supply and drain piping assemblies at kitchen sinks that prevent direct contact with and burns from piping. 36 or 42 inch width.
 3. Material and Finish: Antimicrobial, molded plastic, beige.
 4. Location: Not required. Install at kitchen sinks in lieu of Lav Guard 2 at Owner's discretion.

2.4 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories in disabled accessible locations to be in compliance with accessibility standards, as indicated in Drawings.
- B. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.
- D. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 102800

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.
4. Cleaning appliances.

1.2 RELATED SECTIONS

- A. Allowances: See Division 1 Section "Price and Payment Procedures" for appliance allowances.

1.3 REGULATORY REQUIREMENTS

A. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
3. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
4. NAECA: Provide residential appliances that comply with NAECA standards.

- B. Accessibility: Where appliances are indicated as accessible, comply with applicable provisions in the ADA-ABA Accessibility Guidelines for Buildings and Facilities, ICC A117.1 for kitchen appliances, and 2010 ADAAG Section 804.6.

- C. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program (Energy Star Rated).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. For appliances indicated, documentation that products are ENERGY STAR rated.
- C. Samples: For each exposed product and for each color and texture.

1.5 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.8 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by General Electric Company (GE), or one of the following:
 - 1. Amana; a division of Whirlpool Corporation.
 - 2. General Electric Company (Hotpoint).
 - 3. Sears Brands LLC (Kenmore).
 - 4. Whirlpool Corporation.

2.2 APPLIANCES

- A. **[Replace all appliances with new, as specified below.]**

2.3 RANGES – STANDARD UNITS

- A. Gas Range: Freestanding or Slide-in range with one oven(s).
 - 1. Gas Burners: Four.
 - 2. Anti-Tip Device: Manufacturer's standard.
 - 3. Material: Porcelain-enameled steel with cooktop.
 - 4. Required Features: Oven light.
- B. Dual Fuel Range: Freestanding or Slide-in range with gas burners and one electric oven(s).
 - 1. Gas Burners: Four.
 - 2. Anti-Tip Device: Manufacturer's standard.
 - 3. Material: Porcelain-enameled steel with cooktop.
 - 4. Required Features: Oven light.

2.4 RANGES – DISABLED ACCESSIBLE UNITS

- A. Standard: Comply with ICC/ANSI A117.1 for accessible appliances and section 804.6 of the 2010 ADAAG.
- B. Freestanding or drop-in range with one oven(s). Do not provide slide-in type range.
 - 1. Comply with requirements for range as stated above and per project.
 - 2. Provide temperature controls located at front of range.
 - 3. Clean Type: Self-clean oven.

2.5 KITCHEN EXHAUST VENTILATION

- A. Overhead Exhaust Hood:
 - 1. Manufactures: Subject to compliance with requirements, provide Broan Under Cabinet Range Hood, QDE Energy Star rated series or products by one of the following:
 - a. Air-King.
 - b. Broan.
 - c. Elica.
 - d. Fujioh.
 - e. Venmar.
 - f. Zephyr.
 - 2. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program (Energy Star Rated).
 - 3. Type: Under cabinet-mounted, exhaust-hood system.
 - 4. Accessible units: Provide separate light and fan switches in accessible location. Install at cabinet front or apron unless otherwise noted.
 - 5. Exhaust Fan: Built into hood and with manufacturer's standard capacity.
 - a. Venting: Based on existing conditions, unless otherwise indicated on Drawings.

6. Finish: Baked enamel.

2.6 REFRIGERATOR/FREEZERS – STANDARD UNITS

- A. Refrigerator/Freezer at Non-ADA Locations: Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1.
 1. Basis-of-Design Product: GE GTE15CTHRBB
 2. Type: Freestanding.
 3. Storage Capacity: 14.6 CF Match existing; 18 CF minimum.
 4. General Features:
 - a. Interior light in refrigeration compartment.
 - b. Automatic defrost.
 5. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program (Energy Star Rated).

2.7 REFRIGERATOR/FREEZERS – DISABLED ACCESSIBLE UNITS

- A. Standard: Comply with AHAM HRF-1 and ICC/ANSI A117.1 for accessible appliances and section 804.6 of the 2010 ADAAG.
- B. Refrigerator/Freezer at disabled accessible units: Two-door refrigerator/freezer with freezer on top.
 1. Basis-of-Design Product: GE GPE12FSKSB
 2. Type: Freestanding.
 3. Storage Capacity: 18 CF minimum.
 4. General Features:
 - a. 100% of refrigerator space provided below 54 inches.
 - b. 50% of freezer space provided below 54 inches.
 - c. Interior light in refrigeration compartment.
 - d. Automatic defrost.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

- D. Refrigerator: Reverse handle as needed in kitchens for convenient operation.
- E. Utilities: See Divisions 22 and 26 for plumbing and electrical requirements.
- F. Test each item of residential appliances to verify proper operation. Make necessary adjustments.
- G. Verify that accessories required have been furnished and installed.
- H. All products to be purchased should match in manufacturer and color.

END OF SECTION 113100

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds with aluminum slats.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Comfortex Window Fashions.
 - 2. Hunter Douglas Contract.
 - 3. Levolor Contract; a Newell Rubbermaid company.
 - 4. Springs Window Fashions.
- B. Aluminum Slats:
 - 1. Width: 1 inch.
 - 2. Thickness: Not less than 0.006 inch.
 - 3. Spacing: Manufacturer's standard.
- C. Slat Features:
 - 1. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
- D. Headrail:
 - 1. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 - 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: Clear-plastic wand.
 - 3. Manual Lift-Operator and Tilt-Operator Lengths: Length required to extend to 48 inches above floor level when blind is fully closed.
 - 4. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
- E. Bottom Rail: Matching slats.
 - 1. Type: Manufacturer's standard.
- F. Lift Cords: Manufacturer's standard braided cord.
- G. Ladders: Braided cord.

- H. Valance: Manufacturer's standard.
- I. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - 1. Type: As indicated in Drawings.
 - 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- J. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- K. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
- L. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: As selected by Architect from manufacturer's full range.
 - 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.
 - 2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

1. Locate so exterior slat edges are not closer than 2 inch from interior faces of glass and not closer than 1-1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- C. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- D. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122113

SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes kitchen and vanity cabinets.
- B. Related Requirements:
 - 1. Section 123623.13 "Plastic-Laminate-Clad Countertops."
 - 2. Section 123661 "Simulated Stone Countertops."

1.2 REQUIREMENTS

- A. Quality Standard: Provide cabinets that comply with KCMA A161.1.
 - 1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with the above standard.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Cabinets.
 - a. For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
 - 2. Cabinet hardware.
- B. Laboratory Test Reports:
 - 1. For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. For composite wood and agrifiber products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, and hardware.
- D. Samples: For cabinet finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For casework.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturer: Lanz Cabinets, 3025 West 7th Place Eugene, OR 97402. Tel: 1-800-788-6332.
- B. Requests for substitutions will be considered in accordance with provisions of Section 12500, "Substitution Procedures".

2.2 CABINETS

- A. Cabinet Style: Face frame.
- B. Face Style: Reveal overlay.
- C. Face frames: 3/4-by-1-5/8-inch solid wood with glued mortise and tenon or doweled joints.
- D. Exposed sides and backs: 5/8" plywood with oak veneer (face).
 - 1. All Exterior exposed surfaces to be oak.
- E. Concealed sides and backs: 1/2" hardwood plywood.
- F. Bottom shelf: 5/8" MDF or plywood, edge-banded.
- G. Intermediate shelves: Edge faced 5/8" plywood or 5/8" MDF for fixed shelving up to 36" span. Conform adjustable shelving to KCMA Cabinet Standards for span.
- H. Door and Drawer Fronts: 1/2-inch-thick, veneer-faced plywood.
 - 1. Alternate (contractor must obtain written from Architect prior to bidding): Solid-wood stiles and rails, 3/4 inch thick, with 1/4-inch-thick, veneer-faced plywood center panels.
- I. Breadboards: 3/4" plywood with wood strip type pull to match face frames.
- J. Toe base: 4" toe of 5/8" material to match exposed faces. Standard mitered finish end. Edge-band exposed top edge.

2.3 CABINET MATERIALS

A. General:

1. Adhesives and Composite Wood and Agrifiber Products: Do not use products that contain urea formaldehyde.
2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Hardwood Lumber: Kiln dried to 7 percent moisture content.
5. Softwood Lumber: Kiln dried to 10 percent moisture content.
6. Hardwood Plywood: HPVA HP-1; made with adhesive containing no urea formaldehyde.
7. MDF: ANSI A208.2, Grade MD; made with binder containing no urea formaldehyde.

B. Exposed Materials:

1. Exposed Wood Species: Oak; Maple.
 - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: As selected by Architect from manufacturer's full range.
2. Finish exposed cabinet bottoms 48" or higher A.F.F. to match faces.
3. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
4. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.
 - a. Alternate (contractor must obtain written approval from Architect prior to bidding): MDF, Grade MD.

C. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces or stained to be compatible with exposed surfaces.
2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces or stained to be compatible with exposed surfaces.

D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; or MDF.

2.4 CABINET DIMENSIONS

A. Base cabinets:

1. Minimum depth: 23-1/2 inches.
2. Height at Standard units: 35 inches.
3. Height at Disabled accessible locations: 33 inches.

B. Upper cabinets:

1. Minimum depth: 11-1/2 inches.
2. Height: Size cabinet so that space between top of cabinet and ceiling does not exceed 12 inches.
3. Cabinets over ranges: clearances per manufacturer's recommendations.

2.5 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as indicated by manufacturer's designations.
- B. Pulls: Rear-mounted decorative pulls.
 1. Disabled accessible locations: Install 4-inch pulls at all drawer and door fronts per ADAAG section 309.8. Operable parts shall be placed within one or more reach ranges, specified in 308.
- C. Hinges: Concealed butt hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.
 1. Drawer guides to be bottom mounted. Upgrade standard option as required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install cabinets level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Manufacturer and install cabinets in accordance with Americans with Disabilities (ADA) Standards of Accessible Design or state building code, whichever is more stringent, as indicated on Drawings.
- E. Fasten cabinets to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
- F. At the cabinet above a cooking appliance, provide a minimum vertical clearance of 30-inches from top of range to underside of cabinet.

3.2 ADJUSTING AND CLEANING

- A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including high-pressure decorative laminate.
 - 1. For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
- B. Laboratory Test Reports:
 - 1. For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. For composite wood and agrifiber products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- D. Samples:
 - 1. Plastic laminates, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

- A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates/ WI Certified Compliance Program certificates.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program/ Licensee of WI's Certified Compliance Program.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops 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.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
 - 1. Provide labels and certificates from AWI WI certification program indicating that countertops comply with requirements of grades specified.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Formica Corporation.
 - b. Lamin-Art, Inc.
 - c. Panolam Industries International, Inc.
 - d. Wilsonart International; Div. of Premark International, Inc.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Wood grains, matte finish.
 - c. Patterns, matte finish.
- E. Edge Treatment: Continuous from horizontal cladding (rolled front).
- F. Core Material at Sinks: Particleboard made with exterior glue; medium-density fiberboard made with exterior glue; or exterior-grade plywood.
 - 1. Made with binder containing no urea formaldehyde.
- G. Core Thickness: 3/4 inch.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
 - 3. Softwood Plywood: DOC PS 1.

2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.
- B. VOC Limits for Installation Adhesives and Sealants: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Multipurpose Construction Adhesives: 70 g/L.
 - 3. Structural Wood Member Adhesive: 140 g/L.
 - 4. Architectural Sealants: 250 g/L.

2.4 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.

- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
- C. Field Jointing: Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.
 - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to walls with adhesive.
 - 3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

END OF SECTION 123623.13

16 01 00

BASIC ELECTRICAL REQUIREMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section provides the Basic Electrical Requirements, and apply to all Sections in Division 16.
- B. Related Work:
 - 1. Excavating, Backfilling and Compacting for Utilities.
 - 2. Cast-in-Place Concrete.

1.02 BASIC ELECTRICAL REQUIREMENTS

- A. Quality Assurance: Electrical work shall be done by an Electrical Contractor holding a C-10 and other licenses and permits required.
 - 1. See other sections of these specifications for other qualification requirements.
- B. Drawings and Specifications Coordination:
 - 1. For purposes of clearness and legibility, Electrical Drawings are essentially diagrammatic. Size and location of equipment is indicated to scale whenever possible. Contractor shall verify all conditions, data and information as indicated on Drawings and in Specification Sections where Electrical work is required.
 - 2. Electrical Drawings indicate required size and points of termination of conduits, number and size of wires, and suggest proper route for conduit. It shall be responsibility of Contractor to install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and meet all applicable code requirements. Routing of conduits may be changed, if approved by the District Electrical Inspector, if the length of any conduit run is not increased or decreased more than 10% of length indicated on Drawings.
 - 3. It is intended that outlets be located symmetrical with Architectural elements notwithstanding fact that locations indicated on Drawings may be distorted for clarity.
 - 4. Architectural and Structural Drawings take precedence over Electrical Drawings in representation of general construction work. Drawings of various trades take precedence in representation of work of those trades. Contractor shall refer to all Drawings to coordinate the Electrical work with work of other trades.
- C. Terminology:
 - 1. Term "signal system" shall apply to clock, bell, fire alarm, annunciator, sound, public address, buzzer, public telephone, television, inter-communication, and security systems.
 - 2. Term "low voltage" shall apply to systems operating at 600 volts and under.
 - 3. Term "provide" used on Drawings and elsewhere in the Specifications shall be considered to mean, "furnish and install".
 - 4. Term "UL" means Underwriters Laboratories Inc.
- D. Regulations:
 - 1. Electrical work shall meet requirements of the authorities having jurisdiction and the California Building Code, latest Edition. Also shall meet the requirements from any amendments provided by the local authorities. Material and labor shall conform to Regulations of the National Board of Fire Underwriters for Electrical Wiring and Apparatus. All material shall be new and shall be "UL" listed.
- E. Structural Considerations for Conduit Routing:
 - 1. Where conduits are to pass through or will interfere with any Structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, to accommodate the electrical work, such work shall conform to State Building Code, Part 2, Title 24, Section 1906 for conduits and pipes embedded in concrete and Section 2326.11.9 and 2326.11.10 for notches and bored holes in wood; for steel, as detailed on the Structural Drawings.
 - 2. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall, rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes, pull boxes, vaults and buildings.
 - 3. Holes required for conduit entrances into speaker poles, floodlight poles or other poles, shall be drilled and conduit nipple or coupling shall be welded to poles. Welds shall be by the electric arc process and shall be continuous around nipple or coupling.
- F. Electrically Operated Equipment and Appliances:
 - 1. Equipment and Appliances Furnished by Contractor:

- a. Electrical work shall include furnishing and installing wiring enclosures for, and the complete connection of all electrically operated equipment and appliances and any electrical control devices, which are specified to be furnished and installed in this, or other Electrical Sections of these Specifications, except Electrical work specified or indicated to be in the Mechanical work. All wiring enclosures shall be installed concealed except where exposed work is indicated on Electrical Drawings.
- b. Connections shall be made as necessary to completely install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets of incorrect Electrical characteristics or if any equipment fails to operate properly, Contractor shall report to the District's Inspector in writing, listing buildings and rooms in which located, the name, make and serial number of equipment, and a description of defect.
2. Equipment and Appliances Furnished by Others:
 - a. Equipment and appliances indicated on Drawings as N.I.C. (Not in Contract), "Furnished by Others", will be delivered to the Site. Required Electrical connections shall be made for all such equipment and appliances in accordance with accepted trade practices under direction of the Electrical Inspector. All motorized equipment will be furnished factory wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
 - b. Connections to equipment furnished under other Sections of this Specification shall be part of the Electrical Work. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and other Sections of this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push button stations, selector switches conduit, junction boxes, and wiring necessary for a complete Electrical installation. Work shall also include furnishing and installing conduit and boxes, for HVAC control system, furnished under Mechanical. Devices and equipment furnished shall be of same type used elsewhere on job or as specified.
 - c. Electrical equipment furnished under other Sections of this Specification for installation and connection under work of this Section shall be delivered to the installation location by the Contractor furnishing the equipment.
 - d. Mechanical equipment furnished under other Sections of this Specification, and requiring Electrical connection under this Section, will be set in place by Contractor furnishing equipment.
 - e. Suitability and condition of equipment furnished by other Sections of this Specification shall be determined in advance of installation. Immediate notice of damage, unsuitability or lack of parts shall be given to the Architect.
- G. Protection of Materials
 1. Provide for safety and good condition of all materials and equipment until final acceptance of project by the Owner representative.
 2. Protect all materials and equipment from damage and provide adequate and proper storage facilities during progress of work. All damaged and defective work shall be replaced prior to final inspection.
- H. Cleaning
 1. Exposed parts of electrical work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
 2. Thoroughly clean all parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and all corners and cracks scraped out. Exposed rough metal work shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
 3. Contractor shall remove from the Site all debris and rubbish caused by the electrical work. He shall thoroughly clean building of dirt, debris, rubbish, marks, etc., caused by performance of work.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Consult with the owner representatives before starting work.
- B. All exposed conduits, raceways and boxes shall be painted to match the surfaces adjacent to installation. Refer to Section 09900: Painting.

- C. All existing materials removed from buildings shall be removed from site as directed by owner's representative.
- D. Coordinate electrical work with the work of other trades.
- E. All trenches outside of barricade limits shall be backfilled and paved no later than 72 hours after being opened. During the time that trenches are open in traffic areas. The Contractor shall provide traffic plates.
- F. Where existing structural walls are cored for new conduit runs, separation between cored holes shall be three inches from new or existing holes, unless directed otherwise by structural engineer.
- G. All electrical equipment shall be braced or anchored to resist a horizontal force acting in any direction using the following criteria:
 - 1. Fixed Equipment on Grade 20% of operating weight
 - 2. Fixed Equipment on Structure 30% of operating weight
 - 3. Emergency power and Communication Equipment on Grade 40% of operating weight
 - 4. Emergency power and Communication Equipment on Structure 60% of operating weight
 - 5. Flexible mounted equipment use 2x the above values.
Simultaneous vertical force use 1/3x horizontal force. Where anchorage details are not indicated on drawings, the field installation shall be subject to approval of Structural Engineer.
- H. Nothing in this disclaimer affects, in any way, the duty of the Contractor to furnish accurate "As Built" Drawings after completion of the contract. These shall be provided on a disk format on AutoCAD release 2008, and two sets of a hard copy.
- I. When trenching for new underground conduits, exercise care to avoid damage to existing underground utilities. Contractor shall scan the site to determine the location of existing underground pipes, conduits and structures. Contractor must make allowances in the bid for avoiding damage to existing underground piping, conduit and structures and to adjust the routing of new underground conduits and location of new underground pull boxes, vaults and maintenance holes.

END OF SECTION

16 05 00

BASIC BOX AND OUTLETS MATERIALS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Boxes, Enclosures, Keys and Locks.
 - 2. Receptacles and Switches.
 - 3. Identifications and Signs.
- B. Related Work: Basic Electrical Requirements; Section 16010.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01340.

PART 2 PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

- A. Outlet Boxes and Fittings:
 - 1. Outlet boxes used in concealed work shall be galvanized steel, pressed or welded type, with knockouts.
 - 2. In exposed work, outlet boxes and conduit fittings required where conduit runs change direction or size, shall be cast metal with threaded cast hubs cast integral with box or fitting. Boxes and fittings shall not have unused spare hubs except as otherwise indicated or specified.
 - 3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium plated or zinc galvanized. Castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal, and shall be free of cracks, gas holes, flaws, excessive shrinkage and burnt-out sand.
 - 4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for particular fitting used.
 - 5. Light fixture outlets shall be 4" octagon, 4" square, and 2 1/8" deep or larger, depending upon number of wires or conduits therein, and shall be equipped with 3/8" malleable iron fixture studs, and plaster rings. Plaster rings shall have round opening with 2 ears drilled 2-23/32" center to center.
 - 6. For local switch outlets use 4" square 2 1/8" deep, boxes for single gang, 5" square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than 2 switches. Provide barrier between normal power circuits and emergency circuits. Provide 600V rated separation between switches controlling circuits with a line to neutral voltage of 277V or more.
 - 7. For all receptacle, clock, bell, fire alarm pull station, speaker, thermostat, telephone, and data outlets, use 4" square, 2 1/8" deep boxes or larger, if necessary, with single gang plaster rings. For television outlets, use 4-gang deep boxes and 4-gang plaster rings.
 - 8. Plaster rings shall be provided on all flush mounted outlet boxes except where otherwise indicated or specified. All plaster rings shall be same depth as finished surface.
 - 9. In existing plywood wall or drywall construction, and where flexible steel conduit is fished into walls, one-gang and two-gang outlets for wiring devices may be sectional steel boxes with plaster ears. Boxes shall be fastened to plywood with a flat head screw in each plaster ear screw hole. Boxes fastened to gypsum board shall be "Gripsite" by Raco or equal.
 - 10. Factory made knockout seals shall be installed to seal all box knockouts, which are not intact.
 - 11. At each location where flexible conduit is extended from a flush outlet box, provide and install a weatherproof universal box extension adapter.
- B. Junction and Pull-Boxes:
 - 1. Junction and pull-boxes, in addition to those indicated, shall only be used where necessary in each case.
 - 2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps; spot welded, and shall be rigid under torsion and deflecting forces. Boxes shall have auxiliary angle iron framing where necessary to ensure rigidity. Covers shall be fastened to box with a sufficient number of brass machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws at Site if boxes are not installed plumb. All surfaces of pull and junction boxes and covers shall be given one coat of metal primer, and one coat of aluminum paint.
 - 3. Weatherproof pull and junction boxes shall conform to foregoing for interior boxes with following modifications: Cover of flush mounting boxes shall have a weather-tight gasket cemented to and trimmed even with cover all around. Surface or semi-flush mounting pull and junction boxes shall be UL

approved as rain-tight and shall be complete with threaded conduit hubs. All exposed portions of boxes shall be galvanized and finished with a prime coat and coat of baked-on grey enamel.

4. All junction and pull-boxes shall be rigidly fastened to the structure and shall not depend on conduits for support.
 5. Underground Concrete Pull Boxes:
 - a. Pre-cast Concrete Pull Boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 Traffic bridge loading, and Pre-cast concrete. Pull boxes shall consist of a base section, top ring and cover. Base section shall have two 10"x10" knockouts in each wider side, and one 20"x 20" knockout in each shorter side. All pull boxes shall have a minimum of 6" diameter sump knockout, and 1" diameter ground rod knockout. In each pull box, furnish and install cable racks on walls. Each rack shall be equipped with 3 porcelain cable holders on a vertical steel mounting bar. Each pull box shall have 3/4" diameter pull irons. Covers shall be traffic-type consisting of steel safety plate bolted to frame. Covers shall be marked "Electrical", "Power" "Telephone", "Signal" or "Ground", as required. Pull boxes shall be as manufactured by Quickset, or approved equal.
 - b. Provide end bells in all duct entrances. Terminate each metal conduit with insulated bushing having grounding terminal, O.Z. Type "Big".
 - c. Place pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.
 - d. Install a floor drain in every concrete pull box into a sump containing 10 cubic feet of 1" crushed rock; minimum size 48" deep and 36" diameter. Provide 36" length of tile pipe extending down into the sump. Provide a grille over the top opening of pipe.
 - e. Install a 3/4" diameter, 10'-0" copper weld steel ground rod in every power concrete pull-box. Locate near a wall with 6" projection above floor for ground clamps. Permanently and effectively, ground all metal equipment cases, cable racks, etc., in all pull boxes.
 - f. Provide a 6" deep sand base under each pull box.
 - g. Identify all power and signal cables by tagging in all manholes and pull boxes. Tie securely to cables with nylon cord or insulated type TW wire. Tie so that turns of wires do not form a closed electrical circuit.
 - h. Top of steel plate shall have a minimum coefficient of static friction of 0.5 for either wet or dry conditions, when tested for any shoe sole material. Testing and certification of the friction factor shall be conducted by an independent testing laboratory approved by the engineer, under the direction of a registered Civil or Quality Engineer. Testing shall conform to ASTM D1047 or F489 or F609, or other procedure approved by the Engineer.
 6. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Quickset, or approved equal.
 7. Manholes, vaults and pull-boxes required by utility company, shall be provided and installed by Electrical Contractor. Contractor shall contact these utility companies (SCE, SBC and cable television) to obtain all requirements before submitting their bid. Installation and boxes shall meet all requirements of utility company.
- C. Floor Outlets:
1. All floor outlets except extension outlets, shall be Harvey Hubbell Inc. #B-2503, adjustable, cast iron, watertight floor boxes with flush brass floor plates, and shall be set to finish flush with final floor covering, whether it be concrete, wood, resilient floor covering, or other.
 2. Telephone above floor outlets shall be equipped with a Harvey Hubbell Inc. #SC-3098 pedestal with #SS309B plate.
 3. Plug above floor outlets shall be equipped with a brass 2-1/8" flush cap and a shallow brass extension with 2 back-to-back, 15 ampere, 125 volt, grounding type receptacles, Harvey Hubbell Inc. #SC-3092.
 4. Extension floor outlets shall be cast iron floor boxes with cast iron cover and 1/2" offset entry, for above-floor conduit extension; Harvey Hubbell #F3186. Boxes shall be designed to permit access to wiring without disturbing above-floor extension, and shall be set flush with finish floor.
 5. Above floor service, fitting for surge suppression receptacles shall be equal to Hubbell Cat. No. SC3098 with cover plate SS309DS.
 6. Above floor service, fittings for data outlets shall be equal to Hubbell Cat. No. SC3098 with required cover plate.
- D. Floor Pockets:
1. Three-Gang: Three-gang floor lighting pockets shall be flush floor type, with cast iron floor plate and hinged cast iron door notched for cables. Three-gang floor pockets shall be C.W. Cole TLS-353-6 for wood floors and C.W. Cole TLS-353-6-C for concrete slabs. Each floor pocket shall contain three 20 ampere, 3 wire, and 125-volt receptacles with matching caps.
 2. Single Gang:
 - a. Receptacle floor pockets shall be single gang, flush floor type, with cast iron floor plate, hinged cast iron door notched for cable and cast iron box; Cole #TLA-362-1-FE. Equip each pocket with a standard, single grounding type receptacle unless otherwise indicated. Use C.W. Cole #TLS-362-1, in wood floors.

- b. Microphone or projector floor pockets shall be single gang flush floor type with cast iron floor plate, hinged cast iron door, notched for cable and cast iron box, C.W. Cole #TLA-362-3-FE. Use C.W. Cole #TLS-362-3, in wood floors.

E. Keys and Locks:

1. Contractor shall provide 2 keys with each door lock furnished, including cabinet door locks, switchboard locks, etc.; and shall provide 2 keys for each lock switch on a switchboard or control panel; and shall provide 2 keys with each interlock or other lock switch furnished. Deliver keys to the Owner's representative.
2. Locks shall be keyed to a Corbin 60 key for access to operate equipment and Corbin 70 key for service access. Special keys and locks shall be provided where specified.

2.02 RECEPTACLES AND SWITCHES

A. Receptacles:

1. Duplex receptacles shall be specification grade, 15 amperes or 20 amperes if dedicated circuit, 125 volts, 3 wire, side wired with binding screws, parallel slots, U-ground, plaster ears and captive mounting screws. Body shall be phenolic, plastic or bakelite. Receptacles shall be heavy duty, 3 blade current carrying contacts and doublewide flat blade ground contacts. Receptacles shall be Arrow-Hart 5242-I, Hubbell 5242-I or Leviton 5242-I.
2. Single receptacles shall be specification grade, grounding type, side wired, with binding screws, receptacles shall have standard size ivory bakelite base. For circuits consisting of one single receptacle only, ampere rating of receptacle shall be the same as circuit breaker or fuse. 15 ampere, 125 volt receptacles shall be NEMA 5-15R, Arrow-Hart 5251-I. 20 ampere, 125 volt receptacles shall be NEMA 5-20R, Arrow-Hart 5721-I.
3. Ground fault interrupter type receptacles shall consist of a single receptacle and reset device manufactured in a standard configuration for use with a duplex plate. Receptacles shall be feed-thru, 20 ampere, NEMA 5-20R, ivory in color and shall be Leviton 6399-I. Exterior mounted receptacles shall be weatherproof.
4. Weatherproof receptacles shall, except where otherwise indicated or specified, consist of a duplex receptacle as specified herein and a metal plate with die cast hinged lid and weatherproof mat, Arrow-Hart #5252-WP.
5. Surge suppression receptacles for electronic and computer equipment shall be 15 amp, 125 VAC, NEMA 5-15R, Hubbell #HBL5262S or approved equal. Receptacle shall be blue in color with LED and alarm.
6. Tamper resistant receptacles shall be 15 amps, 125 volts, Hubbell Cat. No. HBLSG62HI, Nema 5-15R.

B. Switches:

1. Local Switches:

- a. Local switches shall be tumbler type, specification grade, rated 20 amperes at 120-277 volts AC only, with plaster ears, binding screws for side wiring, and standard size composition cups which fully enclose the mechanism. Switches shall be approved for use at currents up to the full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80% of the rating for motor loads. Switches shall be single pole, double pole, 3-way, 4-way, non-lock type. Non-lock type switches shall have ivory handles, and switch shall be Hubbell HBL 1221-I single pole, HBL 1222-I double pole, HBL 1223-I 3-way, and HBL 1224-I 4-way.
- b. All lock type switches shall be specification grade, 20 Amp, 120-277 volts and shall have metal or nylon key guides with ON/OFF indication, and shall be operable by the same key. Keys for lock type switches shall be Hubbell Cat. No. HBL 1209. Key switches shall be Hubbell HBL1221-L single pole, HBL1222-L double pole, HBL1223-L three-way, and HBL1224-L four-way or approved equal.
- c. Rotary lock switches shall incorporate a tumbler type lock to prevent unauthorized operation. Lock shall be tumbler type by P & F Corbin, keyed to a HH41 key. Lock switch shall be installed with pin tumblers facing downward. Key shall be removable in all positions. Each device shall be complete with 2 keys. Keys shall be delivered only to the Owner's representative. Switches shall be rated at 20 amperes, 120-277 volt AC. Switches shall be as follows: single pole switches shall be Arrow-Hart 1191; double pole switches shall be Arrow-Hart 1192; 3-way switches shall be Arrow-Hart 1193. Switch plates shall be of stainless steel, engraved with "ON" and "OFF" positions. Switch plates shall be Arrow-Hart 1187. For switch plates of 2 or more gangs, provide special order plates equal to the single gang plate.
- d. Pilot light switches shall be rated 20 amps and shall conform to the specifications for "local switches". The switches shall have red, rugged "Lexan" handles that are lighted by long-lasting neon lamps. Pilot light shall light when load is on. Single pole, 120 volt switches shall be Hubbell HBL1221-PL. Single pole, 277 volt switches shall be Hubbell HBL1221-PL7.
- e. Remote control switches for mechanically held contactors arranged for 3-wire control shall be tumbler type, momentary contact, single pole, 3-position with center "OFF", rated 20 amperes at 120-277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclose mechanism, and ivory handles; Hubbell HBL1556-I.

2. Time Switches and Photo Electric Controls:
 - a. Time switches shall be 7-day solid-state electronic type, capable of fully automatic or manual operation, and shall be housed in a sheet steel enclosure unless built into a panel or switchboard. Contacts shall be rated for 25 amps resistive or inductive-each pole, 240 Vac, 5-amp tungsten or 470 VA pilot duty-each pole 240 Vac. Time switches shall have a non-volatile clock and non-volatile memory and it shall have a built-in rechargeable power carry-over system. Switch shall have a minimum of 15 on/off set points per week. Timing shall be in one minute increments with a minimum on or off time of one minute. Time switch digital display shall show days of week, hour and minute. Display shall have a load status light to indicate when equipment is in operation. Time switch shall be equal to Lighting Control and Design GR2400 series. Follow drawings for additional information and requirements.
 - b. For outdoor lighting control, time switches shall be digital with astronomic capabilities. Time switches shall have 365 day with holiday capabilities with 16 single dates and 5 holiday blocks of unlimited duration utilizing 8th and 9th day schedules. Time switch shall have 2 separately controllable relay closure output circuits. Each circuit shall be single pole, double throw, with contacts rating of 10 amps. resistive at 120/250 Vac and 7.5 amp inductive at 120/250 Vac. Time switch shall have 48 events per circuit per week; separate scheduling for each day of week. Time switch shall have user selectable daylight saving or standard time, automatic leap year correction, and 72 hour memory backup with rechargeable battery. Time switch shall be Lighting Control and Design GR2400 series. Follow drawings for additional information and requirements.
 - c. Photoelectric Control: Photoelectric control shall be rated 2000 watts, 120V with single pole, single throw, and normally closed contact, enclosed in a die-cast aluminum gasketed enclosure with 1/2" conduit fitting, equal to Tork Series 2100.
3. Telephone Dialers For Elevators:
 - a. Dialer shall be equal to Viking Electronics, Inc. Model No. K-1500-4 with PG-1 Programmer one number dialer.
 - b. Dialer shall be installed in Elevator Machine Room and shall be plugged-into RJ-11 jack. Provide connection to telephone backboard for dedicated line.
- C. Hand and Hair Dryers
 1. Hand and hair dryers shall be U.L. listed; shall be for surface mounting, 1725 watts, 120 volts with an induction type motor. Cover shall be one piece, heavy duty, rib reinforced, 0.25" thick tamper proof cast iron. Cover shall be unbreakable and fitted with 360° revolving solid die cast zinc alloy nozzle. Cover shall be finished in the highest quality acid-resistant porcelain enamel. The nozzle shall be bright chrome-plated. See architectural documents for specifications of hand dryers.
 2. The dryer shall be equipped with an infrared sensor, which will allow the dryer to start automatically when the hands are placed underneath the air nozzle, and to stop automatically when the hands are removed.
 3. Component parts shall be guaranteed to be of free of defects in material or workmanship for a period of ten years.
- D. In all restrooms and toilets where new sensor operated urinals and water closets flush meters are installed, furnish and install required wiring to each 120 VAC-24AC, 50 VA transformers supplied with each flush meter. See plumbing drawings for locations where they are required. Provide dedicated circuit 120V for each bathroom.

2.03 IDENTIFICATION AND SIGNS

- A. Identification Plates:
 1. Following equipment shall be provided with identifications plates unless otherwise specified: switchboards, unit substations, motor control centers, control panels, push button stations, time switches, contactors, motor starters, motor switches, panel boards, and terminal cabinets.
 2. Identification plates shall adequately describe function, voltage and phase of particular equipment involved. Where identification plates are detailed or described on Drawings, inscription and size of letters shall be as indicated. For lighting and power panels, identification plates shall indicate panel designation, voltage and phase of panel. For terminal cabinets, identification plates shall indicate system housed therein.
 3. Identification plates shall be black and white nameplate stock of bakelite with characters cut through black exposing white. Plates shall have beveled edges and shall be securely fastened in place with #4 Phillips head, cadmium-plated steel, self-tapping screws. Characters shall be 3/16" high, unless otherwise indicated.
- B. Markings:
 1. Following equipment and controls shall have markings:
 - a. Surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Abbreviations acceptable to the Electrical Engineer of record, along with an identifying number, shall be used. Markings shall be done with locking type stencils using paint of a contrasting color. Figures shall be 3/8" high unless otherwise indicated. Dymo Industries, Inc., self-sticking plastic labels, having embossed characters made with a typewriter, may be used, in lieu of stencils and paint.
- C. Warning Signs:
 1. Provide a warning sign on outside of each door or gate to rooms or enclosures containing high voltage equipment. Signs shall read: "WARNING-HIGH VOLTAGE-KEEP OUT". Lettering shall be 2" high.

2. Provide a warning sign on each high voltage non-load break disconnect and fused cutout (not oil filled). Signs shall read: "DO NOT OPEN UNDER LOAD". Lettering shall be 2" high.
3. Signs shall be of standard manufacture #18 gage steel, with porcelain enamel finish. Letters shall be red on white background.

PART 3 EXECUTION

3.01 BOXES; INSTALLATION AND SUPPORT

- A. Outlet boxes shall be flush with finished surface of wall or ceiling. They shall be plumb and securely fastened to structure, independent of conduit. Except where otherwise indicated, factory-made bar hangers shall be used to support outlet boxes.
- B. Outlet boxes installed in suspended or furred ceilings with steel runner or furring channels shall be supported, except where otherwise indicated, by a Unistrut #P-4000 channel spanning main ceiling runner channels. Each box shall be supported from its channel by a 3/8" 16-threaded steel rod with a Unistrut #P-4008 nut and a Tomic #711-B Adapta-Stud. Rod shall be tightened to a jamb fit with channel and its nut. Box shall be locked to the rod by means of a 1/2" locknut on stud and a 3/8" 16 hex nut-locking stud to rod.
- C. Heights of outlets and equipment indicated on Drawings shall govern, but absence of such indications, following heights shall be maintained, (Heights are to centerline unless otherwise noted):
 1. Wall mounted telephone, light switch, other switches, and fire alarm pull stations: 48" above finished floor.
 2. Bell outlets in corridors: 12" below ceiling.
 3. Clock, speaker, and bell outlets in classrooms and offices: 8'-0" above finished floor.
 4. Fire alarm strobe lights: 80" to bottom of light above finished floor
 5. Outside bell and yard light outlets: 4'-0" above second floor level for 2 or more story buildings, 12" below top plate level for one-story buildings without covered porch or arcade, and 12" below covered porch and arcade ceilings.
 6. Desk telephones, receptacle outlets and data outlets: 15" above finished floor.
 7. Panel boards and terminal cabinets: 6'-6" to top above finished floor.
 8. Television outlets shall be located at a height corresponding to location of TV monitor, or a minimum of 15" above finished floor.

3.02 PLATES

- A. Provide a plate on each new switch, plug, pilot light, data, interphone, public telephone, and television outlet, and on existing and reset outlets where so indicated. Plates shall be of stainless steel unless otherwise specified.
- B. Flush wiring device and signal system outlets indicated to be blank covered, shall be covered with blank stainless steel plates. Flush lighting outlets to be capped shall be covered with Wire mold # 5736 steel covers, painted to match the surrounding finish. Surface-mounted outlets indicated to be capped shall be covered with blank stainless steel covers.
- C. Switch and receptacle plates shall be provided with engraved designations under any one of following:
 1. Three gang and larger gang switches.
 2. Lock switches.
 3. Pilot Switches.
 4. Switches so located that operator cannot see one of the fixtures or items for equipment controlled with his hand on the switch.
 5. Switches not in same room with fixtures or items of all unit heaters, air curtains, fly fans, etc.
 6. Receptacles operating at other than 120 volts.
 7. Switches operating on 277 volts.
 8. Where indicated on Drawings.
- D. Designations shall be as indicated on Drawings or as specified and shall be engraved in plates with 3/16" high block type letters filled with black enamel. Where designations are not indicated or specified they will be given after Contract is awarded. For estimating purposes, they may be assumed not to exceed more than 10 letters per gang.

3.03 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

- A. Switchboards, motor control centers, transformers, panel boards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus used for operation or control of circuits, appliances or equipment, shall be properly identified by means of descriptive nameplates or tags permanently attached to apparatus or wiring.
- B. Nameplates shall be engraved laminated bakelite or etched metal. Shop drawings with dimensions and format shall be submitted to the Architect before installation. Attachment to equipment shall be with escutcheon pins, rivets, self-tapping screws or machine screws. Self-adhering or adhesive backed nameplates are not acceptable.

- C. Tags shall be attached to feeder wiring in conduits at every point where runs are broken or terminated, and shall include pull wires in empty conduits. Circuit, phase and function shall be indicated. Branch circuits shall be tagged in panel boards and motor control centers. Tags may be made of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.
- D. Cardholders and cards shall be provided for circuit identification in panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to inside of panel door. List of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit, area, and connected load.
- E. Junction and pull boxes shall have covers stenciled with box number when indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.
- F. Name shall be correctly engraved with a legend indicating function or areas, when required by Codes, or indicated on Drawings

END OF SECTION

16 11 00

RACEWAYS, FITTINGS AND SUPPORT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Includes:
 - 1. Raceways.
 - 2. Conduit Installation.
- B. Related Work:
 - 1. Basic Electrical Requirements.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01340.

PART 2 PRODUCTS

2.01 RACEWAYS

- A. Conduit Materials:
 - 1. Metallic conduit and tubing shall be manufactured under supervision of UL, Factory Inspection and Label Service Program. Each 10'-0" length of conduit and tubing shall bear UL label and manufacturer's name.
 - 2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc coated with an inside and outside protective coating. Couplings, elbows, bends, and other fittings shall be same materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type.
 - 3. Electrical metallic tubing shall be steel tubing, zinc coated with a protective enamel coating inside. Fittings, couplings, and connectors shall be gland compression type. Electrical metallic tubing is designated hereinafter as "EMT".
 - 4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips. Connectors and couplings shall be approved fittings of type, which thread into convolutions of flexible conduit.
 - 5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction with a smooth moisture and oil proof, abrasion-resistant, extruded plastic jacket. Connectors shall be approved for use with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
 - 6. Nonmetallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL re-examination service, and shall bear the manufacturer's listed marking.
- B. Sleeves for Conduits: Sleeves shall be adjustable type, of #26 gage-galvanized irons, Adjustor Crete Co., Adjust-to-Crete, or Jet Line Products Inc., Jet-Line.
- C. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, Contractor shall provide O-Z/Gender type FSK Thru Wall and Floor Seal.
- D. Expansion Joints: Where conduits embedded in masonry or concrete cross-seismic separations between buildings, expansion joints, or at locations indicated, Contractor shall provide a sliding or a sliding and deflecting fitting, as conditions require, in each conduit. Sliding fittings shall be O-Z Electrical Mfg. Co. Inc. Type AX, with bonding strap and clamps. At exterior locations, use O-Z Electrical Mfg. Co. Inc. Type EX.
- E. Conduit Seal Fittings:
 - 1. Provide conduit seal fittings where indicated on the Drawings. All conduit seals shall be of rigid galvanized steel. Seals in horizontal runs shall be Appleton Type ESU or Crouse Hinds Type EYS. Seals in vertical runs shall be Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain.
 - 2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are used in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.
- F. Surface Metal Raceway:
 - 1. Provide surface metal raceway as indicated on Drawings and paint to match surfaces where installed. Surface raceway shall be by Wire mold or approved equal, unless otherwise indicated. Provide toggle bolts or red head anchors to support surface raceway, plastic anchors are not acceptable. Single

pole switch box shall be 4-1/8" long by 2" wide by 1-3/8" deep, by Wire mold. Wire mold type bushings shall be installed at end of Wire mold run.

2. Surface raceway for single circuit outlets shall be 3 wires, grounded with outlets spaced 12" on center, Wire mold 20GB512. Two-circuit outlet surface raceway shall be 4 wires, grounded, with outlets wired alternately spaces 18" on center, Wire mold 20GBA618.
- G. Wire ways: Wire ways shall be #16 gages galvanized steel enclosed hinge/screw wiring troughs, surface metal raceway, wire way and auxiliary gutter designed to house electrical wiring. Wire way fittings shall have removable covers and sides to permit complete lay-in of conductors throughout entire wire way run. Cover shall have keyhole slots to accept captive screws locking the cover securely closed. Wire ways shall be Underwriters Laboratories listed and shall be equal to Square D type LDG Neman Type 1 enclosure, or type RD Neman Type 3R enclosure.
- H. Penetration in Fire Rated Structures: Provide 3M caulk and fire barriers for making fire rated seals around penetrations through floors, walls, and elevator shafts. Fire stop system must be UL classified for through-penetration applications of metallic conduits and bus ways.
- I. Pull Wires: A 1/8" polypropylene cord shall be installed in each empty conduit. Underground service conduits shall include pull cords, as required by utility company.

PART 3 EXECUTION

3.01 CONDUIT INSTALLATION

A. General Requirements:

1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for all systems of electrical wiring including lighting and power, and signal systems, except as otherwise specified.
2. Within buildings EMT may be used in lieu of rigid metallic conduit where permitted by ordinance. EMT shall not be used in the following cases: in concrete; underground; outdoor; below 6'-0" above finished surface; where subject to damage; in runs longer than 100'-0"; where conduit size is 1-1/4" or greater; in boiler rooms; underground parking garages; in equipment rooms.
3. Within buildings flexible steel conduit may be used in lieu of rigid steel conduit where permitted by ordinance. Flexible steel conduit shall not be used in the following cases: For runs longer than 50'-0"; at exposed conduits; where conduit size is 1-1/4" or greater.
4. Liquid-tight flexible steel conduit shall be used, except where otherwise specified, for final connection of all motor terminal boxes, Shop equipment, Cafeteria equipment, HVAC equipment and other equipment, and shall be of sufficient length (not to exceed 36") to allow full travel or adjustment of motor on its base.
5. Connectors for flexible metal conduit shall be the type, which threads into convolutions of conduit.
6. Connectors for watertight flexible metal conduit shall be approved for such use and shall be installed to make a watertight connection.
7. All exposed conduit shall be run vertically and horizontally following general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to equipment with suitable iron brackets and one hole pipe straps.
8. If connection is from a flush wall-mounted junction box, install a weatherproof universal box extension and adapter and extend with rigid steel conduit to motor starter or junction box on equipment.
9. Underground feeder distribution conduits for all systems may be nonmetallic conduit in lieu of rigid conduit except where otherwise specified or indicated.
10. Conduit shall be concealed unless otherwise indicated. Conduits exposed to view, except those in attic spaces and under buildings, shall be installed parallel or at right angles to structural members, walls, or lines of building. Conduits shall be routed to clear access openings.
11. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance except for underground conduits, for public telephone conduits, and where otherwise indicated or specified. Bends and offsets shall be made with standard tools and equipment made especially for purpose or may be factory made bends or elbows complying with requirements for radius of bend specified herein. Public telephone conduit bends and offsets shall have a radius, which is not less than 10 times trade size of conduit unless otherwise approved by Telephone Company. Refer to "Underground Conduit Installation" for radius of bends and offsets required for underground installations.
12. Running threads will not be permitted. Provide approved conduit unions where union joints are necessary. Conduit shall be kept at least 6" from covering on hot water and steam pipes and 18"

- from flues and breechings. Open ends of conduits shall be kept closed with approved conduit seals during construction of buildings and during installation of underground systems.
13. Joints in conduits installed in concrete, in wet location, exposed to weather or underground shall be made liquid tight. Conduit threads shall be filled with approved pipe joint compound before screwing into couplings and threaded fittings.
14. Where conduits are terminated in groups at panel boards, switchboards and signal cabinets, etc., provide templates or spacers to hold conduits in proper position and to preserve alignment. Conduits terminating at signal cabinets shall enter cabinets in following approved locations only: Conduits entering top, side, and bottom of cabinets shall be aligned in a single row, centered 2" from rear of cabinet; conduits entering back of cabinet shall be aligned in a single row centered 2" from top of cabinet. Conduits shall not be spaced closer than 3" on centers.
15. 1" and smaller conduits above metal lath ceilings shall be tied to ceiling channels. 1-1/4" conduits above metal lath ceilings shall be rigidly suspended with pipe hangers or pipe racks or shall be secured to superstructure with factory made pipe straps. Conduits in metal lath or steel stud partitions shall be tied to furring channels or studs. In ceiling spaces and in partitions, tie wires shall be spaced not more than 5'-0" apart, shall hold conduit tight against channels and studs at point of tie and shall not bear any of weight of conduit. Tie wire shall be #16 gage galvanized double annealed steel tie wire.
16. Where auxiliary supports, saddles, brackets, etc., are required to meet special conditions they shall be made rigid and secure before conduit is attached thereto.
17. Conduit in ceiling spaces, in stud walls and under floors shall be supported with factory made pipe straps or shall be suspended with pipe hangers or pipe racks. Pipe straps shall be attached to and shall hold conduit tight at point of support against ceiling and floor joists, rafters, and wall studs, or 2" x 4" headers fitted between joists or wall studs.
18. Conduits installed on exposed steel trusses and rafters shall be fastened with factory made conduit straps or clamps, which shall hold conduit tight against supporting member at point of support.
19. Conduits under buildings shall be strapped with factory made conduit straps to underside of concrete floor or joists, or wood floor joists, or shall be suspended with pipe hangers or pipe racks. Conduits under building shall not rest on ground but shall be suspended from building or shall be buried below surface of ground. 1" and larger conduits under buildings shall be suspended with conduit hangers or racks.
20. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. Pipe ring shall be malleable iron, split and hinged, and shall securely hold conduit, or shall be spring able wrought steel. Rings shall be bolted to or interlocked with suspension rod socket. Rods shall be 3/8" for 2" conduit hangers and smaller and shall be 1/2" for 2-1/2" conduit hangers and larger.
21. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapeze type and shall consist of a cross channel, Steel City Kindorf #B-900, Unistrut #P-1000 suspended with a 3/8" minimum diameter steel rod at each end.
22. Each rod shall be fastened with nuts, top and bottom to cross channel and with a square washer on top of channel. Each conduit shall be clamped to top for cross channel with conduit clamps, Steel City Kindorf #C-105 or Unistrut Nos. P-1111 through P-1124. Conduits shall not be stacked one on top of another, but a maximum of 2 tiers maybe on same rack providing an additional cross channel is installed. Where a pipe rack is to be longer than 18", or if weight it is to support exceeds 500 pounds, submit details of installation to the Architect for approval.
23. Conduits, which are suspended on rods more than 2'-0" long, shall be rigidly braced to prevent horizontal motion or swaying.
24. Factory-made pipe straps shall be one or 2-hole formed galvanized clamps, heavy-duty type, except where otherwise specified.
25. Hangers' straps, rods, or pipe supports under concrete shall be attached to inserts set at time concrete is poured. Under wood use bolts, lag bolts, or lag screws; under steel joists or trusses use beam clamps.
26. Conduits shall be supported at intervals required by ordinance, but not to exceed 10'-0". 1" and smaller conduits installed exposed shall be fastened with one-hole malleable iron straps. Perforated straps and plumber's tape shall not be used in support of conduits.
27. Each conduit stubbed up through a roof or an arcade shall be flashed with a waterproof flashing which shall be constructed of #24 gage galvanized sheet metal or of aluminum not less than .030" thick. Base of flashing shall extend on roof not less than 10" from conduit. Flashing shall extend up conduit not less than 6" and shall be in contact with conduit for 1" at top.

28. Bushings for all sizes of rigid steel conduit shall be threaded insulating type. Setscrew bushings are not acceptable.
 29. All flex conduits shall be cut square and not at an angle.
 30. It shall be responsibility of Contractor to install conduits with a minimum number of bends, and in such a manner as to conform to structure and meet all applicable code requirements.
 31. Routing of conduits may be changed if approved by the Electrical Engineer and Utility Company representative, providing length of any conduit run is not increased or decreased more than 10% of the length indicated on Drawings.
- B. Underground Requirements:
1. All conduits installed underground shall be entirely encased in concrete 3" thick on all sides with multiple conduits spaced not less than 1-1/2" apart, except where otherwise specified. Provide approved conduit spacers as required to prevent any deflection of conduits when concrete is placed and to preserve position and alignment of conduits in concrete. Conduits shall be tied to spacers. Anchors shall be installed to prevent floating of conduits during pouring of concrete. Red concrete shall be used to encase conduits of systems operating above 600 volts.
 2. All underground conduits shall be buried to a depth of not less than 24" below finished grade to top of the concrete envelope, unless otherwise specified on the drawings.
 3. Assemble sections of conduit with approved fittings and stagger all joints. Cut ends of conduit shall be reamed to remove all rough edges. Joints in all conduits shall be made liquid-tight. All bends at risers shall be completely below surface where possible.
 4. Conduits in a common trench shall be separated by at least 1 1/2" of concrete. Electrical power conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking; and clock shall maintain a separation of a minimum of 6 inches from such signal system conduits. Electrical power and signal conduits installed in a common trench with other utility lines such as gas, water, sewer and drain lines shall maintain 12 inches separation from such utility lines.
 5. The Utility company representatives shall be called to site for approvals of all underground installations before and during concrete pour. Mandrel shall be drawn through each run of conduit in presence of the Inspector, before and after pouring concrete. Mandrel shall be 6" in length minimum, and have a diameter that is within 1/4" of diameter of conduit to be tested. Comply with all the utility company's requirements.
 6. Nonmetallic conduit installations shall comply with following additional requirements: All joints in PVC conduit shall be sealed by means of approved solvent-weld cement supplied by conduit manufacturer. All nonmetallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2" to 1-1/2" inclusive shall not be less than 24". All bends at risers and risers shall be rigid steel conduit. Radius of curve of any bend or offset, in nonmetallic conduit for public telephone system shall be not less than 10 times trade size of conduit, unless otherwise specifically approved by public telephone system.
 7. Install a 6" wide, polyethylene, red underground barrier type 12" above full length of concrete "CAUTION ELECTRIC LINE BURIED BELOW".
 8. All underground conduit systems for use by serving utility company shall meet all requirements of utility company.
- C. General Installation Requirements for Signal System Conduits
1. Location of outlet boxes and equipment on drawings is approximate, unless dimensions are indicated.
 2. Drawings shall not be scaled to determine position and routing of wire ways, drops and outlet boxes.
 3. Location of outlet boxes and equipment shall conform to architectural features of the building and other work already in place, and must be ascertained by Contract in the field prior to start of work.
 4. The maximum pulling tensions of the specified cables shall not be exceeded and proper radius of all cable bends shall be maintained.
 5. For computer network wiring, conduit types shall be limited to rigid metal conduit, electrical metallic tubing, schedule 40 PVC, and flexible metallic conduit for lengths less than 6'-0".
 6. No interior section of conduit run shall be longer than 100 feet and contain more than two 90° bends between pull points or pull boxes.
 7. The inside radius of a conduit bend shall be at least 6 times the internal diameter of the conduit. When the conduit size is greater than 2 inches, the inside radius shall be at least 10 times the internal diameter of the conduit. For fiber optic cable, the inside radius of a conduit bend shall be at least 10 times the internal diameter of the conduit.
 - a. Conduit shall be sized as per table 4.4-1 of EIA/TLA-569 standard.

- b. Conduit shall be reamed to eliminate sharp edges and terminated with an insulated bushing.
 - 8. Pull boxes shall not be used for splicing cable.
 - 9. For indoor application, a pull box shall be placed in conduit run where:
 - a. The length is over 100FT.
 - b. There are more than two 90° bends.
 - c. There is a reverse bend in the run.
 - d. Boxes shall be placed in a straight section of conduit and not used in lieu of a bend. The corresponding conduit ends should be aligned with each other. Conduit fitting shall not be used in place of pull boxes.
 - 10. Where a pull box is used with raceway(s), the pull box shall:
 - a. For straight pull through, have a length of at least 8 times the trade-size diameter of the largest raceway.
 - b. For angle and U pulls:
 - 1) Have a distance between each raceway entry inside the box and the opposite wall of the box of at least 6 times the trade-size diameter of the largest raceway, this distance being increased by the sum of the trade-size diameters of the other raceways on the same wall of the box.
 - 2) Have a distance between the nearest edges of each raceway entry enclosing the same conductor of at least:
 - 3) Six times the trade-size diameter of the raceway; or
 - 4) Six times the trade-size diameter of the larger raceway if they are of different size.
 - 5) For a raceway entering the wall of a pull box opposite to a removable cover, have a distance from the wall to the cover of not less than the trade-size diameter of the largest raceway plus 6 times the diameter of the largest conductor.
 - 11. Drawings generally indicate work to be done, but do not indicate all bends, transitions of special fittings required to clear beams, girders or other work already in place. Contractor shall carefully investigate conditions where conduits and wire ways are to be installed, and furnish and install required fittings.
- D. In Slabs on Grade:
- 1. Unless specifically approved by the City Inspector, conduits 1-1/4" size and larger shall not be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, slabs shall be thickened at bottom where conduits occur to provide 3" of concrete between conduit and earth. Required excavation shall be part of work of this Section.
 - 2. If concrete slab is 5" or more in thickness with a moisture barrier plastic sheet between earth and slab, 1" and smaller conduits shall be installed in slab with a minimum of 1" concrete between earth and conduit.
- E. Penetration in Concrete Walls, Beams and Floors: Provide sleeves where conduits pierce concrete walls, beams and floors, except floor slabs on earth. Sleeves shall have 1/2" clearance around conduits. Sleeves shall not extend beyond exposed surfaces of concrete and shall be securely fastened to forms. Where conduits pass through walls below grade, caulk with approved sealant and backer materials between conduit and sleeve to obtain a watertight joint. Sealant shall be as indicated in Section 07920: Sealant and Caulking.
- 3.02 STUBS
- A. Panel board: Install two 1" conduits from each flush mounted Panel board to accessible under floor space and to accessible above ceiling space where these conditions occur. Cap conduits with standard galvanized pipe caps.
 - B. Floor: At each point where floor stubs are indicated in open floor areas, for connections to machines and equipment, conduits shall be terminated with couplings, tops flush with finished floor. Stubs shall extend above couplings the indicated distance. Where capped stubs are called for, couplings shall be closed with cast iron plugs with screw drive slots.
 - C. Underground:
 - 1. Underground conduit stubs shall be terminated at locations indicated, except if necessary, they shall extend 5'-0" beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and nonmetallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with an approved plug. As-Built Drawings shall show location of ends of underground conduit stubs fully dimensioned with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on As-Built Drawings before back filling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.

2. Over ends of individual underground conduit stubs or groups of conduit stubs, install 4"x18" deep PVC filled with concrete, flush with finished grade in asphaltic concrete or lawns, and 2" above finished grade in planting areas. Cast a 3" x 3" brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or other approved anchorage methods.

END OF SECTION

16 12 00

600VAC or less Low Voltage wires

PART 1 GENERAL

1.01 DESCRIPTION

- A. Low voltage wire, splices, terminations and installation.
- B. This Section describes single conductor THWN or THHN, a general purpose building wire insulated with polyvinyl chloride (PVC) and covered with a tough protective sheath of nylon intended for lighting and power circuits at 600 volts or less. The wire may be operated at 90 °C in dry locations and is listed by Underwriters Laboratories for use in accordance with Article 310 of the National Electrical Code.

1.02 SUBMITTALS

- A. Comply with Section 01340.

PART 2 PRODUCTS

2.01 WIRE

- A. Wire shall be single conductor type THHN or THWN insulated with polyvinyl chloride (PVC) and covered with a tough protective sheath of nylon, rated at 600 volts. The wire may be operated at 90° C. maximum continuous conductor temperature in dry locations and 75° C. in wet locations and shall be listed by Underwriters Laboratories under Standard 83 for Thermoplastic Insulated Wires. Conductors shall be solid copper for #10 AWG and smaller conductors and stranded copper for #8 AWG and larger conductors. Each conductor shall be insulated with PVC and sheathed with nylon. Each wire shall be identified by surface marking indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Wire shall be tested in accordance with the requirements of UL Standard for types THWN or THHN.
- B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper per UL Standards 83 or 1063.

2.02 STANDARDS

- A. THWN/THHN wire shall comply with the following standards:
 - 1. UL 83 for thermoplastic insulated wires.
 - 2. UL 1063 for machine tool wires and cables.

PART 3 EXECUTION

3.01 WIRE INSTALLATION

- A. Wire shall not be installed until all plastering throughout building is completed, and all debris and moisture removed from conduits, boxes, and cabinets.
- B. Wire-pulling compounds used as lubricants in installing conductors in raceways shall only be talc or other compounds approved and listed by UL. No oil, grease, graphite, or similar substances may be used. Pulling of #1/0 or larger conductors shall be done only with an approved cable pull machine.
- C. The Electrical Inspector shall be called to site and shall supervise installation of all feeder cables. The Inspector shall be notified not less than 2 working days in advance of proposed time of installation.
- D. At all outlets for light, power and signal equipment, pigtail splices with 8" circuit conductor leads shall be provided for connection to fixtures, equipment and devices.
- E. Pressure cable connectors, pre-insulated "Scotchlok", 'Y', 'R', or 'B' spring-loaded twist-on type, may be used for splicing # 8 gage or smaller conductors, for all wiring systems, except public address, or system clocks.
- F. All joints, splices, tap and connections for cables, #6 gage and larger shall be made with high-pressure cable connectors approved for use with copper conductors. The connector shall be insulated with a heavy wall heat shrink "WCSM", or a cold applied roll-on sleeve "RVS". Insulation level shall be a minimum of 600V and the joints, splices, and taps shall be qualified to ANSI C119.2, and UL listed for pressure connectors.
- G. Wire switchboards, panel cabinets, pull boxes and other cabinets except public address shall be neatly grouped and tied in bundles with nylon ties at 10" intervals. At switchboards, panels and terminal blocks, wires shall be fanned out to terminals.
- H. Keep conductor lengths to a minimum within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.

- I. Exercise care to maintain the conductor required bending radius
- J. Each neutral conductor larger than #6 gage which is not color identified throughout its entire length shall be painted white or taped white wherever it appears in a switchboard, cabinet, gutter or pull box. Neutral conductors #6 gage and smaller shall be white color identified throughout their entire length.
- K. Fire Alarm, Clock, Security Intrusion Detection, Public Address, and Telephone Systems wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not allowed between devices and/or terminal cabinets at junction and pull boxes. Wiring shall be terminated at approved terminal blocks only.
- L. All systems of wiring shall be so installed that, when completed, systems will be free from short circuits and grounds, other than required grounds. Electrical contractor shall include in his bid cost of services an approved independent testing laboratory to test all feeders' insulation resistance.
- M. The tests to be performed are as follows:
 - 1. With a megger insulation tester, use the time-resistance method (Sometimes referred to as absorption test) to test each feeder and branch circuit wire. Tests must be conducted with wire disconnected at each end in order to test the wire itself. A second test must be conducted with the wire connected at each end and the circuit breakers or switches in the closed positions.
 - 2. Tests shall be performed in presence of the City's Electrical Inspector.
 - 3. Three copies of the test results shall be submitted to the City's Electrical Inspector. Test results shall be submitted on an official form from the independent testing laboratory showing project location, test engineer, test conditions, test equipment data, and final test results.

3.02 WIRE COLOR CODE

- A. Color Code for Clocks, Program Bells, Program Selector and Fire Alarm System Devices.
- B. Color Code, Power and Lighting: Wires for power and lighting systems shall be color coded and shall be installed under direction of the City's Electrical Inspector. Except where otherwise specified, color coding shall be as follows:

SYSTEM		COLOR CODE
Power		Black
Lighting	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral	White
Grounding		Green

3.03 FEEDER IDENTIFICATION

- A. Lighting, power, low voltage feeder wires and cables shall be identified at each point conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of a heat shrink wire marker, which provides terminal strain relief, Raychem Shrink mark, or Brady Perm sleeve markers. Identification in other areas shall be by means of wraparound tape markers Raychem Cable Markers, or Brady Perma-Code. All markers shall include the feeder designation, size and description.

3.04 TAPE

- A. Splices, joints and connectors joining conductors shall be covered with insulation equivalent to that on conductors. Free ends of conductors connected to an energized source shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL for use as sole insulation of splices shall be used and shall be applied according to manufacturer's printed specifications.

END OF SECTION

16 42 00

SERVICE ENTRANCE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide all underground lighting and power service conduits from utility company's service pole or other service point to project's service equipment as indicated on Drawings and specified.
- B. Contractor shall consult utility company before submitting Contractor's bid to determine exact location of serving point or service poles, quadrants on poles for service risers and work and material; Contractor is required to leave service installation complete and ready for cable installation without additional cost to the Owner. Service cable will be provided by utility company and will be paid for by the Owner.
- C. Work shall comply with requirements of utility company. Where required and indicated on Drawings, install transformer vault, outdoor transformer enclosure, pad and slab box, manholes or other equipment pertaining to service.

1.02 RELATED WORK

- A. Excavating, Backfilling and Compacting
- B. Cast-In-Place Concrete.

1.03 DESIGN REQUIREMENTS

- A. Comply with requirements of utility company having jurisdiction.
- B. Interrupting capacity of main circuit breaker and distribution circuit breakers shall be equal to or greater than available short circuit current at point as obtained by utility company or computed by the Engineer. Selective coordination between main and feeder circuit breakers is required.

1.04 SUBMITTALS

- A. Comply with Section 01340.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Transformer Pads and Slab boxes: Concrete transformer pads shall be provided as indicated on Drawings and shall meet requirements of serving electric utility company. Also, provide all pull boxes and slab boxes indicated on the drawings.
- B. Service Conduits: As described under Section 16110: Raceways, Fittings and Supports. For utility portion of wiring and conduit runs, it must comply with utility company's requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Service conduits shall terminate at service poles or other service point, as indicated on Drawings and shall extend underground to main service terminating pull section as indicated. All bends in conduits shall be long radius type and all sweeps shall have a radius of not less than 10 times conduit trade size. Underground conduits shall be encased in concrete 3" thick on all sides with multiple conduits spaced not less than 1-1/2" apart.
- B. Service cable, if overhead, shall be connected to metering compartment of switchboards or, if underground, in service terminating pull section as required and directed by utility company.

3.02 CONDUITS CROSSING PUBLIC DEDICATED PROPERTY

- A. Where service or other conduits cross a street, alley, highway or any other public dedicated property, Contractor shall make necessary arrangements to open and close public property and shall pay all costs in connection with required licenses, permits, fees and deposits. Conduits shall be installed in a manner required by authorities having jurisdiction.

3.03 STRUCTURAL CONDITIONS

- A. Where conduits are to pass through or interfere with any structural member, or where notching, boring or cutting of structure is necessary, or where special openings are required through walls, floors,

footings, or other building elements, to accommodate electrical work, all such work shall be done as directed and approved by the Architect.

- B. Placement of conduits in concrete slabs and structural members shall comply with requirements of applicable Section of CCR, Title 24, and Public Works and shall be as approved by the Architect.
- C. Where a concrete encasement for underground conduits abuts a foundation wall or underground structure which conduits enter, encasement shall be maintained in position in relation to structure as indicated on Drawings, or rest on a haunch integral with wall or structure, or shall extend down to footing projection, or shall be doweled into structure. Underground structures shall include manholes, pull boxes, vaults, and buildings.
- D. All cutting and patching of rough and finish construction work shall be done as required for installation of work under this Section. Patching shall be of same materials, workmanship and finish as, and shall accurately match the surrounding work. Work shall be done under direction of the Architect.

END OF SECTION

SWITCHBOARDS AND PROTECTIVE DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Furnish, install and connect main switchboard, including metering facilities as required by Power Company.
- B. Main switchboards shall be complete with pull, service and distribution sections.
- C. Protective devices in main switchboard shall have a minimum symmetrical short circuit interrupting rating, as provided by electric utility company.
- D. Provide mounting detail and seismic anchorage notes for switchboards.

1.02 RELATED WORK

- A. Cast In-Place Concrete.
- B. Basic Electrical Requirements.
- C. Basic Electrical Materials.
- D. Service Entrance.

1.03 SUBMITTALS

- A. Comply with Section 01340.
- B. Shop Drawings:
 - 1. Include a front elevation indicating dimensions and locations of equipment on switchboard, make, kind and size or capacity of all equipment and bussing, location of each service conduit entering switchboard, all barriers, nameplate inscriptions, finish, total weight and size of switchboard and locations and sizes of anchor bolts. Contractor is responsible for providing equipment that fits in the space available and comply with the NEC required clearances, regardless from the Engineer's submittal action.
 - 2. A system short circuit study must be prepared by the manufacturer in accordance with IEEE Guidelines. This study must be included with the Coordination Study.
 - 3. Coordination study shall be provided by manufacturer for main protective device and branch circuit protective devices including secondary of each transformer protective device. Study shall be done on Log-log paper. The circuit protective devices must be set based on the coordination study. A final written record of all protective device settings must be provided to the Owner representative.
- C. Project Record Documents: Provide a single reproducible drawing of switchboards as installed, indicating main and branch circuit ratings, circuit numbers, and part numbers.
- D. For ground fault relays and sensors, the following information must be provided:
 - 1. Certified calibration and acceptance test.
 - 2. Installation instructions.
 - 3. Operating instructions.
 - 4. Maintenance instructions.
 - 5. Replacement parts list.
 - 6. Final test report.

1.04 QUALITY ASSURANCE

- A. Work shall be done by a qualified Contractor holding C-10 and other licenses and permits required by legally constituted authorities having jurisdiction over this work.

PART 2 PRODUCTS

2.01 SWITCHBOARDS

- A. General Description: Switchboards shall be product of Square D, Eaton, General Electric or Siemens. Dimensions shown on the drawings are based on Square D; any other equipment shall be able to fit in the space available. Also equipment shall conform to the following requirement:
 - 1. Complete assembly, including steel framing and covers, bus system, and breaker mounting, shall satisfy all applicable provisions of UL 891 and NEMA PB-2 and the California Electrical Code for low voltage distribution switchboards. Switchboards shall be furnished with a UL label.
 - 2. Switchboards shall be floor standing, dead front, dead rear, line bussed, front operated and connected, circuit-breaker type, unless otherwise indicated and shall contain equipment

indicated and specified. Switchboard shall be complete with pull, service and distribution sections as required.

3. Required equipment shall be enclosed in fully interchangeable die formed steel sectional cabinets with top and bottom plates and required braces and gussets welded together so that cabinets will be absolutely rigid, plumb and uniform in size. Each cabinet shall be a separate and independent unit with assembly holes die-stamped or jig drilled; openings for interconnections shall be so placed that any cabinet can be located in any position in assembly without drilling or cutting holes on job. Deliver switchboard to site in completely assembled sections and provide required assembly bolts and blanking plates. Front plates and doors shall be die-formed steel, of not less than #12 gage furniture steel, completely removable, secured to cabinet with oval head machine screws, with cup washers, and uniformly and symmetrically spaced.
4. Circuit breakers shall be automatic, one-piece molded-case, trip-free, common trip, quick-make, quick-break; thermal-magnetic type bolted to bus, with handles clearly indicating tripped position. Breakers shall have a single handle with no tie-bar. Voltage, amperage and number of poles shall be as indicated on Drawings. Breaker ratings shall be on handle. Breakers shall have lockout provisions approved by the State for padlocking and shall have a minimum symmetrical short circuit interrupting rating, as indicated on Drawings.
5. Fusible feeder switches shall be quick-make, quick-break, voltage rating and number of poles as Indicated on Drawings, with visible blades and dual horsepower ratings. Switch handles shall physically indicate "ON" and "OFF" positions. Switches shall be lockable only in "OFF" position and accept 3 industrial type heavy-duty padlocks. Switch covers and handles shall be interlocked to prevent opening in "ON" position. Provide means to permit authorized personnel to release interlock for inspection purposes. A circuit identification cardholder shall be provided for each branch switch.
6. Meter panel or plate shall meet all requirements of serving Utility and be equipped with necessary fittings.
7. Provide silver-plated UL Rated, copper bus bars of same capacity as main breaker, or as indicated on Drawings, between current transformer and main section and distribution sections; also, full height of breaker space in distribution portions. Bus bar bracing shall be designed to withstand maximum available short circuit current. Provide service cable lugs as required by utility company.
8. Distribution sections shall be furnished with full height bussing. Unused spaces shall be provided with blank covers. Each switchboard, as a complete unit, shall be given a single short circuit current rating by manufacturer. Such ratings shall be established by actual tests by manufacturer, in accordance with UL specifications, on equipment constructed similarly to the furnished switchboard.
9. Provide a nameplate for each component on switchboard. Plates shall be black and white bakelite nameplate stock, with characters cut through black exposing white, and shall bear designation of service, or feeders controlled and fuse size. Provide a similar nameplate for meter and transformer compartments.
10. Paint cabinets, framework, and plates inside and out with one coat of rust resisting metal primer and one coat of grey enamel, baked on, or lacquer sprayed on.
11. Manufacture boards according to standardized drawings and specifications which are available for checking, and prepare shop drawings and submit for approval. Switchboard shall meet requirements of all legally constituted authorities having jurisdiction, and respective serving utility.
12. All switchboards installed outdoors shall be weatherproof type, NEA 3R enclosure. Enclosure construction shall be formed of code gage galvanized steel with an ANSI #61 gray enamel finish. A heavy-duty 3-point latching vault type door handle with padlocking provisions shall be furnished on each door. Padlocks shall be furnished keyed to a Corbin Cat 60 key.
13. For grounded electrical wye service switchboards rated more than 150 volts, to ground and 1000 amperes or more, provide ground fault protection for main protective device. Ground fault protection shall be listed as approved by UL, and shall consist of a ground sensor encircling all phase conductors and neutral connected to a solid state ground relay which initiates tripping circuit interrupting device. Contractor must include in his bid, testing of ground fault protection system by an independent recognized testing laboratory. Testing lab shall provide necessary testing equipment at site and perform a certified test on ground protection system in presence of the City Electrical Inspector. The ground fault setting shall be selected to coordinate with downstream circuit protective devices. Contractor shall verify that the system neutral is grounded at the service entrance switchboard only, except neutrals of step down distribution transformers. For branch circuit protective devices, rated 800 amps or more, provide ground fault

protection, as described above, for main protective device. Coordinate settings with main protective device ground fault sensor.

14. A test winding shall be provided to simulate flow of ground fault current through current sensor, in order to test complete system, including sensor pick-up relaying equipment and trip mechanism of circuit protective device.

B. Building Main Switchboard:

1. Building main switchboard shall be of floor standing metal clad dead-front type. Arrangement and construction shall be as indicated on Drawings and specified. Design, construction and testing shall comply with Code requirements and applicable NEA and UL Standards. Structural elements of cubicles shall consist of standard rolled shapes or formed sheet steel members with a #12 gage minimum thickness. Construction shall be of bolted or welded type with sufficient mechanical strength to maintain rigidity under shipping, erection, or short circuit stresses. Cubicles shall be insulated and enclosed with captive bolted P & O Mill prime or cold rolled sheet steel covers. End cubicles shall be provided with blanking plates for future additions. Switchboard shall not exceed 90" in height, including wiring gutters or pull spaces. Steelwork shall be sanded, cleaned, rust proofed and primed. Finish coating shall be factory standard. Construction marks or damaged surfaces shall be refinished at job site to match original finish.
2. Bus work and connections shall be hard-drawn copper bars having a minimum conductivity of 98 percent. Current density for copper shall not exceed 1,000 amperes per square inch for connections. Continuous full load temperature rise shall not exceed NEA requirements and those listed in applicable codes. Bus structure shall be free-fitted, and shall have sufficient strength and rigidity to withstand short circuits of magnitude indicated on Drawings, without damage or permanent distortion. Connections shall be securely bolted together. Fastening bolts shall be corrosion-resistant plated carbon steel, secured with constant pressure-type locking devices. Insulating supports shall be made of high-strength, impact-resistant, flame-retardant material. Connections for incoming and outgoing cables shall be supplied with heavy-duty pressure-type terminal lugs. Cables and internal wiring shall be supported with suitable bolted cleats. Arrangement of incoming and outgoing cables shall be as indicated on Drawings or as required. Insulated conductors used within switchboard shall be listed, flame-retardant and shall be rated not less than voltage applied to it, and not less than voltage applied to other conductors or bus bars with which switchboard may come into contact.
3. Current transformer mounting facilities and metering mounting facilities shall be provided in accordance with utility company requirements.
4. Main circuit breaker or main fusible switch shall be as follows:
 - a. Main circuit breaker shall be molded case type, quick-make, quick-break, with thermal-magnetic trips, of frame size and trip rating indicated on Drawings. Main breaker shall have a minimum short circuit interrupting capacity as determined by utility company. Provide shunt-trip and integral ground fault devices, as indicated on Drawings.
5. Nameplates shall be furnished for each device. A large nameplate-identifying switchboard, showing service voltage, function and current rating shall be supplied. Test material information shall be taken from Drawings and a format submitted for review together with shop drawings. Nameplates may be made of engraved laminated plastic or etched metal and shall be permanently attached with escutcheon pins or screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Switchboards shall be located so that they are readily accessible and not exposed to physical damage.
- B. Switchboard locations shall have sufficient working space around the switchboard to comply with the California Electrical Code.
- C. Switchboards installed outdoors shall be specifically approved for wet locations and shall be in a weatherproof NEMA 32 enclosure.
- D. Switchboards shall be securely fastened to the mounting surface.
- E. Switchboard cabinets shall be grounded as specified in Article 250 of the California Electrical Code. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.
- F. Lugs shall be suitable and approved for use with the conductor being connected.
- G. Conductor lengths shall be kept to a minimum within the wiring gutter space.

- H. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- I. Maintain the required bending radius of conductors inside the cabinet.
- J. Distribute and arrange conductors neatly in the wiring gutters.
- K. Tightening the wire lugs or any conductor connections shall be performed in the presence of the Electrical Inspector. Torque values shall be those recommended by manufacturer.
- L. Remove all blocks used for shipment from all component devices.
- M. Manually exercise all circuit breakers to make certain they operate freely.
- N. Remove all debris from switchboard interior.
- O. Follow all manufacturers' instructions for installation.
- P. Furnish Spare Fuses: One spare fuse shall be furnished for each fusible switch installed. Spare fuses shall be of the same type and rated as those installed.

3.02 PADS AND ANCHORING

- A. Where freestanding equipment is installed at exterior locations or in locations below grade, concrete pads shall be provided as described under Section 03300: Cast-In-Place Concrete.
- B. Where a utility meter is housed in a switchboard, pad shall extend 3'-0" from face of switchboard door or board, whichever is greater.
- C. Anchor bolts for freestanding equipment shall be designed to meet code seismic requirements.
- D. Equipment shall be anchored to new slab with 3/4" redhead wedge anchor bolts. 3/4" anchor bolts shall be tested to withstand 150 ft-lbs torque. A minimum of 4 anchor bolts per switchboard section are required.

END OF SECTION

16 45 00

GROUNDING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide and install a grounding system as indicated.
- B. Related Work:
 - 1. Basic Electrical Requirements.

1.02 SYSTEM

- A. All metallic objects on the premises that enclose electrical conductors or that are likely to be energized by electrical currents shall be effectively grounded.
- B. All metal equipment parts such as enclosures, raceways, and equipment grounding conductors and all earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.
- C. All metallic systems shall be solidly interconnected to the electrical system as provided by the service entrance and for each grounded separately derived system that is installed.
- D. A separately derived A.C. source shall be grounded to the equipment grounding conductor and to a separate made electrode.
- E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by use of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of approved size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit over 6'-0" in length shall be provided with a green insulated grounding conductor of approved size.
- F. Cold water or other utility piping systems shall not be used as grounding electrodes. Grounding electrodes shall be "made electrodes" specified as follows:
 - 1. Grounding electrodes as specified in Article 2.01, Paragraph B of this Specification.
 - 2. Concrete enclosed electrode, which is made up of at least 20'-0" of #4 AWG, minimum size, copper conductor, encased by at least 2" of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar must be connected to copper wire using approved connections. An external electrode as specified in Article 2.01, Paragraph B of this Specification Section must be installed and connected to foundation or footing rebar.
- G. Non-current-carrying metal parts of high voltage equipment enclosure, signal and power conduits, switchboard and panel board enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded.
- H. Metallic or semi-conducting shields, and lead sheaths of cables operating at high voltage, shall be permanently and effectively grounded at each splice and termination.
- I. Neutral of service conductors shall be grounded as follows:
 - 1. Neutral shall be grounded at only one point within site for that particular service. Preferable location of grounding point shall be at service switchboard, or main switch.
 - 2. Equipment and conduit grounding conductors shall be bonded to that grounding point.
 - 3. Equipment grounding conductor is carried from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to "made electrode" for that building.
 - 4. Neutral of feeder shall not be grounded.
- J. If there is a distribution transformer at a building, secondary neutral conductor shall be grounded to "made electrode" serving building.
- K. Within every building, main switchboard or panel shall be bonded to the cold water line. Metallic piping systems (gas, fire sprinkler, etc.) shall be bonded to cold water line.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01340.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Yard boxes shall be precast concrete and shall be approximately 14" wide, 19" long, and 12" deep (outside dimensions), or larger, if necessary, to obtain required clearances. Boxes shall be equipped with bolt down, checkered, cast iron covers and a cast iron frame cast into box. Yard boxes shall be Brooks 36. See electrical drawings for detail.
- B. "Made" electrodes shall be approved copper-clad steel ground rods, minimum 3/4" diameter, 10'-0" long.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Grounding electrodes shall be located in nearest usable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, concrete yard box shall be 2" above planting surfaces.
- B. If concrete enclosed electrode is used, grounding wire shall terminate to a suitable copper plate with grounding lugs.
- C. Grounding rods shall be driven to a depth of not less than 8'-0". A permanent ground enhancement material as manufactured by Erico Electrical Products shall be used at each ground rod to improve grounding effectiveness. The manufacture's guidelines shall be used for each installation.
- D. Grounding electrodes shall have a resistance to ground of not more than 5 ohms.
- E. When using grounding rods, if resistance to ground exceeds 5 ohms, 2 or more rods connected in parallel shall be provided to meet grounding resistance requirement.
- F. Ground rods shall be separated from one another by not less than 10'-0".
- G. Parallel grounding rods shall be connected together with approved fittings and approved grounding conductors in galvanized rigid steel conduit, buried not less than 12" below finish grade.
- H. Electrical Contractor shall include in his bid, cost of services of an approved independent testing laboratory, to test grounding resistance of all made electrodes, ground rods, and bonding of building steel, water pipes, gas pipes and other utility piping. Tests to be performed are as follows:
 - 1. Visually and mechanically, examine ground system connections for completeness and adequacy.
 - 2. Perform "fall of potential" tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.
 - 3. Perform the two-point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panel board grounds. Metal railings at building entrances and at handicapped ramps shall also be tested.
 - 4. Test shall be conducted in presence of the City Electrical Inspector.
- I. Three copies of test results shall be submitted to the Electrical Engineer of Record. Test results shall be submitted on an official form from the independent testing laboratory showing project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

END OF SECTION

16 47 00

PANELBOARDS AND SIGNAL TERMINAL CABINETS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Lighting and power distribution facilities, including panel boards.
- B. Related Work:
 - 1. Basic Electrical Requirements.
 - 2. Basic Electrical Materials.
 - 3. General Lighting.

1.02 SUBMITTALS

- A. Comply with Section 01340.
- B. Shop Drawings: Include a front elevation; indicate cabinet dimensions, make, location and capacity of equipment, size of gutters, and type of mounting, finish, and catalog number of locks.

1.03 DESIGN REQUIREMENTS

- A. Panel boards:
 - 1. Panel boards shall be wall-mounted, enclosed safety type with 120/240 volt, 3-wire solid neutral 277/480 volt, 4-wire or 120/208 volt, 4-wire solid neutral mains as indicated on Drawings or specified. First panel board of each building shall be provided with main or sub-feeder circuit breakers where so indicated.
 - 2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be rated as indicated on Drawings, with ampere rating marked on handle and shall indicate "ON - OFF" and tripped positions. Ground fault interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL as a ground fault device.
 - 3. Two and 3 pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, non-tamperable, ambient compensated, single handle, internal common trip, and quick-make, and quick-break mechanism with silver alloy contacts. Circuit breakers shall be rated as indicated on the Drawings.
 - 4. Main and sub-feeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall have interchangeable trip units. Handles of main and sub-feeder circuit breakers shall be under cabinet door. Voltage rating shall be as indicated on Drawings.
 - 5. All circuit breakers shall be one-piece, bolt-on type and shall meet short circuit interrupting capacity requirements indicated on Drawings.
 - 6. All internal connections shall be made with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. All terminals shall have copper conductors. Panel boards fed by conductors having over current protection greater than 200 amperes shall be protected on supply side by over current devices having a rating not greater than that of panel board.
 - 7. Except where otherwise indicated, circuit breakers shall be in 2 vertical rows connected to bus bars in a distributed phase arrangement. Two pole branches shall be balanced on busses. Each single pole branch shall be numbered adjacent to its circuit breaker with odd numbers on left and even numbers on right.
 - 8. All specified circuit breaker spaces should include necessary hardware required for future installation of circuit breakers.
 - 9. Provide locking devices for each individual circuit breaker. Padlocking device shall be secured to circuit breaker and by panel dead front plate.
- B. Panel board Cabinets:
 - 1. Panel board cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall have at least 6" high gutters at top and bottom where feeder cable size exceeds #4 or where feeder cable passes through cabinet vertically. Cabinets shall have top and bottom gutters sized as required by inspection department having jurisdiction, but never less than 6" where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than 4" wide. Width of cabinets shall be 20", unless indicated different on Drawings.

2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Each door shall be equipped with flush type lock, spring latching, Corbin lock for metal door, keyed to a Corbin CAT 60 key.
3. Where contactors, time switches, and control devices are specified or indicated to be installed within panel board cabinets, a separate compartment and door shall be provided at top of cabinet for devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Door shall be equipped with flush type lock, spring latching, Corbin lock for metal door, keyed to a Corbin Cat 60 key.
4. Outdoor cabinets shall be NEMA 3R. Construction shall be formed from code gage galvanized steel with an ANSI #61 gray enamel finish. Provide a heavy-duty 3-point latching vault type door handle with padlocking provisions. Provide stainless steel butt hinges on each door. Padlocks must be furnished, keyed to a Corbin Cat 60 key.
- C. Panel board Schedule: Contractor shall prepare a neatly typewritten schedule with number or name of room or area, or load served by each panel board circuit. Room numbers or names used shall be determined at site and shall not necessarily be those used on Drawings. Schedule shall also indicate designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be mounted in a frame under transparent plastic 1/32" thick on inside of each panel board cabinet door.
- D. Panel board Standards: All panel boards shall meet latest revisions of following standards:
 1. National Electric Code, Article 384.
 2. UL 67, Panel boards.
 3. UL 50, Cabinets and Boxes.
 4. UL 943, GFCI.
 5. UL 489, Molded case circuit breakers.
 6. NEMA PBI.
 7. Federal Specifications W-P-115 and WC-375B.
 8. Panel boards must be UL labeled.
- E. Terminal Cabinets, Signal:
 1. All signal terminal cabinets shall conform in every respect to the Specifications for panel board cabinets, except as modified herein.
 2. All terminal cabinets shall be flush type, with 2" trim or surface mounted type, as indicated on Drawings. All terminal cabinets shall have section. Cabinets shall be provided with barriers to separate each system. Sections over 24" in width shall be provided with double door and lock. Each terminal cabinet, or section of a terminal housing a separate system, shall measure 12" long 18" high x 5-3/4" deep, unless otherwise indicated on Drawings. Trims for sectional cabinets shall be of one-piece construction.
 3. All terminal cabinets shall be equipped with 3/4" thick plywood backboards within cabinets, and fastened in place with machine screws. Backboards shall be largest size cabinet and conduit terminations will permit.
 4. Flush mounted terminal cabinets shall be finished as specified for flush mounted panel board cabinets. Surface and semi-flush mounted terminal cabinets shall be finished as specified for surface mounted panel board cabinets.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Panel boards shall be manufactured by Square D, W.A. Benjamin, General Electric, or approved substitute.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Panel boards shall be located so that they are readily accessible and not exposed to physical damage.
- B. Panel boards installed outdoors shall be specifically approved for wet locations and shall be weatherproof in a Nema 32 cabinet.
- C. The Panel board location shall have sufficient working space around the panel to comply with the California Electrical Code.
- D. Panel boards shall be securely fastened to the mounting surface.
- E. Unused openings in the cabinet shall be effectively closed.

- F. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.
- G. Conduits shall be installed to prevent moisture or water from entering and accumulating within the enclosure.
- H. Lugs shall be suitable and approved for use with the conductor being connected.
- I. Conductor lengths shall be kept to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- J. Maintain the required bending radius of conductors inside the cabinet.
- K. Clean the cabinet of all foreign material such as cement, plaster, paint.
- L. Distribute and arrange conductors neatly in the wiring gutters.
- M. Use the manufacturer's torque values to tighten all lugs.
- N. Before energizing the panel board the following steps must be taken:
 - 1. Retighten all connections to the manufacturer's torque specifications. Verify that all required connections have been made.
 - 2. All blocks used for shipment must be removed from all component devices and the panel board interior.
 - 3. Manually exercise all circuit breakers to make certain they operate freely.
 - 4. Remove all debris from panel board interior.
- O. Follow all manufacturers' instructions for installation.

END OF SECTION

16 50 90

LIGHTING REQUIREMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Furnish and install lighting fixtures, lamps, ballasts as shown on the Electrical Drawings and the Lighting Consultant Drawings and as specified.
- B. Section 16010 - General Requirements applies to work in this section.

1.02 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. The following list includes the required lighting fixture shop drawing information that shall be submitted:
 - a. Manufacturer's catalog sheets of standard fixtures, indicating materials, gauges, dimensions, standard finishes available, weights, and Underwriters' Laboratories, Inc. (UL) approval of fixtures.
 - b. Shop drawings of special fixtures shall contain the same information as required for standard fixtures.
 - c. Photographs or catalog cut sheets of all lighting fixtures, with distribution curves and complete photometric data.
 - d. Manufacturer's catalog sheets indicating input and load electrical characteristics, ambient temperature rating, noise level rating, mounting methods and U.L. listing for use with required lamps. Ballast data for LED light fixtures shall indicate wattage change for a given line voltage change, indicated in percent.

1.03 QUALITY ASSURANCE

- A. The manufacturer of occupancy sensors shall provide a single source warranty for all equipment specified, to be free from defects in material and workmanship for a period of three years after date of acceptance by the Owner.
- B. The occupancy sensor, dimmers and all other lighting control devices manufacturer shall have been producing lighting control equipment for a period of at least five consecutive years.

1.04 SUSTAINABILITY REQUIREMENTS

- A. Exterior Light Fixtures
 - 1. Exterior luminaires except at unit door entrances shall emit 0% of the total initial designed fixture lumens at an angle above 90 degrees from nadir and/ or meet the requirements of the Dark Sky certification program.
 - 2. Exterior lighting cannot exceed 80% of the lighting power densities defined by ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.

1.05 GUARANTEE

- A. Lighting fixture ballasts: Furnish without limitation, a written guarantee against failure and all defects in materials and workmanship for two (2) years from date of acceptance of the project.

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES, LAMPS AND BALLASTS

- A. Lighting fixtures shall have all parts and fittings necessary to completely and properly install the fixtures. All fixtures shall be equipped with lamps of the size and type specified. All fixtures shall be the standard product of fixture manufacturers unless otherwise shown, and shall be Underwriters' Laboratories, Inc. (U.L.) approved.
- B. Where both catalog number and description are indicated, the requirements of the description shall take precedence and prevail.
- C. All fixtures of one type shall be of one manufacturer and of identical finish and appearance.
- D. Complete units and all electrical components for high intensity discharge, fluorescent, incandescent, and special fixtures shall bear the U.L. and Electrical Testing Laboratory (ETL) labels. Labels shall not be placed on fixtures at locations where installation of unit labels is visible.
- E. Fixture types shall be as indicated on the Drawings.
- F. All plastic panels shall be 100 percent pure virgin acrylic, shall be completely de-staticized and shall be free from dust, dirt, grease, paint, debris, etc.
- G. Recessed fixtures in suspended ceilings shall be free of light leaks above and below ceiling. Temperature of fixture shall not exceed U.L. Standards.

- H. Reflectors, cones or baffles shall be free of spinning lines, ripples or any marks or indentations caused by riveting or other assembly techniques. No rivets, springs or other hardware shall be visible after installation.
- I. Lamp sockets shall be rigidly and securely attached to the fixture enclosure or husk to insure safe operating temperature as recommended by lamp manufacturer.
- J. All exposed metal parts of exterior lighting fixtures shall be stainless steel, anodized aluminum or have 4 mil zinc coating applied after fabrication and before finish. Screws and fastening shall be stainless steel. Painted finishes shall be as specified in schedules.
- K. All industrial type fluorescent lighting fixtures shall have a porcelain enamel finish.
- L. Lamps:
 - 1. LED Lamps shall be new and of wattage and type indicated on the drawings or as required for the particular fixture installed.

2.02 ACCEPTABLE MANUFACTURERS

- A. Lighting fixtures shall be as specified on the drawings.
- B. Conform to Sections 16010 and 01340 requirements for submitting additional manufacturers.
- C. Ballasts:
 - 1. Advance Transformer
 - 2. Jefferson Electric
 - 3. Universal
 - 4. General Electric
- D. Lamps:
 - 1. Philips
 - 2. General Electric
 - 3. Osram/Sylvania

PART 3 EXECUTION

1.01 INSTALLATION

- A. Fixtures in concrete shall be steel housing with bitumastic paint finish and approved for use in concrete. Coordinate requirements with Lighting Designer, Landscape Architect and Architect.
- B. All adjustable lighting fixtures shall be aimed and set in the presence of the Architect.
- C. Stem hung fixtures shall be provided with ball swivels, located at the canopies, and rockers, at the fixtures, allowing a minimum 45-degree swing from the vertical. Stems shall be of 3/8-inch ID minimum pipe and shall be finished to match the lighting fixture.
- D. Exterior fixtures requiring exposed exterior boxes shall be mounted on cast boxes equipped with gaskets.
- E. Backing for surface mounted or stem hung fluorescent fixtures shall be structural channel or angle iron with 5/16-inch bolts, except where mounted directly to concrete structures, in which case anchors and suspension shall be used. The exact method of support shall be determined in conjunction with the Architect.
- F. Stems: Each 4-foot and each 8-foot individually mounted fixture shall be supported by two (2) stems. For fixtures mounted in continuous rows where individual fixtures are mounted on common mounting channels, or otherwise rigidly fastened together, install one stem for each 4-foot lamp length and two for each 8-foot lamp length. Stems shall be evenly spaced and not more than 50 inches apart. Before the ceiling mounted stem supports are installed, the exact stem spacing shall be determined in conjunction with the Architect. Provide all metal shims, spacers and mounting bolts or devices, where necessary, in order to permit surface mounted fixtures to be pulled tight to ceiling supports or backing without causing ceiling tiles to be raised out of place.
- G. lighting fixtures, which are to be mounted in continuous rows of two or more fixtures, shall have at least two bolts or other interlocking devices, as approved by the Architect, at each connection to provide for positive and true alignment of the fixtures.
- H. Louvers, diffusers or lenses shall not be installed in lighting fixtures until such time as all glazing has been completed and all construction work involving plastering, grinding, sanding, painting, etc., and final clean-up sweeping and dusting have been completed.
- I. Reflector surfaces and lamps in all lighting fixtures shall be cleaned of accumulated dust, first, plaster, paint, etc., before the installation of the louvers, diffusers, or lenses.
- J. Recessed lighting fixtures shall be independently supported by #12 AWG wires to specified anchors in the slab above. A 2-foot x 4-foot fixture shall require four (4) wires; a 1-foot x 4-foot fixture shall require four (4) wires. One (1) wire shall be attached to surface mounted fixtures. All wires to have 1-inch slack.

- K. Provide all lighting fixtures recessed in a ceiling, which has a fire resistant rating of one hour or more with box enclosures, which have a fire-rating equal to that of the ceiling. The space from the fixture to the enclosure shall be 1-inch for fluorescent and 3-inch for incandescent fixtures.
- L. Verify weights and recommended mounting methods of all decorative fixtures with manufacturers, and furnish and install supports. Fixtures weighing more than 20 pounds shall be supported independently of the outlet box.
- M. Luminous ceiling cavities shall be completely enclosed with gypsum board and shall be painted with 90% reflecting white paint. Cavities shall be free of all obstructions including piping and ductwork, except for branch circuit wiring to fixtures in luminous ceiling. Branch circuit wiring in luminous ceiling shall not extend to fixtures outside luminous ceiling. The installation of luminous ceiling diffusers shall be in accordance with drawing details and as described in these specs.
- N. Install lamps in all fixtures:
 - 1. Replace all lamps used during construction with new lamps prior to final acceptance of the project.
 - 2. Clean all lamps after installation.
- O. After the installation is completed, remove and replace any ballast, which are judged by the Architect to be excessively noisy.
- P. Clean and repair any damage to the finished building caused by installation of the light fixtures.

END OF SECTION

SECTION 22 00 00

PLUMBING

PART 1 GENERAL

1.1 GENERAL CONDITIONS

- A. The General Conditions, Supplementary Conditions and Division 1, are a part of this section and the contract for this work and shall apply to this section as fully as if repeated herein.

1.2 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, appliances and necessary incidentals for the complete installation of all plumbing as shown on the drawings and as specified herein.
- B. Work Specified in this Section
1. Sanitary soil, waste and vent system.
 2. Roof drainage system.
 3. Domestic cold water systems.
 4. Domestic hot water systems.
 5. Sump pump systems.
 6. Gas system.
 7. Domestic water heaters.
 8. Furnish and set all sleeves for pipes passing through walls and floors.
 9. Connections to sanitary sewer, and water 5 ft. from building.
 10. Pipe covering, insulation and wrapping.
 11. Excavation and backfill.
 12. Rough-in and final connections to fixtures and equipment furnished under other sections of the specifications or by the Owner.
 13. All plumbing fixtures, water heaters, valves, hot water circulating pump, and other miscellaneous items or equipment required for a complete installation.
 14. Installation of all penetrations through fire walls and floors.
- B. Related Work in Other Sections
1. Cutting and patching as specified in Division 1.
 2. Concrete work as specified in Division 3; however, furnish templates for spacing and size of concrete pads and anchor bolts for equipment under plumbing.
 3. Electrical work as follows will be provided under Division 26:
 - a. Conduit and wiring as indicated on the drawings and as required.
 - b. Installation electrical devices such as starters, disconnects, control panels, and when indicated, furnishing such devices.
 4. Site utilities - water, sewer and storm drainage 5 ft. from building.

1.3 QUALITY ASSURANCE

- A. Codes and Standards
1. All items indicated on site, architectural or mechanical drawings are to be provided complete from point of connection to finished fixture in conformance with all governing authority requirements. Nothing in these drawings or specifications shall be construed to permit work in violation of governing codes.
 2. In addition to the requirements of all governing codes, ordinances and agencies, conform to the requirements of the following codes and standards:
 - a. Uniform Building Code.
 - b. California Plumbing Code.
 - c. City of Los Angeles requirements.
 - d. State Fire Marshal.
 - e. State Health Department requirements.
 - f. All requirements of Federal/OSHA.
 - g. Title 24 of California Administrative Codes.

- h. All other regulatory agencies having jurisdiction over this work.
 - B. Guarantees: Furnish a written guarantee form required under Division 1, against defects in materials and workmanship for one year. Guarantee shall include repair of damage to, or replacement (if so required) of any part of premises caused by water, oil, or gas leaks or breaks in pipe, fixtures or equipment provided under this section.
- 1.4 SUBMITTALS
 - A. Manufacturer's Literature: Within 35 days after award of contract and before any of the materials of this section are delivered to the job site, submit seven complete brochures of all materials and equipment, per Division 1 of these specifications.
 - B. Other Submittals
 - 1. Shop Drawings.
 - 2. Sterilization test report.
 - 3. Test data.
 - C. Operation and Maintenance Instructions: Deliver to Architect two complete sets in bound booklet form of written operating and maintenance instructions and brochures for equipment specified in this section. Fully instruct Owner's operating personnel and demonstrate performance, operation and maintenance of equipment. Amount of time allocated for said instruction and demonstrations of equipment and systems shall be part of these obligations. One additional set of approved instructions shall be suitably framed behind glass and mounted as directed.
 - D. Record Drawings: Comply with requirements of Division 1. Keep an accurate dimensioned record of as-built locations and elevations, as referred to approved base datum, of buried concealed lines, manholes, cleanouts, valves, plugged tees, capped ends, and of work which is installed different from that indicated.
- 1.5 PRODUCT HANDLING
 - A. Protection: Take all precautions necessary to protect the materials of this section before, during, and after installation.
 - B. Replacements: In the event of damage, immediately repair all damaged and defective work to the approval of the Architect at no additional cost to the Owner.
- 1.6 MISCELLANEOUS
 - A. Examination of the Site: Exercise care in examining the site and coordinate all work indicated on the drawings with existing conditions. Report to Architect in writing conditions that will prevent proper provisions of this work. Verify depth and location of service lines with servicing companies having jurisdiction before excavating. By submission of the bid, the Contractor warrants that he has familiarized himself with the existing conditions and will perform all work as required for hookup and as required by the contract documents at no additional cost to the Owner.
 - B. Service Connections: Make all necessary arrangements with applicable utility company for connection to existing service lines. Pay all fees associated with work including meters and hookup charges. Utility assessment fees, if any, will be paid by the Owner and are not part of this contract.
 - C. Drawings: Coordinate all space requirements with other trades. Drawings indicate desired location and arrangement of piping, equipment, and other items and are to be followed as closely as possible.

PART 2 PRODUCTS

2.1 GENERAL

A.1 Pipe PEX

§ Fixtures

Kitchen

- o Kitchen sink -33x22 Double bowl, drop-in, self-rimming, 8"deep, three hole, stainless steel. HDS#500872
- o Kitchen sink faucets to be Delta Single Handle #100LFWF (no spray hose).

ADA NO SUBSTITUTIONS

- o Sink Faucet Delta aerator flow must be less than 1.5 GPM
- o InSink Erator Badger 500 1/2HP with cord Garbage Disposal

Bath

- o Lavatory Sink Kohler Bryant 20 1/8" x 16 1/2" oval white drop-in #K26994-4-0
- o ADA Lavatory Sinks American Standard Lucerne Wall-Hung Lavatory White 4" center hole #0356.041
- o Lav Bath Faucets to be Delta Single Handle #523LFHDF ADA
- o New Angle Stops shall be "1/4 turn" ball valve style
- o New shower valves to be Delta #R10000-UNWS.
- o Shower head not to exceed 1.5 GPM
- o Toilet – 1.28 GPF. ADA American Standard Cadet PRO ELONGATED WHITE
- o Shower doors - Deluxe bi-pass doors with chrome finish & textured glass. HD # 501724 or equivalent.
- § Water Heater – TBD
- § Hose bibs shall be 1/4 turn, ball valve style w/key.
- § Laundry room needs floor drain.
- § All laundry wall drain pipe to be 2" ABS.

A.2 Pipe Identification

1. Piping identification per ANSI and OSHA standards: Each individual pipeline shall be marked for quick and easy identification as to content and character of material carried in the pipes by Seton SNA or STR markers.
2. Markers shall be installed and located in such a way they shall be visible where piping system is exposed.
 - a. Furnish two identification charts complete with glass and frame showing list of materials carried in the piping system, classified by nature of its contents and respective identifying colors.
3. Color scheme shall be approved. Base color for markers shall be as follows:
 - Domestic hot water - Yellow w/ Black Letters.
 - Domestic cold water - Yellow w/ White Letters.
 - Fuel gas - Yellow w/ Black Letters.
 - Irrigation - Green w/ White Letters.
 - Sanitary sewer - Green w/ White Letters.
 - Sanitary vent - Green w/ White Letters.
 - Storm drains - Green w/ White Letters.

B. Materials: Materials when not otherwise definitely specified shall conform to the applicable ASTM, ASME, AGA, and ASA standards.

C. Equal Materials and Substitutions: In addition to manufacturers specified, the following shall also be considered equal, provided corresponding models meet specified requirements. Equivalent substituted equipment named herein shall be submitted to Architect for approval. Submit alternate selections at time of bid, listing major equipment.

ITEMMANUFACTURER

Strainers:	Walworth, Bailey, Mueller
Solders:	Handy-Harman, Lucas, Milhaupt
Cleanouts:	Zurn
Valves:	Walworth, Milwaukee
Pipe Hangers & Supports:	Fee & Mason, Elcan
Access Panels:	Milcor
Gas Vents:	Metalbestos
Insulation:	Manville, Gustin Bacon, Fiberglas
Plumbing Fixtures:	American Standards, Kohler.
Toilet Seats:	Church, Beneke
Flush Valves:	Delaney
Electric Water Coolers:	Elkay
Drains & Floor Sinks:	Zurn
Backflow Preventers:	Watts, Neptune, Hersey
Water Pressure Reducing Valves:	Bailey, Watts
Pressure Gauges:	Marsh, Marshalltown, Terice

Water Heaters:	American, State, National
Soil Pipe:	Tyler, Universal
Sump Pumps & Sewage Ejectors	Paco

2.2 PIPE AND FITTING SCHEDULE

- A. Soil, waste, vent and storm drain piping and to 5 feet outside building: No-hub cast-iron pipe and fittings CISPI-301.
- B. Domestic hot and cold water and sewage ejector pump discharge piping above ground: Type L hard-drawn copper tube, ASTM 688, and wrought copper fittings.
- C. Domestic cold water piping below ground and outside the building:
 - 1. Type K hard-drawn copper tube, ASTM B88, and wrought copper fittings ANSI B16.22, solder joint type (refer to paragraph "Pipe Wrapping" herein).
- D. Indirect and Condensate Drains: Type M copper tube, ASTM B88 and wrought copper fittings, ANSI B16.22, solder joint type.
- E. Gas Piping
 - 1. 2 inches and smaller: Schedule 40 black steel pipe, ASTM A53, A120, with 300 lb. WOG black banded malleable iron screwed fittings.
 - 2. 2-1/2 inches and larger: Schedule 40 black steel pipe, ASTM A53, A120, with tube-turn econo-weight welded fittings.
- F. Sub-Soil Drainage: Equivalent to Schedule 40 PVC perforated pipe with solid wall fittings and solvent cemented joints. Perforations shall be 3/8 inch diameter on 3 inch centers 90 degrees apart in two rows parallel to pipe axis. Install per manufacturer's directions.
NOTE: Installation shall be in accordance with the Soils Engineer's recommendations.

2.3 MATERIALS FOR JOINTS, FITTINGS AND VALVES

- A. Soil, Waste, Vent and Storm Drain Cast-Iron Pipe
 - 1. "No-Hub" couplings as approved by the cast-iron soil pipe foundation, CISPI-301.
- B. Solder and Flux
 - 1. Water Piping: Equivalent to copper brazing allow Harris "Bridgit". 95-5 solders are not approved.
 - 2. Copper Indirect and Condensate Drainage Piping: Lead-free solder with non-corrosive paste flux.
- C. Welded Joints: Welding shall be performed only by qualified welders, and shall comply with ASME Boiler Construction Code, ANSI Code for pressure piping, and state requirements.
- D. Unions and Gaskets
 - 1. 2 inches and under for steel pipe: Screwed malleable-iron ground joint, 300 lb. Class 150 WOG with brass-to-iron seat, galvanized or black to suit service.
 - 2. 2-1/2 inches and larger for steel pipe: Cast-iron flanged gasket type, conforming to ANSI B16.1, galvanized or black to suit service, or 150 lb. forged steel slip-on flanges.
 - 3. Unions for copper tubing: Cast bronze, ground joint pattern, soldered joint connection, ASTM B62 and ANSI B16.18.
 - 4. Dielectric Unions: Epco, complete with isolators and gaskets of same size as pipe, galvanized or black to suit service.
 - 5. Dielectric Flanges: F.H. Maloney Co., Type E flanges for cathodic insulation.
 - 6. Gaskets: 1/16 in. Garlock #17022.
- E. Strainers: Y-type with semi-steel body and stainless steel screen with perforations suitable for service requirements, or same size as pipeline in which installed. Provide gate valve with hose connection at each strainer blow-off.
 - 1. 2-1/2 inches and smaller: Bailey 100-A series, 125 lb. or 250 lb., screwed ends with screwed gasketed cap.
 - 2. 3 inches and larger: Bailey 100-A series, 125 lb. or 250 lb., flanged ends and bolted gasket cap.
- F. Valves: Valves shall be of same manufacturer, or following numbers or equivalent by comparator chart of approved manufacturer. Provide adapters for valves in copper tubing where necessary. All domestic water valves, two (2) inches and smaller, shall be ball valves.
 - 1. Eccentric valves, 2 inches and smaller, gas: DeZurik #425 valve with RS49, plug seals, iron body, screwed or flanged, U.L. listed.
 - 2. Gate valves, 2-1/2 inches and larger, domestic water: 200 psi WOG, solid wedge disc, union bonnet, rising stem, flanged.
Nibco F-617-0

- | | | | |
|--|----------|---------|--|
| | Crane | 465 1/2 | |
| | Stockham | G-623 | |
| | Hammond | IR330 | |
3. Partition stop valves: T&S B415, loose-key type with wall flange.
4. Ball valves, domestic water, 2 inches and smaller: Bronze, class 125, threaded.
- | | | | |
|--|----------|-------------|--|
| | Nibco | T-585 | |
| | Stockham | S-216-BR-RT | |
| | Hammond | 8201 | |
- Note: Flanged iron body valves or equipment used in copper piping systems shall be installed with Maloney Flange and Bolts insulating kits.
5. Balancing Valve: Griswold SH, Nibco #1710 or equal. Automatic balancing adjustable GPM flow. Provide ball valve downstream of balancing valve if balancing valve can not be used as a shut-off-valve.
- G. Check Valves
1. Horizontal swing:
- a. 2 inches and smaller (200 psi WOG), bronze screwed cap, swing. Threaded Solder
- | | | | |
|--|----------|------------|------------|
| | Nibco | T-413(BWY) | S-413(BWY) |
| | Crane | 37 | 1342 |
| | Stockham | 320 | B-309 |
| | Hammond | IB904 | IB912 |
- b. 2-1/2 inches and larger (200 psi WOG), iron body, bronze trim, screwed cap, swing, Y-pattern, regrinding, flanged.
- | | | |
|--|----------|---------|
| | Nibco | F-918-B |
| | Crane | 373 |
| | Stockham | G-931 |
| | Hammond | IR1124 |
- H. Pressure Reducing Valves
1. 1 inch and smaller: Watts 223S or equal.
2. 1-1/4 inches and larger: Cla-Val #90-01 or equal.
- 2.4 BACKFLOW PREVENTERS
- A. Reduced Pressure Type: Cla-Val model RP, Watts, Ames.
- 2.5 HOSE BIBBS
- A. HB-1: Equivalent to Woodford 24P-3/4, polished chrome-plated wall faucet with vacuum breaker and loose tee key.
- B. HB-2: Equivalent to Woodford Y24, chrome-plated yard type with vacuum breaker and loose tee key.
- C. HB-3: Equivalent to Woodford B75, wall hydrant with vacuum breaker.
- 2.6 PIPE HANGERS
- A. Hangers shall be supplied with factory installed isolation and di-chromate finish.
- 2 inches and smaller: Super Strut C-727-F.
 - 2-1/2 inches and larger: Super Strut C-710-F.
 - Concrete inserts: Super Strut 452.
 - Riser clamps for copper piping: Super Strut C-720-P, plastic coated.
 - Riser clamps for other piping: Super Strut C-720.
- B. Hanger rods shall conform to the following table:
- | | |
|--------------------------------------|---------------|
| Pipe size 2 inches and smaller: | 3/8 inch rods |
| Pipe size 2-1/2 inches and 3 inches: | 1/2 inch rods |
| Pipe size 3 inches and larger: | 5/8 inch rods |
- 2.7 ROOF FLASHING
- A. Galvanized sheet metal pipe flashing with neoprene canter flashings.
- 2.8 PIPE SLEEVES

- A. At concrete walls or floors, Adjust-to-Crete, Paramount, Hole-Out or Sperzel Cretesleeve. Floor sleeves shall extend to top of concrete curbs for piping rising through floors. Wall sleeves shall be flush with finished surface. Sleeves shall be sized to allow 1/2 in. clearance around pipe insulation. Insulation and covering shall be continuous through wall and floor sleeves.

2.9 ACCESS PANELS

- A. Access Panels in Plaster Walls and Ceilings: Elmdor PW, 24x24 in. with metal access door and frame, prime coated steel and painted to match adjacent surfaces. For fire rated areas use FR 1-1/2 hour "B" Label access panels, U.L. listed.
- B. Access Panels in Acoustic Tile Ceilings: Elmdor AT, 24x24 in. with metal access door and frame, 24x24 in. minimum size, prime coated steel, recessed to accept standard tile in full opening door.
- C. Access Panels in Ceramic Tile Walls: Smith 4730, chrome-plated cover and frame of suitable size for purpose intended, but not less than 8x8 in. size. For fire rated areas use FR 1-1/2 hour "B" Label access panels, U.L. listed.

2.10 CLEANOUTS

- A. For cast-iron soil pipe, iron body with extra heavy bronze plugs screwed into caulking ferrules; for steel pipe, extra heavy bronze plugs; and for vitrified clay pipe, vitrified clay plugs. Where cleanouts occur in finished interior walls, provide access panels, plates, and frames for flush mounting. Exposed parts of floor cleanouts shall have adjustable top. All cleanouts and cleanout plugs shall be accessible. Cleanout shall be the following:
- B. In finished floors: Cast-iron with polished nickel bronze round top, non-skid diamond tread set flush with the floor. Provide flashing flange when used with waterproofing membrane.
Smith - 4023
Wade - W-6000
Zurn - ZN-1420-2
- C. In mechanical equipment areas: Cast-iron with heavy cast-iron round top, non-skid diamond tread set flush with the floor. Provide flashing flange when used with waterproofing membrane.
Smith - 4223
Wade - W-6000
Zurn - Z-1420-25
- D. In walls: Cleanout tee with squared polished nickel bronze access plate with vandalproof screws and frames. Opening 8x8 in. minimum.
Smith - 4558-U
Wade - W-8460-S
Zurn - ZN-1445-3
- E. In exterior grades: Cast-iron body, vandalproof cover, non-skid diamond tread, set flush with grade or finished surface. In non-surfaced area, they shall be cast in a concrete block 14x14x6 in. deep.
Smith - 4020-U
Wade - W-8300MF
Zurn - ZN-1460-15-W/Z-1450-8

2.11 PRESSURE TEMPERATURE RELIEF VALVE

- A. Provide domestic water heater with ASME rated pressure/temperature relief valve set to relieve at 125 psi pressure and at 188 degrees to 208 degrees F temperature range.

2.12 PRESSURE GAUGES

- A. Potter-Roemer 6240-U.L. - F.M. 0-300 psi range, complete with 3-1/2 in. diameter dial and gauge cock. Install pressure gauges where indicated and as required.

2.13 INSULATION

- A. All pipe insulation shall comply with the State of California Energy Conservation Standards. Insulation thicknesses indicated are based on insulation having thermal resistances in the range of R-4.0 to R-4.6 per inch of thickness on a flat surface at a mean temperature of 75 degrees F. Thicknesses indicated are minimum and shall be increased proportionately for materials having R values less than 4.0 per inch of thickness or may be reduced for materials having R values greater than 4.6 per inch thickness. Install pipe insulation after piping is installed, tested and approved and is in clean, dry condition. Firmly butt insulation joints. All outdoor piping insulation waterproof with 0.016-thick aluminum jacket with longitudinal z joint secured with preformed two (2) inch wide butt straps and preformed aluminum fitting covers equivalent to Manville Matal-On.

2.14 PLUMBING FIXTURES (REFER TO PLUMBING FIXTURE SCHEDULE ON PLANS)

- A. Wall-Hung Fixtures: Fixtures specified with hangers or supporting arms shall have hangers or arms securely mounted on a 1/4 in. thick by 6 in. wide steel wall plate which extends at least one stud beyond first and last fixture mounting points, or a total of three studs minimum. Attach wall plate to each structural stud it crosses by tack welding each side of stud flange at top and bottom of plate. Fixture or supporting arms shall be securely and firmly attached to steel wall plate in accordance with manufacturer's instructions. If structural studs are not being installed behind wall-hung fixtures, plumbing contractor shall notify Architect and Mechanical Engineer immediately.
- B. Floor-Mounted Water Closets: Install on slotted cast-iron floor flanges. Make joints permanently gas and water tight with a preformed wax gasket and held in place with 5/16-in. solid brass bolts concealed with vitreous china bolt caps. Color to match fixture.
- C. Urinals: Install with brass nipples. Install at heights indicated on Architectural drawings.
- D. Drains: Where installed in construction with waterproof membrane, provide drains with flashing clamp device with corrosion-resistant clamping bolts.
- E. Fixture Sealer: Install wall-hung fixtures with white silicone sealer between fixture and wall, applied smooth and even.
- F. Fixtures, trim and accessories as shown and specified on the drawings.

2.15 SPECIALTY ITEMS

- A. See drawings for schedule.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection: All plumbing shall be installed in accordance with the requirements of all governing authorities, the original design, and the referenced standards.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Interferences between installed work of various trades due to lack of coordination shall be resolved by Owner's Representative whose decision is final. Relocate or offset any work as required to accommodate work of other trades at no extra cost to the Owner when so directed by the Owner's Representative.

3.2 LOCATIONS AND SPACE REQUIREMENTS

- A. Contractor shall fully inform himself regarding peculiarities and limitations of spaces available for installation of work under this division. Drawings indicate desired location and arrangement of piping, equipment and other items, and are to be followed as closely as possible. Work specified and not clearly defined by drawings shall be installed and arranged in a manner satisfactory to Owner's Representative. In event changes in indicated locations and arrangements are deemed necessary by Owner's Representative, they shall be made by Contractor without additional charge provided the change is ordered before work is installed and no extra materials are required.
- B. Verify all spaces, dimensions for all fixtures, equipment, tenant or Owner-furnished equipment and equipment furnished under other sections.
- C. Obtain all necessary rough in data and dimensions for all fixtures, equipment, tenant or Owner-furnished equipment and equipment furnished under other sections.
- D. Maintain ample headroom clearances and accessibility. Maintain ceiling heights.
- E. Constantly check work of other trades to prevent interference with this installation.

3.3 PIPE INSTALLATION

- A. Make pipe runs straight and true. Springing or forcing piping into place is not permitted. Install in manner to prevent any undue strain on equipment. Make joints smooth and unobstructed inside and out, and ream pipe ends thoroughly to remove burrs. Conceal piping in finished portions of the buildings except as otherwise

directed or indicated. Cap or plug ends and openings in pipe and fittings immediately to exclude dirt until equipment is installed or final connections are made. Make pipe size reductions with reducing fittings. Use no bushings unless specifically authorized. Use no close nipples. Proceed to rough in as rapidly as general construction of building will permit and complete and test before any lathing, plastering, or drywall, or other finish work is started. Fit work to available space and accurately rough in. Grade and valve water piping so as to provide for complete drainage and control of the system. Provide clamps and/or concrete thrust blocks at dead ends, angles, or other points where separation of joints may occur. Grade vent piping to allow piping to free itself of condensation or water.

- B. Install piping to clear beams unless sleeving is indicated. Constantly check work of other trades to prevent interference with this installation. Obtain approval from Architect if coring or cutting of concrete work is necessary due to failure to install required sleeves prior to the time of concrete pour. Cost of coring and cutting work shall be borne by the subcontractor.
- C. Exposed Plated or Enameled Pipe: Make connections to equipment with special care. Show no tool marks or threads.
- D. Dielectric Unions: Make connections between two dissimilar metal pipes with dielectric unions.
- E. Unions: Provide a union on one side of each shutoff valve, at both sides of automatic valves, at equipment connections and elsewhere indicated or required, unless flanges are indicated.
- F. Floor, Wall and Ceiling Plates: Provide where pipes pierce finished surfaces.
- G. Noise: Install soil, waste, and water piping in manner that prevents any unusual noise from flow of water under normal conditions.
- H. Shutoff Valves: Provide where indicated and required for adequate control of systems and for isolation of fixture groups and equipment.
- I. Buried Piping: Install with minimum 36 in. coverage unless otherwise indicated. Lay piping accurately to grade where invert elevations are indicated. When required, provide thrust blocks per manufacturer's recommendations.
- J. Equipment and Materials: Install per manufacturer's recommendations.
- K. Accessibility: Install work readily accessible for normal operation, reading of instruments, adjustment, service, inspection and repair. Provide access panels where indicated and required.
- L. Pipe Joints: Make screwed joints with a minimum amount of compound applied to the male thread only. All joints shall be made per code requirements.

3.4 HANGERS AND SUPPORTS

- A. Hold horizontal pipe runs firmly in place using approved steel and iron hangers, supports, and/or pipe rests unless otherwise indicated. Suspend hanger rods from concrete inserts or from approved brackets, clamps or clips. Hang pipes individually or in groups if supporting structure is adequate to support weight of piping and fluid. Except for buried piping, hang or support pipe runs so that they may expand or contract freely without strain to pipe or equipment.
 - 1. Horizontal steel piping: Provide hangers or supports every 10 ft. except every 8 ft. for piping 1-1/4 in. and smaller.
 - 2. Horizontal copper tubing: For 2 in. diameter and over, provide hangers every 10 ft.; for 1-1/2 in. diameter and smaller, every 6 ft.
 - 3. Horizontal cast-iron hub and spigot piping: Provide hangers or supports at each hub.
 - 4. Vertical piping: Support at floor with iron pipe clamps.
 - 5. Sway brace in accordance with SMACNA standards.
- B. Branches: Provide separate hangers or supports for branch lines 6 ft. or more in length.
- C. Sound and Electrolysis Isolators: Provide at all hangers and supports for hot and cold domestic water lines. Securely attach pipe to walls, studs, etc. All such piping isolated from structure by Acousto-Plumbing Systems (Robert Bahaglia (800) 854-2215 Ext. 112), or by Trisolator Products (Stoneman Industries). Installation of piping, fixtures, and equipment shall be in accordance with Acoustical Engineer's requirements.

3.5 EXPANSION AND CONTRACTION

- A. Install piping subject to expansion and contraction with expansion loops made up of bends, fittings, or Victaulic couplings, expansion joints, swing joints, or other approved methods or devices. Branch lines from mains subject to expansion and contraction shall have a swing joint at a point of connection with the main. Risers which pass through one or more floors shall have swing joints at their base. Anchor lines subject to expansion and contraction by approved methods to restrict movement.

3.6 CORROSION PREVENTION

- A. Make joint between cuprous and ferrous materials with approved nylon insulating couplings. Separate contact surfaces of dissimilar metals with non-conducting coating or sheet.

3.7 CLEANOUTS

- A. Provide cleanouts where indicated and required. Unless otherwise indicated, cleanouts shall be accessible with extensions to grade, to outside of buildings, or to floors above as indicated or required. Do not locate cleanouts in public lobbies and public corridors unless approved by Architect.
- B. Membranes: Where waterproofing membrane occurs under floor, bring membrane to cleanout without puncturing, and permanently anchor to integral anchoring flange with a heavy cast-iron clamping collar and rustproofed bolts.
- C. Covers: Set cleanout covers with all finished wall, floor or grade. In all cases securely anchor by means of integral lugs and bolts. Where surfacing material such as resilient covering is specified, ascertain thickness being used and set cleanout top so finished floor is smooth.
- D. Use Acorn 3500 thread compound.

3.8 ACCESS BOXES AND PANELS

- A. Provide valve boxes for valves located below grade. Provide metal access panels of size and type hereinbefore specified for valves or shock absorbers located in concealed areas.
- B. Access Boxes and Panels: Set flush with finished wall, floor or ceiling. Those in finished walls shall have door or plate removed during construction or be otherwise suitably covered to protect finish.
- C. Outside General Service Access Boxes: Provide with metal, asbestos cement, or clay pipe sleeve extensions where added depth is necessary. Do not locate boxes in public walks, driveways or covered passages unless indicated.

3.9 EXCAVATION AND BACKFILLING

- A. Perform excavation and backfilling required work under this section unless otherwise specified. Conform to requirements of Division 2 and of public authorities having jurisdiction.

3.10 SPECIALTY ITEMS

- A. Install as indicated on the drawings, as herein specified, and as recommended by manufacturer.

3.11 TESTS

- A. Perform tests to Architect's satisfaction. Make tests in presence of Architect and at a time suitable to him if requested. Furnish necessary labor and equipment and bear costs for testing. Cost of replacing and/or repairing damage resulting therefrom shall be borne by this Contractor. Should the Contractor refuse or neglect to make tests necessary to satisfy the Architect that requirement of specifications and drawings are met, such tests may be made by an independent testing company and the Contractor charged for all expenses.
- B. Hydrostatic Tests: Make by completely filling piping system with water and eliminating accumulations of air so that leakage, no matter how small, will be apparent on testing gauge immediately. Maintain pressure until pipe under test has been examined, but in no case less than 24 hours. Test systems at following pressure:

<u>SYSTEM</u>	<u>TEST PRESSURE</u>
Domestic cold water	150 psig
Domestic hot water	150 psig
Irrigation	150 psig
- C. Sanitary Soil, Waste, Vent System Tests: Before installation of fixtures, cap ends of system and fill lines with water to 10 ft. above the section being tested (including vents) and allow to stand until a thorough inspection is made. Make tests in sections if necessary or convenient. However, include interconnections between new sections and previously tested sections in the new test.
- D. Roof drainage system: Test as specified for sanitary system.
- E. Gas systems: Test with compressed air for six hours or longer as directed to prove tight without leaks. Use pressure recorder to record pressure of all lines for duration of test.

3.12 ADJUSTING

- A. Upon completion of work and after cleaning of system, fixtures and equipment, and automatic parts of plumbing system shall be carefully adjusted normal operation. All flush valves and fixture stops shall be checked for proper operation and final adjustments made where required. System shall operate quietly without vibration or noise.

END OF SECTION

SECTION 22 05 00

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.1 SCOPE

- A. The work includes, but is not limited to the following:

Construction, installation, materials and equipment described herein are generally common to the various sections of this Division as listed in Section 23 00 00, General Mechanical Provisions.

1.2 RELATED DOCUMENTS

- A. Provisions established within General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

1.3 DESCRIPTION:

- A. Work included in This Section: The following Specification applies to all Sections of the Mechanical Division.

1.4 SUBMITTALS:

- A. Make submittals in conformance with Section 23 00 00.

1.5 PRODUCT HANDLING:

- A. Keep materials dry and protected against weather.

PART 2 PRODUCTS

2.1 STANDARDS FOR MATERIALS:

- A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards. All materials and equipment shall be UL listed and labeled where possible.
1. Underwriters Laboratories, Inc. (UL).
 2. National Electrical Manufacturer's Association (NEMA).
 3. American National Standards Institute (ANSI).
 4. American Gas Association (AGA)
- B. Manufacturer's names and catalog numbers are used as a means of establishing product grade and quality. Where several manufacturers are named, only these named manufacturers' are to be used on the job. Other named manufacturers, although acceptable as manufacturers, must prove their product will conform satisfactorily and will meet space and capacity requirements, etc., of the first named manufacturer.
- C. The use of one named manufacturer in the schedules on the Drawings is for guide purposes. The provisions of the above paragraph will govern in the selection of products to be used.
- D. Where the "or approved equal" clause is used in these specifications, the name, or names, mentioned are to be used as a basis of quality. Other manufacturer's products will, however, be considered as substitutions and shall not be used as a basis for pricing.
- E. Basis of quality shall be interpreted to include material, workmanship, weight, finish, gauges of material, appearances, capacity, performance, etc.
- F. Manufacturer's representation as to availability of equipment parts and replacement and service personnel in the area will be a factor in consideration of substitutions.

2.2 MATERIALS

- A. Piping: All pipes shall be continuously and permanently marked with the manufacturer's name, type of material, size, pressure rating, and where applicable, ASTM No., ANSI or U.L., or NSF listing. On plastic pipe, the date of

extrusion must also be marked.

	Schedule No.	Description
1.	P-1	Steel, galvanized, Schedule 40, ASTM A53 (current issue).
2.	P-2	Copper water tube, Type L hard, ANSI H23.1, ASTM B88, IAPMO i.s. (current issue).
3.	P-3	Steel, black, Schedule 40, ASTM A53, seamless, butt weld or threaded.
4.	P-4	Refrigerant Piping

B. Pipe Fittings

	Schedule No.	Description
1.	PF-1	Malleable iron, screwed, galvanized, beaded, ASA for use with P-1.
2.	PF-2	Wrought copper - solder type ANSI B16.22 for use with P-2
3.	PF-3	Standard weight malleable iron, same as PF-1, except not galvanized for use with P-3.
4.	PF-4	Standard weight seamless, carbon steel, butt welding fittings, ASTM A-106, Grade A for use with P-3.

C. Vibration and Pipe Isolators

Refer to Section Noise, Vibration and Seismic Control (provided by others if applicable).

D. Unions

1. Tubing: 3" and smaller, 150 lb. cast bronze or copper, ground joint, non-ferrous seat with sweat ends, Walseal, Nibco and Mueller. Contractor has the option to use Type "L" copper. Black steel shall be provided for tubing 4" and larger.
2. Pipe: 3" and smaller, 150 lb. cast brass ground joint, brass to brass seat, threaded ends.

E. Flanges

1. 150 lb. cast brass, flat faced, solder sweat type, ASA B-16.4, on piping 2-1/2" and larger.

F. Gaskets

1. 1/16" thick rubber, Johns-Manville 107, Garlock 22, or Crane 555, full faced.

G. Valves

1. General
 - a. Each valve shall have the manufacturer's name or brand, the figure or list number and the rated working pressure cast or stamped on the body or bonnet or other equivalent means of easy identification.
 - b. Valves without specified materials or working pressure shall be selected to match materials

and pressure ratings of the fittings as a minimum.

- c. All gate and globe valves shall be back seating type suitable for repacking under pressure.
- d. Globe valves shall have composition discs suitable for the temperature and pressure of the service.
- e. Ball and butterfly valves on insulated piping shall have the neck extended two inches above the outside diameter of the flange to accommodate the full thickness of the insulation.
- f. Automatic Valves (Solenoid Valves) shall be 125 lb. WOG, brass bodied, screwed, stainless steel trim, resilient seated, normally closed 2-way, and 120 volts, 60 hertz, ADSCO Bulletin 8210 for sizes 3/8" to 3"; Bulletin 8222 for 125 lb. steam, sizes 3/8" to 3". Equal by General Controls, ALCO or Magnatrol will be acceptable.

2. Service Valves, (SV)

- a. 2" and smaller: 150 lb. WOG, bronze body, screwed, full port, stainless steel ball and handle, teflon seats packing and gasket, Jenkins Fig. 32AS or 150 lb. WOG bronze body, wedge disk, non-rising stem gate valve, screwed.
- b. 2-1/2" and larger shall be gate valve.

3. Check Valves, (CV)

- a. Swing checks.
 - 1). 2" and smaller: 125 lb. SWP bronze screwed with regrinding bronze discs and screw-in cap, Jenkins Fig. 92A.
 - 2) 2-1/2" and larger: 125 lb. SWP iron body, bronze trim with regrinding bronze discs and seat ring and bolted cover, Jenkins Fig. 624.
- b. Spring Loaded Checks, (NSCV)
 - 1) 2" and smaller: 125 lb. SWP bronze body, screwed, guided bronze disc, bronze ring with Conical Stainless Steel, Type 302, Spring, Miller 162.
 - 2) 2-1/2" and larger: 125 lb. SWP iron body, flanged, guided stainless steel disc and ring, Conical Stainless Steel, Type 302, Spring, Miller 162.
- c. Relief Valves
 - 1) Relief valves shall be properly sized for system in which installed, in accordance with codes. Relief valves similar to Lonergan Type T.

H. Air Vents

- 1. Air vents shall be similar to Armstrong Type AR No. 21.

I. Water Flow Measuring Devices

- 1. Minimum Overall Accuracy: Plus or minus 2% over range of 70-110% of design flow. Select devices for not less than 110% of design flow rate.

2. Orifice Type: Cast iron wafer type, precision-machined, valved pressure taps or quick disconnects with integral check valves. Install between ANSI pipe flanges.
3. Combination Balancing-Measuring Valve: 2" and smaller, at Contractor's option, in lieu of both water flow measuring device and separate balancing valve.
4. Flow Measuring Device Identification
 - a. Metal tag attached by chain to device. Include meter or equipment number, manufacturer's name, meter model, flow rate factor and design flow rate in gpm.

J. Strainers

1. 2" and smaller: 250 lb. Y-pattern Bronze, screwed, with machined and gasketed strainer screen retainer cap, Bailey No. 100A.
2. 2-1/2" and larger: 125 lb. Y-pattern cast iron, flanged, with bolted strainer screen cap with offset blow-down connection.
3. Strainer screen shall be Monel with 3/64" perforations (225 per sq. in.)
4. Strainers shall have machined a gasketed caps either straight threaded or bolted.
5. Strainer open area of screen shall be at least three times the cross-sectional area of the pipe in which installed based on iron pipe size (IPS) and may be either woven wire or perforated with equivalent openings as specified in pipe schedules.
6. Minimum inside dimension or diameter of box, 4" for valve sizes 3" and smaller, and 5" for valve sizes 4" and larger.
7. Where several valves or other equipment are grouped together, provide larger boxes of rectangular vault type, adequately sized for conditions and similar in construction to those specified above.

K. Dielectric Isolators

1. General

Isolators shall be so constructed that the two pipes being connected are completely insulated from each other with no metal-to-metal contact and suitable for service on which used. Insulating couplings are not acceptable.

2. Unions

- a. For piping 2" and smaller, unions shall be brass solder sweat to IPS with ground-joint and micarta sleeving.
- b. Steam and condensate lines: High temperature type, suitable for continuous operation on temperatures up to 250 degrees F. for condensate and 400 degrees F. for steam.

3. Flanges

- a. For piping 2-1/2" and larger, flanges shall be flanged sets with neoprene gasket for flat face flanges with bolt hole punches to receive bolt sleeves of 1/32" micarta with 1/8" thick micarta washers.

- b. All others: Insulating flanges or unions, suitable for 125 psig W.P.
 - 4. Manufacturer
 - a. Dielectric isolator shall be as manufactured by F.H. Maloney, EPCO, Cathodic Protection Service, Corro Ban Products or W.C. Vallett.
- L. Flexible Piping Connections
 - 1. Designation and length as recommended by manufacturer for system's test and operating pressures and temperatures.
- M. Instruments
 - 1. General
 - a. Pipe mounted pressure gauges and thermometers shall be as scheduled herein and shown on the plans.
 - b. Pressure gauges
 - (1) Gauges shall be of the Bourdon tube type, Marsh Instrument Co., "Quality Gauge".
 - (2) Gauges shall have 3-1/2" minimum dial face, white with black numbers and graduations, steel or aluminum case with double strength glass, nickel plated ring and built in or add on pulsation dampeners.
 - (3) Movement shall be of the phosphor bronze seamless Bourdon tube type with recalibrating bushed rotary gear movement and link fitted with a black aluminum pointer with means for face calibration.
 - (4) Accuracy in the middle third of dial range shall be plus or minus 1% of total dial range.
 - c. Thermometers. Thermometers shall be vapor tension type, 4-1/2" diameter, corrosion resisting movement, black enamel finish casing, J. P. Marsh Type 59, or approved equal.
- N. Pipe Supports
 - 1. General
 - a. Supports shall be defined as hangers, brackets, framing, guides and anchors.
 - b. Supports shall be factory-fabricated units with published load limits.
 - c. Supports fabricated of steel shapes and installed in weather exposed locations, in equipment rooms or regularly occupied areas shall be hot dip galvanized after fabrication.
 - 2. Horizontal piping
 - a. Hangers shall be of the following types:
 - 1) For piping 4" and smaller adjustable malleable iron split ring type, Grinnel Fig. No. 104, or Fig. 174.

- 2) For piping larger than 4" and all insulated pipe fitted with inserts and shields, adjustable steel clevis type Grinnel Fig. No. 260, or Fig. 181.
- 3) Rod lengths shall be adjustable.
- 4) Hang rods for both single and trapeze hangers from suitable clips, beam clamps or self-drilling expansion type or from 3/8" diameter rods and percussive driven studs. Verify with Structural Engineer.
 - b. Brackets shall be Grinnel 194 or 195.
 - c. Roll stands shall be Grinnel Fig. 271.
3. Vertical piping
 - a. Clamps shall be Grinnel Fig. No. 261.
4. Rods
 - a. Solid mild steel minimum size as follows:

2" and smaller pipe	3/8" diameter rod
2-1/2" to 3-1/2" pipe	1/2" diameter rod
4" to 5" pipe	5/8" diameter rod
6" pipe	3/4" diameter rod
8" to 12" pipe	7/8" diameter rod
5. Concrete fasteners
 - a. Percussion driven studs shall be Ramset No. 2049 or equal by Drivet or Remington.
 - b. Self drilling anchors shall be Rawl or Philips Red Head.
- O. Sleeves, Core Drilling and Escutcheons
 1. General
 - a. Sleeves shall be permanently installed type where waterproofing is required cast-in-place or dry-packed in core drilled hole. Refer to section 03300.
 - b. Escutcheons shall be prime coated steel type
 2. Sleeves shall be as follows:
 - a. Floor slabs inside partitions, furred spaces and interior concrete walls: Core drill as necessary.
 - b. Cast concrete beams: Core drill as necessary.
 3. Escutcheons shall be as follows:
 - a. 6" and smaller: Prime coated steel with set screw, Beacor No. 13 or equal by F & S Manufacturing Co.
 - b. Larger than 6": Prime coated brass with set screw, Beacor No. 3 or equal by F & S Manufacturing, Fig. 605 or equal.

- c. Raised sleeves in floor slabs: Deep drawn prime coated steel or brass, F & S Manufacturing Fig 605, or equal by Beacor.
 - 4. Caulking shall be as follows:
 - a. Watertight: Projects Research Co. "Rubber Caulk" No. 150 heavy type or equal by DAP, Dow Corning or General Electric.
 - b. Fireproofing: Caulked glass fibrous rope.
- P. Flashing
 - 1. General
 - a. Flashing shall be galvanized flashing with 10" skirt and boot with counter flashing sleeve.
 - b. Ductwork flashing shall be 22 ga. galvanized steel.
- Q. Access Panels
 - 1. General
 - a. These specifications cover prefabricated wall and ceiling access panels normally required to provide access to equipment requiring servicing and adjustment.
 - b. The types of wall and ceiling access panels required are similar to Milcor Styles A, L, K, and M, Potter-Roemer No. 265 and 275, Zurn Series Z-1376, Carey Styles HP, HP HPE, and AT, or Karp #214, for the appropriate locations and with hinge, metal gauge, latch, and other modifications necessary to conform to requirements specified hereinafter. Panels shall be U.L. labeled to match wall or ceiling rating requirements.
 - 2. Location
 - a. Furnish for installation by the pertinent trade, access panels wherever fans, air handlers, air filters, valves, balance valves, damper operating mechanisms, fire damper access doors and similar items normally requiring adjustment or servicing are installed in concealed spaces.
 - b. Where furred ceilings are of the removable panel type of construction, the removable panels will be used for access to small equipment such as valves, dampers and controls.
 - 3. Sizes
 - a. Access panels shall be of a size to permit removal of equipment for servicing, but not less than 12" x 12" minimum opening.
 - b. Where proper servicing of the equipment requires the entrance of a serviceman, the access opening shall be sized accordingly with minimum opening not less than 18" x 24".
 - c. Where access panels are to be located in acoustic tile ceilings, size of access panel shall be increased, when required, to next nearest full tile size so that access panel can be installed integral with tile pattern without cutting into tiles.
 - 4. Construction
 - a. Access panels shall be neatly constructed and substantially made of steel complete with

frame and with necessary grounds for attaching to metal lath, tile walls or other construction, as required. Hinges shall be of concealed type. Minimum door and frame gauges shall be USS No. 16 and USS No. 18, respectively. Panels and frames shall be furnished with a factory-applied prime coat, except panels in tile walls shall be chrome plated and polished or satin finish Type 304 stainless steel.

- b. Panels to be installed in acoustical tile ceilings shall be as specified in paragraph one (1) above except that the door panels shall be recessed and faced with acoustical tile to match the ceiling tile so the frame will be concealed. The depth of the door recess shall be such that door facing tile are flush with ceiling tile.

5. Exceptions

- a. Normally, access doors to large attic spaces and large pipe spaces behind toilet batteries will be furnished under another section, and when so furnished will be shown on the plans. Examine all plans carefully and furnish any access panels or doors to equipment in these spaces where they are not to be furnished under the other section.

2.3 ACCEPTABLE MANUFACTURERS

A. General

- 1. Manufacturer's products named in this Section were selected for desired type, quality and performance.
- 2. Manufacturers producing similar products and of a type, quality and performance as specified, are listed below.

B. Manufacturers shall be as follows:

- 1. Cast iron soil pipe

Alabama
Rich
U.S. Pipe

- 2. Vitrified clay pipe

Pacific Clay Products
Interpace

- 3. No-hub piping couplings

"MG" Coupling
Tyler Pipe
Clamp-All

- 4. Grooved end fittings

Victaulic

- 5. "Tap-in" fittings

Trans-O-Con
Vogt

Bonney
Applied Piping Products

6. Service valves (gate and ball valves)

Nibco Scott
Lunkenheimer
Jenkins
Crane

Ohio Brass
Stockham
Walworth

7. Butterfly valves

Jenkins
Crane
Posi-Seal
Victaulic
Pratt
Stockham

Mission
Centerline
Deming

8. Check Valves - non-slam

Miller
Williams Hager
Jenkins
Stockham

9. Check Valves

Crane
Jenkins
Walworth
Nibco
Stockham

10. Air vent

Sarco
Hoffman
Marsh
Bell & Gossett
Armstrong
Braukman

11. Throttling valves (Globe)

Nibco-Scott
Jenkins
Crane
Walworth
Stockham

12. Needle valves

Crane
Eugene Ernst

Walworth

13. Plug cocks
- | | |
|--------------------|--------------|
| Crane | Eugene Ernst |
| Rockwell-Nordstrum | Stockham |
14. Strainers
- | | |
|-----------|-------------------|
| Yarway | Illinois |
| Zurn | Bailey |
| Armstrong | Strong |
| Leslie | Muessco (Mueller) |
15. Air Eliminators
- | | |
|-----------|----------|
| Armstrong | Serco |
| Bailey | Wheatley |
| Hoffman | |
16. Relief Valves
- | | |
|-----------|-----------|
| Bailey | Loneragan |
| Cash-Acme | Mueller |
| Cla-Val | Watts |
| Fisher | |
17. Water Flow Measuring Devices
- | | |
|----------------------------|--------------------|
| Dieterich Standard Annubar | Barton Instruments |
| Bell & Gossett | Armstrong Pump |
18. Design Criteria
- a. Piping specialties shall be rated for 150 psi WSP.
- b. Offsets, z-bends, expansion loops, anchors, guides, and supports shall be of proper design to perform expansion within stress limits of ANSI Code for Pressure Piping.
19. Requirement of Regulating Agencies: Relief valves to be ASME rated.
20. Instruments
- | | |
|--------------|----------|
| Eugene Ernst | US Gauge |
| Marsh | Weiss |
| Trerice | Palmer |
21. Pipe supports
- | | |
|---------------------|------------|
| Carpenter-Patterson | Kindroff |
| Power Piping | Unistrut |
| Grinnell | Superstrut |
| Elcen | Fee-Mason |

2.4 MOTORS AND CONTROLLERS:

- A. Furnish motors, motor starters, and automatic controls as specified elsewhere, unless specifically excluded. Set motors in place and furnish starters to Electrical Section together with all necessary wiring diagrams and instructions (see Temperature Control Section of the Specifications). All electrical wiring is specified to be done by the Electrical Section.
- B. All motors shall conform to the requirements of the latest NEMA motor standards and shall be manufactured by Century, GE, Louis Allis or U.S. Motors of a type suitable for service intended. All motors five horse-power and above shall be multi-voltage. All motors shall be rated to operate at a temperature of 40 degrees C above the ambient room temperature. Oiling devices shall be so located that they will be readily accessible. In general, motors of one-half HP capacity or larger shall be three phase and the smaller motors shall be single phase. Motors or belt driven equipment shall be provided with adjustable slide rails. Motors or outdoor installation shall be TEFC unless otherwise specified. In all cases, the nameplate horsepower of the motor submitted shall be equal to or greater than the scheduled horsepower and shall be greater than the required horsepower to handle the load.
- C. Controllers for all three phase motors shall be automatic magnetic type, complete with ambient compensated thermal overload protection in each leg of a type and capacity suitable for the motor protected. Controllers for single phase motors shall provide thermal overload protection. All controllers shall have at least two extra sets of contacts for interlocking and alarm functions. Auxiliary controls and devices shall be operated on 110V, single phase current from a separate source or through transformers. Submit shop drawings on all controllers. Controllers shall be Allen-Bradley, General Electric, Square D or Cutler Hammer.
- 4. All electrical devices that fall within scope of the UL testing capabilities shall be so tested and marked on reinspection basis.
- 5. Provide nameplates for all switches, starters, etc. Plates shall be made of plastic or of black anodized aluminum, suitably engraved and shall be mounted below the device. Punch plastic tape will not be acceptable.
- 6. If the Contractor proposes to furnish motors varying in horsepower and characteristics from those specified, he shall first inform Architect of the change and shall then pay all additional electrical charges in connection with the change.

2.5 FOUNDATIONS:

- A. All concrete foundations required by equipment furnished by the Mechanical Sub-Contractors shall be constructed by them (except where otherwise noted) in conformity with the recommendations of the manufacturer of the respective equipment, and with approval of the Architect. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms where the concrete is poured. All 1" below the equipment bases for alignment, leveling and grouting with non-shrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up tight and the equipment shimmed, if necessary. After removal of the forms, the surface of the foundation shall be rubbed. Unless otherwise noted, foundations shall be 6" high. All concrete work performed by these Sub-Contractors shall conform entirely to the requirements of the specifications section which describes this class of work.

2.6 FLAME SPREAD PROPERTIES OF MATERIALS:

- A. Materials and adhesives used throughout the mechanical system for filters, acoustical lining, thermal (pipe) insulation, flexible connections, duct tape, pneumatic tubing, etc., exposed in plenums, shall conform to the Federal Standard flame spread properties of materials. Under this requirement, the classification shall not exceed No. 11, with the range of indices between 0 and 25 for the basic materials, their indices of 50 in its classification No. 111 as listed in the Federal Specification.
- B. Only materials and adhesives meeting these requirements will be acceptable.

PART 3 EXECUTION**3.1 EXCAVATING AND BACKFILLING:**

- A. Trenches for underground pipes shall be excavated by the Plumbing Sub-Contractor to the required depths and bell holes shall be provided to ensure uniform bearing. Excavation below grade shall be refilled with existing material firmly compacted. Where rock is encountered the trench shall be excavated to a grade 3" below the lower-most part of the pipe and the trench shall be refilled to grade required. Trenches shall be per O.S.H.A.

requirements sheathed or braced, and pumping or bailing performed as may be necessary to protect the workman and adjacent structures and to permit proper execution of the work. After pipe lines have been tested, inspected and approved by the Architect, the trenches shall be backfilled with existing material, tamped, or otherwise thoroughly compacted in place, as specified herein.

- B. All excavations shall be made to the proper depth, with allowances made for floor slabs, forms, beams, etc. Ground under pipes shall be well compacted before pipes are installed, bell holes shall be provided to ensure uniform bearing. Where rock is encountered it shall be excavated to a grade 3" below the lowest part of the pipe and the trench refilled to the required grade.
- C. All exterior pipes shall be installed with a minimum of 18 inches of cover below the finished grade, unless otherwise indicated.
- D. All backfilling shall be done after testing, inspection and acceptance shall be made with selected soil, free of rocks and debris and shall be pneumatically tamped in six inch layers to secure a field density ratio of 90%.
- E. All excavated material not suitable and not used in the backfill shall be removed from the site.
- F. Field check and verify the locations of all underground utilities prior to any excavating. Avoid disturbing these as far as possible. In the event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equal to that before the trenching was started.
- G. Where the excavation required the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cut shall be held to a minimum, consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with Specifications, the facility shall be patched. Use materials for patching to match those taken out. The patches shall bond with the original surfaces and shall be level with them and shall present a neat and workmanlike appearance.

3.2 LOCATION OF OUTLETS:

- A. The locations of all pipes, outlets, appliances, etc., shown on Drawings are approximate only, and understood to be subject to such revision as may be found necessary or desirable at time work is installed.
- B. Generally, all outlets shall be properly centered in rooms, panels and other finished work and shall not interfere with outlets or equipment of other trades and shall meet the dimensioned or large scale drawings of the Architect.
- C. The Electrical and Mechanical Sub-Contractor shall coordinate their work with the ceiling and wall finish trades, so that the finished project will be symmetrical. Outlets smaller than the pattern, shall be centered on the pattern, while any outlet larger than pattern shall be centered either on the pattern or at the intersection of four patterns unless dimensioned otherwise on the plans.

3.3 GENERAL PIPING REQUIREMENTS:

- A. Furnish and install, including all labor and materials required, the various piping systems as specified, adhering to the general routing and methods of distribution shown on the Drawings, including all required pipe, fittings, valves, hangers, sleeves, inserts and other items and appurtenances as may be required for satisfactory operation of various systems.
- B. All piping shall be installed in the most direct, neat and workmanlike manner, employing only mechanics skilled in each respective trade.

- C. Exposed lines shall be where possible, run parallel with and perpendicular to building lines and wherever possible, shall be grouped together for easier service and identification. Lines which require definite grades for draining shall have precedence in routing over all other lines. Wherever possible, horizontal lines and vertical lines shall be held as close as possible to the walls, ceilings, struts, members, etc., to occupy the minimum space consistent with the proper requirements for insulation, expansion, removal of pipe and access to valves, dampers, etc. Concealed work shall finish off within limits permitted by the vertical or horizontal chases.
- D. Hangers and Supports:
1. All piping shall be securely fastened to the structural components of the building. Do not compromise the structural integrity of the building structure when fastening the hanger rods to the structure.
 2. Hangers and supports shall be Fee and Mason, Michigan Hanger or Grinnell of the following catalog types:
 - a. Uninsulated piping Figure 400 or 500
 - b. Insulated piping Figure 800
 - c. Vertical piping Figure 304, 307 or 366
 3. Horizontal hanger spacing shall be as follows:
 - a. Cast iron soil pipe - 5'0" except may be 10'0" where 10' lengths of pipe are installed.
 - b. Threaded steel pipe - 10'0" for 3/4" diameter and under and 12'0" for 1" diameter and over.
 - c. Copper tube and copper pipe - 6'0" for 1-1/4" diameter and under and 10'0" for 1-1/2" diameter and above.
 - d. Rigid plastic pipe - 4'0".
- E. Valves which are required for a control or isolation of any and all parts of the systems shall be furnished, installed and located in any accessible position or made accessible through removal panels, etc., and where several valves are related as to function, they shall be grouped in battery.
- F. Unions or flanges shall be used at connections to all equipment to facilitate dismantling and elsewhere as required, in the erection of the pipe or in installation of valves and shall not be located in concealed spaces. Connections to rotating equipment shall be made in such a manner to prevent transmission of vibration into piping system.
- G. Nipples shall be of the same material and composition as the pipe on which they are installed, and shall be extra heavy when unthreaded shoulder is less than one inch. No running thread nipples will be permitted.
- H. All pipe shall be properly reamed after cutting and threading and shall be cleaned before installation.
- I. Threads used in the assembly of pipe shall conform to ASA Dimensional Standards B2 and shall be cut true and clean. Pipe ends shall be with an approved pipe lubricant applied to the male threads only.
- J. Copper pipe shall be assembled with sweat fittings using a suitable water soluble binder flux paste and Easy-Flo or Silfos solder.
- K. Swing joints, turns, expansion loops, existing joints or long offsets, shall be provided wherever shown on the Drawings and wherever necessary to allow for the expansion of piping within the building. Broken pipes or fittings due to rigid connections must be removed and replaced at Contractor's expense. Anchors shall be installed where shown or required to control expansion of the piping systems. Anchors shall be of the clamp type securely fastened to building structure.
- L. All pipes and piping systems shall be substantially supported and properly held in position. In all cases, piping systems shall be supported from concrete slabs or structural members. Pipe supports in existing structures shall be as detailed and/or noted on Drawings. In no case, however, shall holes be drilled in any building structure member for pipe supporting purposes, without the Architect's approval. No piping is to be unsupported or shall support its own weight.
- M. Hangers in contact with copper piping shall be unistrut with felt isolators.

3.4 INSTALLATION OF PIPING

A. General

1. Furnish and install all piping, equipment trim, etc., including all work necessary to make complete and properly operating systems, whether or not all details are mentioned in these specifications or indicated on the drawings.
2. Rough-in work: Pipe sizes shown on the drawings are nominal inside diameter except copper tubing for refrigerant service which is outside diameter. Wherever five inch size pipe is shown, six inch may

be substituted. Unless noted otherwise, make all pipe trim full line size.

3. Proceed as rapidly as the building construction will permit, so as to be completed, tested and approved before being enclosed.
4. Carefully inspect each piece of pipe and each fitting to see that there is no defective workmanship on the pipe or obstructions or dirt in the pipes and fittings. Material having burrs, slag intrusions, cracks, eccentricity, excessive roughness, damage due to rough handling, etc., will be rejected and shall be removed from the job site.
5. Whenever work is not in progress and at the end of each workday, cap or plug all openings in completed piping to prevent the entrance of materials that would obstruct the pipes. Leave in place until removal is necessary for completion of installation.
6. No piping shall be permanently closed up, furred in, or covered over before it has been tested and inspected as specified herein and is accepted by the Architect/Engineer.
7. Install piping parallel to walls and to present a neat appearance both as to workmanship and grouping.
8. Piping shall clear all obstructions, preserve headroom and keep openings and passageways clear whether shown on the plans or not.
9. Should structural difficulties prevent the running of pipes or the setting of equipment at the point indicated by drawings, the necessary minor deviations therefrom, as determined by the Architect/Engineer will be allowed, but must be made without additional cost.
10. Locate piping to clear steel reinforcing bars in beams. Offset reinforcing bars in walls to clear piping and sleeves. Get approval from Structural Engineers.
11. Joists, girders, beams, columns or reinforcing steel shall not be cut or weakened.
12. Conceal all piping within the building wherever possible, unless otherwise noted on drawings. Exposed piping, wherever necessary, shall if possible be run in unfinished rooms.
13. Do not use couplings except where required pipe runs between fittings that are longer than a standard length of the type of pipe being used and except where their use is specifically approved by the Architect/Engineer.
14. Copper, bronze, and brass solder type fittings, including unions and flanges, shall have sockets of proper diameters to suit outside diameters of copper and brass pipe and copper tubing with which they are being used. The expanding or swaging of tubing to fit IPS fitting sockets will not be permitted.
15. Cut pipe accurately to measurements established at the site. Work into place without springing or forcing. Properly clear all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted.
16. Pipe damage: Show no tool marks or threads on exposed plated, polished or enameled connections to fixtures. Tape finished surfaces to prevent damage during plastering. Brass and copper piping shall have no tool marks wherever installed.
17. Make all changes in direction with fittings and changes in main size with reducing fittings. Unless otherwise noted, for pipe size change on all horizontal pump circulated water supply and return piping, use eccentric couplings flat on top.
18. Only those branches in welded pipe and copper tubing which are at least two pipe sizes smaller than the main may be made up with "tap-in" fittings.

19. Grooved end pipe shall be installed only outside (weather exposed).
20. Dielectric insulation
 - a. Provide dielectric insulation at all points where copper water piping including brass nipples in same, is connected to ferrous metal such as steel piping, tanks, water heaters, etc.
21. Pitch pipe lines to be free of sags, traps or unnecessary bends as required for proper drainage. Provide a gate valve of same size as line but 3/8" minimum and 3/4" maximum size at each low point.
22. For expansion and contraction of heated or cooled piping, provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system, whether shown or not shown on drawings. Anchors shall be constructed of structural shapes. Submit details to the Architect/Engineer.
23. Support piping independently at pumps, coils, tanks, and other equipment so that its weight will not be supported by the equipment.
24. Unions and Flanges
 - a. Provide unions or flanges suitably located to facilitate maintenance and removal of all equipment or automatic pipe mounted apparatus.
 - b. Faces of flanges to be connected shall, in all cases, be alike.
 - c. Provide two unions at threaded three way mixing valves.
25. Shop or field fabricated fittings, bushings, street ells, and long screw nipples are not acceptable and shall not be used. Reducer couplings, tees or ells shall not be used.
26. Equipment by others: For rough-ins and final connections to equipment furnished by others, ascertain exact sizes, type, services and locations before starting work.
27. Springing, bending or forcing of pipe into place shall not be allowed. Use fittings for all offsets or changes in alignment of piping.
28. Flexible Pipe Connections
 - a. Provide flexible piping connection on each pipe connection to equipment mounted on or suspended from isolators and where such connections are shown on plans.
29. Relief Valves
 - a. Relief valves shall be installed on equipment and apparatus as required by applicable codes, as specified with equipment, and as indicated.
 - b. Relief valves shall have brass bodies and trim on copper or brass piping, cast iron bodies and brass trim on steel piping.
 - c. Screwed end regulating valves shall be provided, with companion flanges (or Victaulic couplings if used) on both ends of the valve to facilitate removal for servicing.
 - d. Gas and refrigerant relief valves shall be provided with discharge piping to outside of building. Water relief valves shall be piped to spill over floor sink.
30. Water Flow Measuring Devices
 - a. Install the water flow measuring devices according to manufacturer's recommendations.

- b. The installation is to be accessible for service.

31. Pressure Gage

- a. Extension necks shall be provided as required for insulated piping.
- b. Provide pressure gages at the following locations and elsewhere as specified under other Sections or as indicated.
 - 1. All other equipment specified or indicated as being equipped with pressure gauges.

32. Thermometer

- a. Provide thermometers at the following locations and elsewhere as specified under other Sections or as indicated.
 - 1. All other equipment specified or indicated as being equipped with thermometers.

B. Additional Requirement for HVAC Piping System:

- 1. Cold piping shall be separated by at least 6" and precaution shall be taken to see that the pipes do not come into contact.
- 2. Indirect drains from equipment shall be installed as indicated and as necessary. Drains shall be provided from coil drip pans, air vents, etc. Drains shall empty to nearest floor sink.
- 3. All piping shall be installed to make apparatus connected, complete, and ready for regular and safe operation. Unless otherwise noted, all apparatus and equipment shall be installed in accordance with manufacturer's approved standard details.
- 4. Unions and/or flanges shall be installed in piping systems on both sides of all equipment and where required to facilitate the removal of valves, pressure regulators, traps, etc.
- 5. Drawings and Specifications shall be used to determine number and requirements of all items of equipment requiring piping connections. Accessory piping, such as vent, drain, relief, etc., shall be furnished wherever equipment is provided with connections for such piping.
- 6. Expansion and contraction in piping systems shall be accomplished by expansion loops, spring pieces or swing joints, unless otherwise indicated.
- 7. Unless otherwise noted, piping shall be sloped as follows:
 - a. Condensation Drainage, including Air Conditioner Drain Pan: In direction of flow to ensure adequate drainage with adequate trap seal for static pressure developed by air conditioning system, slope 1/4" per foot wherever possible, but not less than 1/8" per foot.
 - c. Atmospheric Relief and Vent Piping: Minimum slope sufficient to ensure adequate venting and drainage.
- 8. Valved and capped connection shall be provided at all low points in piping systems necessary or required for draining systems.
- 9. During construction, open ends of pipes shall be capped where necessary or required to prevent debris from entering piping systems.

10. Piping shall be supported independently at all equipment to prevent equipment being stressed by piping weight or expansion.

3.5 INSTALLATION OF VALVES

A. General

1. Valves shall be full line size. Automatic valves are excepted.
2. All valves shall have proper clearances for handle operation, and shall close tight at the specified test pressure.

B. Arrangement

1. Install valves in the systems so located, arranged and operated as to give complete regulation of all apparatus, equipment, and fixtures.
2. Install valves for accessibility and easy maintenance.
3. Install valves with stems horizontal or vertically upright.
4. Install ball valves in refrigerant gas lines with stems horizontal.
5. Provide valve box at each valve or cock in ground. Set cover flush with finished grade except in planted areas set 1" above ground.
6. Balance valves. Install balance valves where shown and on each circulating return branch where two or more branches occur on domestic hot water system.
7. Provide readily accessible lubricated gas shut-off valve in gas supply to each gas burning appliance ahead of union connection thereto, and in addition to any valve on appliance. Locate within 3'-10" of appliance, except range connectors may be within 6'-0".
8. Compression stops. Install stop valve or compression stop on water supply lines to each plumbing fixture, including hose faucets and showers, installed under this contract, to permit repairs with shutting off water mains. Unions are not required adjacent to compression stops.
9. Hose faucets. Mount with outlet 18" above floor or finished grade, unless shown otherwise.

C. Location

1. In all branches and headers of water piping serving a group of two or more plumbing fixtures.
2. On both inlet and outlet of all apparatus and equipment.
3. For shutoff of branch mains.
4. For flushing and sterilizing the systems.
5. Where shown on the drawings.
6. Ahead of each automatic valve for water service.

3.6 PIPE SUPPORTS

A. Installation

1. Securely support all piping from building construction with manufactured iron hangers, brackets, trapezes, guides, anchors and sway braces to maintain pipe alignment and prevent sagging, noise and excessive strain due to uncontrolled movement under operating conditions.
2. Relocate any hangers as necessary to correct unsatisfactory conditions that may become evident when system is put into operation.
3. Supporting of pipe by wire, rope, wood or other makeshift devices will not be permitted.
4. Burning of holes in beam flanges or narrow members will not be permitted.
5. Where calculated maximum travel exceeds one inch, provide rollers at all non-suspended type supports and on all but one of the largest pipes on trapeze supports.
6. Fasten hanger rods to structural steel members with beam clamps with retaining clips; to concrete with steel or malleable iron inserts.
7. For existing concrete construction, hang rods with self-drilling anchors of same size as rods. Rods 1/2" diameter and less may be secured with percussion driven studs, if approved by Structural Engineer.
8. Sheet lead, lead wool or wood plugs will not be accepted as a substitute for cinch anchors as a means of attaching materials and equipment to concrete.
9. Support cast iron, plastic and glass drainage pipe at each floor.
10. Supports for insulated pipe shall be outside the insulation. Protect pipe insulation at every hanger, support or guide with inserts and shields. The galvanized steel shield shall be applied between the hanger or support and the pipe insulation. Provide saddles at all rollers for insulated pipe not equipped with inserts and shields.
11. When poured-in-place, construction is employed, deliver inserts or other hanger devices to be cast in slabs for installation under the Concrete Section. Provide complete layout information in ample time for casting in slabs and without delaying project.
12. Support of larger pipe shall be as detailed on the drawings.

B. Manifolding

1. Parallel runs of piping, except for fire protection, may be supported on trapeze hangers, spaced as required for the smallest pipe carried.
2. Support piping in chases on channel framing.
3. For piping over 2" construct framing of welded assemblies of steel shapes. Provide calculations that the design will carry five times the weight of thrust of the pipe.

C. Support Spacing

1. Maximum spacing for horizontal piping supports shall be as follows:

Material	Size	Spacing
Steel or Brass pipe	3/4" and smaller	6 ft.
Steel or Brass pipe	1" and 1-1/4"	8 ft.
Steel or Brass pipe	1-1/2" to 3"	10 ft.

Steel or Brass pipe	4" and larger	14 ft.
Copper tubing	1" and smaller	6 ft.
Copper tubing	1-1/4" and larger	8 ft.
C.1. Soil Pipe	All sizes	5 ft. ea. joint
C.1. Acid Res. Pipe	All sizes	5 ft. & ea. joint
Glass Pipe	All sizes	8 ft.
Plastic Pipe	All sizes	4 ft.

2. Where building structure does not permit the specified spacing, provide additional adequate struts or blocking. Location and details shall be submitted to the Architect/Engineer for approval.

3.7 PIPE ANCHORS

A. Shot Driven Anchors

1. Supports may be secured to the concrete structure by shore anchors as long as the pin does not penetrate the concrete more than 3/4 inch and it is rated for the load it will carry, if approved by the Structural Engineer. Submit calculations.
2. For loads that exceed the shore anchor rating, use drilled anchors.

B. Drilled Anchors

1. Drilled anchors shall be of the self-drilling expansion type with self-cutting annular broaching grooves, or they may be of the non-drilled type with expansion tip.
2. Anchors shall have a recommended load with a minimum of safety factor of four. Submit calculations.

3.8 PIPE JOINTS

A. General

1. Remake any leaky joints with new materials. The use of thread cement, caulking or patch welding to make the old joint tight is absolutely prohibited.

B. Solder and Brazed Joints

1. Cut square; remove burrs and clean both the pipe or tubing and inside of female fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloth. Apply solder flux with brush to tubing. Remove internal part of solder-end valves prior to soldering.
2. Joining for copper tubing and brass pipe shall be as follows:
 - a. Water piping 3" and smaller: 95-5 Tin-Antimony solder ASTM B32, Grade 5A.
 - b. Drainage piping: 50-50 solder.
 - c. For all reinforced "Tap-In" non-ferrous piping connections, water piping larger than 3", steam condensate, all underground, and all refrigerant piping: Over 1000 DEG G brazing alloy, ASTM B250, Class BCUP-5. 95-5 Tin-Antimony solder for refrigerant lines is acceptable.

C. Screwed Piping

1. Cut square and clean with machine cutter, hack saw or carborundum pipe wheel. Wheel cutters are not acceptable. Deburr with file or pipe reamer. Do not ream to exceed I.D. of pipe and thread to ANSI B2.1 requirements.
2. Use Teflon tape, Armitite #250 or Enterprise "Threadseal" sealing compound on outside threads for

joining all services, except refrigerant piping.

3. Litharge and glycerin may be used for sealing threads of compressed air piping and shall be used for refrigerant piping.
4. No more than two full threads shall remain exposed after making up joints.
5. Do not wrap pipe threads and slip joints with string, paper, putty or similar fillers. Threaded joints must be made tight with tongs or wrenches. Piping in finished areas shall bear no tool marks. Caulking of any kind will not be permitted.

D. Welded Piping

1. Oxyacetylene or electrical arc process.
2. Weld in accordance with and by welders who have qualified under the latest Edition, American National Standard Code for pressure piping ANSI/ASME B31.1, Chapter 5, and subsequent Addenda.
3. Remove foreign matter from pipe ends before tacking or welding.
4. Align ends concentric and tack weld.
5. Weld and reinforce to full thickness of pipe. Welds shall be continuously fused to pipe and to prior pass weld, shall have full penetration without slag inclusions or porosity. Fillet type welds for flanges and socket fittings shall have a throat dimension not less than the pipe wall thickness.
6. Welding rods: Oxwall No. 1-HT or equal
7. Fabricated fittings are not acceptable
8. Connections:
 - a. Slip-on flanges shall be both face and back welded.
9. Hammer each pass clean of slag and scale.
10. The Owner reserves the right to inspect and to x-ray test any welds per latest Edition, American National Standard Code for Pressure Piping ANSI/ASME 3.1 Chapter 6, and subsequent Addenda.

E. Cast Iron Drainage Pipe

1. Pack all joint tight in hub and spigot cast iron soil pipe with first quality oakum to within 1" of end of hub, fill remaining space with molten lead and caulk tight.
2. Pack other joints and couplings in cast iron soil pipe.
3. Firmly seat spigot and full depth of hub or of hubless couplings.

F. Cast Iron and Concrete Water Pipe

Bolted or Neoprene rubber or elastomeric ring joints, when approved, are acceptable. Submit catalog cuts for approval. At cast iron fittings, lead caulked joints are acceptable.

3.9 ACCESS TO EQUIPMENT

A. General

1. Install all piping, equipment and accessories to permit access for maintenance.
2. Any relocation of piping, equipment and accessories required to provide maintenance access shall be accomplished at no additional cost to the Owner.

B. Access

1. Provide access doors where any valves, motors and equipment requiring access for servicing, repairs, or replacement are located in walls, chases or above ceilings.
2. The location of access doors shall be coordinated with and installed by the applicable trade installing walls or ceiling.
3. Contractor shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

3.10 SLEEVES, CORE DRILLING AND ESCUTCHEONS

A. Sleeves

1. General
 - a. Provide minimum of 1/2" clearance around all sides of pipe and extend full thickness of the construction. Where piping is to be insulated, allow for full thickness of insulation, plus 1/2" clearance all around.
2. Locations and types
 - a. Secure sleeves to metal or wood forms so that they will not become displaced during pouring of concrete. Fill sleeves on decks with sand.
 - b. Remove sleeves from openings after forms have been removed from concrete.
 - c. Cut proper sized holes in concrete to replace metal sleeves that are crushed or knocked out of position during pouring of concrete.

B. Core Drilling

1. Size core drilling holes adequately to allow for dry packing sleeves in place; to allow for insulation to extend through holes; to allow for fireproof caulking of clearance around pipes to prevent direct contact between pipes and structures.
2. Locations of core drilling shall be approved by the Architect/Engineer prior to drilling.

C. Escutcheons

1. Provide chromium plated escutcheons with screw or spring clamping device on all piping that penetrates floors, walls and ceilings where exposed to view. Escutcheons shall completely cover opening.

3.11 STRAINERS

A. General

1. Strainers shall be full line size.
2. Valve blow-down connection with a gate or ball valve sized same as the connection. Plug valves not

pipd to drain.

B. Location

1. Ahead of each automatic control valve for both steam and water service.
2. Where shown on the drawings.
3. At each pump inlet.

3.12 EQUIPMENT SUPPORTS

A. General

1. Provide all necessary steel framing supports for equipment for a complete and satisfactory installation.
2. Fit suspended equipment with minimum of three steel rods and bolt base mounted equipment without isolators to floor or platform with one rod or bolt per weight of equipment not to exceed the following. Provide minimum of four sway brace rods at 45 degrees for each item of suspended equipment. Securing rods to the structure shall be as required for pipe hangers.

Rod or Bolt Size	Equipment Weight
3/8"	50 pounds
1/2"	120 pounds
5/16"	225 pounds
3/4"	300 pounds
7/8"	950 pounds

B. Approval

1. Submit drawings of miscellaneous supports for approval.

3.13 PIPE WRAPPING

A. Cleaning and wrapping all underground steel piping.

1. Piping shall be machine coated and wrapped as follows:

Clean
Prime
Coal tar enamel
Fiberglass inter wrap .020"
Coal tar enamel
Kraft paper

2. As an acceptable alternate piping may be wrapped with 10 mil, identified and approved polyvinyl chloride tape. Two layers, half-lapped, shall be applied, (total thickness 40 mils). Surfaces shall be cleaned and primed with solution recommended by the manufacturer of the tape. The fittings shall be field wrapped with polyvinyl chloride tape and the identification marks visible on the completed joint wrapping.
3. As an acceptable alternate pipe may be coated with dihydrazide epoxy resin using a coating approved with factory authorized applicator. The coating shall be identified with the name of the applicator imprinted thereon. Joints shall be field-coated and damaged spots in the coating repaired, as recommended by the coating manufacturer, before the pipe is covered.

3.14 CUTTING AND PATCHING:

- A. Refer to Specification Section on cutting and patching. No joists, beams, girders or columns shall be cut without first obtaining written permission from the Architect.
- B. Perform all cutting required for installing work. Obtain permission from the Architect before doing any cutting. All cutting for pipe work to be installed in an existing structure shall be done with a core drill. Similar cutting for items requiring rectangular openings shall be done with a Carborundum saw.
- C. All patching within the building, on the premises or adjacent thereto shall be done by the Contractor using the appropriate trade, and shall be done in such a manner as will restore the area or surface to its original condition to the satisfaction of the Architect.
- D. No cutting shall be done to any structural members unless specific permission is granted by the Architect.

3.15 ROOF PENETRATIONS:

- A. All roof penetrations shall be provided with counter flashings arranged to provide a weathertight installation. The installation shall include, where required, ventilating collars to give proper clearance from the combustible roofs, floors and ceilings.

3.16 ROUGHING-IN AND FINAL CONNECTIONS:

- A. The Mechanical Sub-Contractor shall have the responsibility of rough-in for and assembly of various equipment and to make final connection to all equipment furnished by Owner and/or under Sections of these Specifications.
- B. Roughing-in and assembling of this equipment shall be determined from the manufacturer's Shop Drawings or as directed and in no case shall the location be scaled from the Architectural or Mechanical Drawings.
- C. The Contractor shall be aware that various equipment, valves, strainers, unions, etc., shown on the plans furnished by others shall be coordinated and assembled before installation under this contract.

3.17 IDENTIFICATION OF EQUIPMENT:

- A. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, valves, piping, etc., by marking them with approved engraved Bakelite plates with the same name or number on the operating instructions.

3.18 WELDING:

- A. All welding shall be done by craftsmen experienced in the trade.
- B. Weldments shall be cleaned and coated with rust inhibiting paint.

3.19 PAINTING:

- A. Finish painting of all exposed materials and equipment including pipes, etc., is included as part of the work of Section 09900 of the Specifications.
- B. All pipe and apparatus shall be thoroughly cleaned and all rust and grease removed.
- C. All motors, pumps, starters, switches and other apparatus furnished from the factory with enamel finish, and finish color is approved by the Architect, then it shall have all surfaces touched-up with same type and color of paint.
- D. Inside of supply and return air ducts at grilles in finished areas shall be painted matte black.

3.20 CONSTRUCTION REQUIREMENTS:

- A. Where equipment is being furnished under another Division, request from the Architect an accepted drawing that will show exact dimensions of required locations of connections. Install the required facilities to the exact requirements of the approved drawing.
- B. Assume responsibility for all costs or changes required that may be incurred if this Specification is not followed.

3.21 WORKMANSHIP:

- A. All work shall be done in the best and most workmanlike manner by qualified, careful mechanics who are skilled in their trade. The standards of work required throughout shall be of the first class only and mechanics whose work is unsatisfactory to the Architect or Owner's Representative shall be instantly dismissed from the work upon written notice from the Architect or Owner's Representative.

3.22 COOPERATION WITH WORK UNDER OTHER DIVISIONS:

- A. Cooperate with all other trades so as to facilitate the general progress of the work. Allow all other trades every reasonable opportunity for the installation of their work and the storage of their materials.
 - B. The work under this Division shall follow the general building construction closely. Set all pipe sleeves, inserts, etc., and see that openings for chases, pipes, etc., are provided before concrete is placed or masonry installed.
 - C. Work with other trades in determining exact locations of outlets, pipes, diffusers, and pieces of equipment to avoid interference with lines required to maintain proper installation of other work.
 - D. Make such progress in work that will not delay the work of other trades. Schedule the work so that completion dates as established by the Owner are met. Furnish sufficient labor or work overtime to accomplish these requirements if directed to do so.
 - E. The Mechanical and Electrical work shall have precedence over each other in the following sequence.
 - 1. Soil and waste piping.
 - 2. Ductwork.*
 - 3. Fire Protection
 - 4. Domestic water piping.
 - 5. Electrical.*

*Light fixture shall have precedence over air diffusers.
- 3.23 INSTALLATION AND CONNECTION OF ANOTHER DIVISIONS EQUIPMENT:
- A. Verify the mechanical requirements of all equipment furnished under other Divisions or by the Owner. Install plumbing ductwork, etc., as required to completely connect all equipment.
- 3.24 EQUIPMENT PROTECTION:
- A. Provide suitable protection for all equipment, work and property against damage.
 - B. Assume full responsibility for material and equipment stored at the site and incorporated within the building.
 - C. Equipment shall be covered and tightly sealed against entrance of dust and dirt.
- 3.25 CLEAN-UP:
- A. During the execution of the work remove all rubbish and excess materials accumulated as a result of the work.
 - B. Remove all dirt, paint, grease and stains from all exposed equipment. Upon completion of work, clean all equipment and the entire installation so as to present a first class job suitable for occupancy. No loose parts or scraps of equipment shall be left on the premises.
 - C. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer.
- 3.26 TESTS, ADJUSTMENTS AND INSPECTIONS:
- A. On completion of the installation, test and adjust all new equipment installed or existing equipment connected.
 - B. Pay all costs for labor, materials, equipment, etc., as required for testing and adjusting of the systems. Provide all apparatus, temporary piping connection or any other requirements for all tests. Take due precautions to prevent damage to the building or its contents incurred by such tests. Repair and make good any damage so caused at no additional cost to Owner.
 - C. Any leaks, defects or deficiencies discovered as a result of these tests or tests performed by the Owner-retained testing and balancing firm shall be repaired and test shall be repeated until test requirements are fully completed.
 - D. When practical, all piping tests shall be made before pipe is covered or concealed.
 - E. It is the intention of this section of the specifications to provide necessary tests during and at completion of the job to ensure tight piping and ductwork and a correctly adjusted system, and the Contractor shall do everything necessary to accomplish this.
 - F. All motors, bearings, etc., on all equipment shall be correctly oiled and greased before the equipment is operated and again at the completion of the job. Provide complete oiling and greasing instructions for Owner's designated personnel. Grease fittings shall be installed on equipment that requires periodic greasing.
- 3.27 RECORDS FOR OWNER:
- A. The Contractor shall obtain at his own expense a complete record of the installation of all materials and systems covered by his contractual agreement. The record shall indicate the location of all equipment and the routing of all systems. All piping buried in concrete slabs, walls and below grade shall be located by dimension unless a surface mounted device in each space indicates the exact location. Record drawings shall be delivered to the Architect in good condition upon completion and acceptance of the work and before payment is made.

- B. The Contractor shall assemble and present to the Owner three bound sets of owning and operating instructions for mechanical systems on the project. The operating instructions and maintenance brochures shall consist of a typewritten description of system operation, including necessary diagrams keyed to the valve and piping identification systems, and shall include the various operating instructions as received with each piece of equipment, and one copy of each shop drawing or other submittal data. Operating instructions shall be bound in a hardboard cover secured with fasteners. The project will not receive final acceptance of the Architect until the operating instructions and maintenance brochures have been received by the Owner. Instruct the Owner's operating personnel in the proper operation and maintenance of the equipment and systems for a period of not less than three days.

3.28 GUARANTEES AND WARRANTIES:

- A. The one year warranty provided in the General Conditions shall be in addition to and not in limitation of any guarantees or warranties of longer duration or other remedies provided by law of the Contract Documents.

END OF SECTION

SECTION 22 10 00

PIPING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Provisions established within General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

1.02 SCOPE:

- A. Furnish all labor, materials, tools, equipment and related items required for the complete installation of insulation as indicated by the Contract Documents.

1.03 WORK INCLUDED:

- A. Piping insulation.
- B. Jackets and accessories.

1.04 RELATED WORK:

- A. Painting: Painting insulation jacket.

1.05 REFERENCES:

- A. ANSI/ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- B. ANSI/ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.
- C. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.
- D. ANSI/ASTM C572 - Cellular Glass Block and Pipe Thermal Insulation.
- E. ANSI/ASTM C578 - Performed, Block Type Cellular Polystyrene Thermal Insulation.
- F. ASTM B209 - Aluminum and Aluminum - alloy Sheet and Plate.
- G. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- H. ASTM C449 - Mineral Fiber Hydraulic - setting Thermal Insulating and Finishing Cement.
- I. ASTM C610 - Expanded Perlite Block and Pipe Thermal Insulation.
- J. ASTM E84 - Surface Burning Characteristics of Building Materials.
- K. NFPA 255 - Surface Burning Characteristics of Building Materials.
- L. UL 723 - Surface Burning Characteristics of Building Materials.

1.06 QUALITY ASSURANCE:

- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, UL 723.
- C. Under no circumstances will materials containing asbestos be allowed on this project site.

1.07 SUBMITTALS:

- A. Submit product data under provisions of Section 23 00 00 and 22 05 00.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instruction under provisions of Section 23 00 00.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manville.
- B. Knauf.
- C. Owens - Corning.
- D. IMCOA

- E. Substitutions: Under provisions of Section 23 00 00.
- 2.02 GENERAL:
 - A. All materials used shall have a flame spread rating of not more than 25 without evidence of continuous progressive combustion, and with a smoke developed rating of not higher than 50. Shop drawing submittals shall show this information.
- 2.03 DOMESTIC WATER PIPING:
 - A. For all Hot Water, Cold Water and Hot Water Return piping:
 - 1. Use Owens - Corning Fiberglass 25 ASJ/SSL or equal one-piece pipe insulation with all service jacket and self sealing lap.
 - 2. For 1/2" and 3/4" lines use 1/2" thick pipe insulation. For 1" and larger lines use 1" thick pipe insulation.
- 2.04 REFRIGERANT PIPING
 - A. Use 1/2" thick IMCOA IMCOLOCK/IMCOSHIELD (up to 210°F service temperature) or 1/2" thick Armaflex" of approved equal pipe insulation on the suction line. The insulation shall be threaded on the pipe, pulled back, then the connection should be made. All seams will be butt joint connection.
- 2.05 ACCESSORIES:
 - A. Insulation Bands: 3/4 inch wide; 0.015 inch thick galvanized steel.
 - B. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
 - C. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
 - D. Finishing Cement: ASTM C449.
 - E. Fibrous Glass Cloth: Untreated; 9 oz/sq. yd. (305 g/sq. m) weight.
 - F. Adhesives: Compatible with insulation and suitable for return air use if used in those spaces.

PART 3 EXECUTION

- 3.01 PREPARATION:
 - A. Do not apply any insulation until piping has been inspected, pressure tested and found tight.
 - B. All surfaces to be insulated shall be cleaned and dried before applying insulation.
- 3.02 INSTALLATION:
 - A. Install materials in accordance with manufacturer's instruction.
 - B. Continue insulation with vapor barrier through penetrations.
 - C. In exposed piping, locate insulation and cover seams in least visible locations.
 - D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
 - E. On insulated piping without vapor barrier and piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.
 - F. Provide an insert, not less than 6 inches (150 mm) long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2 inches (50 mm) diameter or larger, to prevent insulation from sagging at support points. Inserts shall be cork or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.
 - G. Neatly finish insulation at supports, protrusions, and interruptions.
 - H. Jackets:
 - 1. Indoor, Concealed Applications: Insulated pipes conveying fluids above ambient temperature shall have standard jackets, with or without vapor barrier, factory-applied or field-applied. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may be used. No jacketing is necessary for polyolefin foam insulation.
 - 2. Indoor, Concealed Applications: Insulated dual-temperature pipes or pipes conveying fluids below ambient temperature shall have vapor barrier jackets, ambient-applied or field-applied. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe, and finish with glass cloth and vapor barrier adhesive. No vapor barrier jacket is necessary for polyolefin foam insulation.
 - 3. Indoor, Exposed Applications: For pipe exposed in mechanical equipment rooms or in finished spaces, insulate as for concealed applications. Finish with canvas jacket; size for finish painting. Do not use PVC jackets.

4. Exterior Applications: Provide vapor barrier jackets. Cover with (aluminum) (or) (stainless steel) jacket with seams located on bottom side of horizontal piping. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. No jacketing is necessary for polyolefin foam insulation if it is U.V. stabilized and the manufacturer warrants its outside use without jacketing.
5. Buried Pipeline: Provide assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with .016 aluminum foil sandwiched with three layers of bituminous compound.

3.03 DOMESTIC WATER PIPING INSULATION INSTALLATION:

- A. Insulate all hot and cold water supply piping, valves and fittings.
- B. Fittings and valves shall be insulated with insulating cement applied to thickness equal to that of adjoining pipe insulation and shall be covered with glass cloth jacket. Fittings may be insulated with two layers of pre-cut Fiberglass blanket insulation jacketed with pre-formed PVC covers in lieu of insulating cement and cloth jacket. For polyolefin foam, fittings and valves shall be insulated with thickness equal to that of adjoining pipe insulation and shall be of the same type. No jacketing is necessary for polyolefin foam insulation.

END OF SECTION

SECTION 23 00 00

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

***FOR EQUIPMENT OTHER THAN SPECIFIED HEREIN WITHIN, CONTRACTOR SHALL REFER TO MECHANICAL PLANS.

- 1.1 DESCRIPTION: Division 1 applies to this Section. Section 23 00 00 applies to all other Sections of the Mechanical Division unless otherwise specified. The Work of this Section includes labor, materials, equipment and services necessary for complete, safe installation in conformity with applicable codes and authorities having jurisdiction.
- A. Work In This Division: Principal items include:
- | | |
|----------|--------------------------------|
| 23 00 00 | Mechanical General Provisions. |
| 23 72 00 | PTAC System AC Units. |
| 23 31 00 | Ductwork. |
- B. Related Work Not in This Section: Consult all other Divisions, determine the extent and character of related Work; coordinate Work specified herein with that specified elsewhere.
- C. Definitions:
1. "Piping": Pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and related items.
 2. "Wiring": Raceway, fittings, wire boxes and related items.
 3. "Concealed": Embedded in masonry or other construction, installed in furred spaces, within couple partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
 4. "Exposed": Not installed underground or "concealed" as defined above.
 5. "Motor controllers": All manual or magnetic starters (with or without switches) individual push buttons or hand-off automatic (HOA) switches controlling the operation of motors.
 6. "Control devices": Automatic sensing and switching devices such as thermostats, pressure flat, electro-pneumatic switches and electrodes controlling operation of equipment.
 7. "Unfinished space": A room or space that is ordinarily accessible only to building maintenance personnel. A room that in the Architect's finish schedule has exposed and unpainted construction for walls, floor and ceiling. Any room specifically mentioned as "Unfinished".
 8. "Finished space": A room or space that is not unfinished as described above. Any space ordinarily visible to the visiting public, including exterior spaces.
 9. "This Division": The Mechanical Division 23 of the Specifications; a portion of Specifications that includes all the Sections of the Specifications listed under Article 1.01, Description.
 10. "Individual Mechanical Section": Any one of Sections listed under Article 1.01, Description.
 11. "Other Divisions": Portions of Specifications that does not include the Mechanical Division.
 12. "Riser": Vertical pipe or duct having a vertical length greater than one story height.
 13. "Drop": A vertical pipe or duct that does not penetrate a floor.
 14. "Upfeed connection": A vertical pipe or duct that penetrated a floor, but has a vertical length of less than one story height.
 15. "Header": Any pipe or duct of constant size that serves a battery of closely spaced inlet or outlet connections.
- 1.2 QUALITY ASSURANCE
- A. Code compliance: all work performed under this Division must comply with the latest edition of all applicable codes and requirements including but not limited to:
1. California Administrative Code - titles as applicable.
 2. California Building Code (latest edition).

3. California Mechanical Code (latest edition).
 4. California Plumbing Code (latest edition).
 5. City of San Jose Title 24, Part II State Building Code.
 7. State of California Regional Water Quality Control Board Requirements.
 8. Factory Mutual Requirements
 9. Underwriters Laboratories
- B. Minimum requirements: The requirements of the Drawings and Specifications are the minimum that shall be allowed under this Section.
- C. Permits, Fees, Licenses and Inspections
1. Permits and Fees: Refer to Conditions of the Contract. Obtain and pay for all fees pertaining to Sections of Division 15 and AQMD. Prior to bidding verify, with the serving Utilities, that the services as indicated and/or specified are correct. Bids shall include any excess charges and other Utilities service costs not borne by serving Utilities, and required to complete the service installations indicated and/or specified.
 2. Inspections: All work shall be regularly inspected and certificates of approval shall be delivered to the Architect.
 3. Permit to operate: Obtain and pay for a State Industrial Accident "Permit to Operate" for each pressure vessel.
- D. Mechanical Work Superintendent: Furnish the services of a superintendent experienced in the Work of each Section of Work under Division 23 who shall be constantly in charge of the progress of the Work of Division 23 together with all necessary journeymen, helpers, and laborers required to properly unload, erect, connect adjust, start, operate and test the Division 23 Work involved.
- 1.3 SUBMITTALS: Refer to Division 1 for basic requirements and procedures. Refer to the individual Sections of Division 23 for the submittals required.
- A. Deviations: If the equipment submitted under Division 23 requires changes in material or labor from that required in the Contract Documents, such changes shall be submitted as Shop Drawings in accordance with the Division 1.
- B. Approved Changes: Any approved changes in the piping, wiring, controls, or installation procedures required by the equipment manufacturer shall be made at not additional cost to the Owner, and with no reduction in scope.
- C. Product and Equipment Data: Submit a complete list of material and equipment proposed for the Work, including manufacturers' names, even if they are as specified or shown on Drawings. Reference listings to Specification Section and Article to which each is applicable. Include complete catalog information such as construction, ratings, and performance curves as applicable.
- D. Certificates: For materials specified to meet UL, FM, or trade standards, furnish the manufacturer's or vendor's certification that material furnished for the Work does, in fact, equal or exceed requirements specified.
- E. Shop Drawings: Conform to Division 1. Submit in complete groups of materials and, in addition to the Contractor's review and approval required in Division, each item of material submitted shall be initialed by Contractor as verification that submittal has been reviewed in detail and is in fact the Contractor's choice of materials. The Contractor shall verify the dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting the Shop Drawings. Departure from above procedure shall result in re-submittal and delays. Includes all information required by Division 23 Sections.
- F. Contractor's Certification: Add and sign following paragraph on equipment and materials submitted for

review; failure to add the following statement shall result in delay of the review of submittal:

"It is hereby certified that the (equipment)(material) shown and marked in this submittal is that proposed to be incorporated into the Project; is in compliance with the Contract Drawings and Specifications; can be installed in the allocated spaces".

G. Deviations from Contract Documents:

1. Substitution: Refer to Division 1. Submittals which are intended to be reviewed as a proposed substitution, variation, or departure from Contract Documents, shall be submitted to the Architect not later than ten calendar days before date set for opening bids.
2. Deviations: If Shop Drawings show deviations from Contract Document requirements because of standard shop practice, or other reasons, make specific mention of variations in transmittal letter to Architect, as well as encircle variation on Shop Drawings to identify and call them to the Architect's attention as required in Division 1. Unless Contractor has notified Architect of proposed variations, deviations, or omissions and received approval thereof, Contractor is required at his sole expense to repair, replace, provide whatever materials are required, and perform approved Work necessary to rectify such deviations and variations as directed by the Architect as time such variations, deviations, or omissions are discovered, even though this does not occur until after the Shop Drawings have been reviewed and Work in question has been completed. Repair and replacement shall be mandatory in such instances and shall be performed at no cost to Owner.

H. Equipment Ordering: Be responsible for equipment ordered and/or installed prior to receipt of approved Shop Drawings and other related submittals returned from the Architect. Corrections or modifications to equipment as noted on Shop Drawings shall be performed or equipment removed from the Job Site at the request of the Architect without additional compensation to Contractor.

I. Manuals: Coordinate with and conform to Division 1, Contract Closeout; supplement only with items not specified therein. Compile the Manual from information supplied by equipment manufacturers and from test and balance data furnished.

1. Contents: Each Manual shall contain:

- a. Complete instructions on the operation of all mechanical equipment, including all control settings, switch positions, timer operation, sequence of operation etc.
- b. Complete instructions regarding the maintenance of all mechanical equipment including periods and frequencies of all inspections, lubrications and filter replacement, etc.; type of lubricants required; and exact description of performance of such maintenance and full description of inspections and corrections to make a step-by-step basis.
- c. Copy all control and wiring diagrams.
- d. Complete nomenclature of all replaceable parts, their part numbers, and the name address and phone number of the nearest vendor.
- e. Copy of the test and balance report.
- f. A complete index at the front furnishing immediate information as to location in the manual of all data regarding the installation. Numbered tab sheets shall be used.

J. Record Documents: Prepare and submit in accordance with Division 1, Contract Closeout. With Record Drawings include Record Specifications for all Sections of Division 23. On Record Drawings, locate buried service piping and indicated future connections outside of buildings both by depth and by accurate measurement from permanent landmarks of buildings both by depth and by accurate measurement from permanent landmarks such as a building or structure.

K. Training: Provide training to owner's representatives for all operating and routine maintenance procedures. Duration of the training shall be no less than 40 hours for HVAC, building control, and plumbing systems. Submit video taping of the training session as part of the closeout documents.

1.4 JOB CONDITIONS

A. Drawings:

1. Diagrammatic drawings: For purposes of clearness and legibility, the drawings are essentially diagrammatic and, although size and location of equipment is drawn to scale, make use of all data in all of the Contract Documents, and verify this information at building site.
2. Routing of ducts and piping: The Drawings indicate required size and termination of pipes and ducts and suggest proper routes of piping and duct to conform to the structure, to avoid obstructions and to preserve clearance. It is not the intent to indicate all necessary offsets and it shall be the responsibility under this Division to install ductwork and piping in such a manner as to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and make all equipment requiring inspection, maintenance, and repair accessible without further instructions or extra cost to the Owner.

B. Coordination with Other Trades:

1. Check with other sections of the specifications so that no interference shall occur and in order that grade lines may be established for the work.
2. Installed work which interferes with the work of other trades shall be satisfactorily removed and rerouted.
3. No extras shall be allowed for changes made necessary by interference with the work of other trades.
4. Contractor shall be aware of ceiling heights of different areas in building.

C. Damage Responsibility: This Division is responsible for damage by it's own negligence to the grounds, or equipment, and the loss of refrigerants or fuels caused by leaks or breaks in any pipes or equipment provided under this Division.

- 1.5 WARRANTY: Conform to Division 1. The Contractor shall unconditionally warranty materials, equipment, and labor furnished and installed under Division 23 for a period of one year from the date of substantial completion as defined under Division 1. The standard warranty of the manufacturers shall apply for replacement of parts after expiration of other warranty periods stated herein if they are for shorter time than the standard manufacturer's warranty. Manufacturer shall furnish and replace parts to the Owner. Deliver to Architect printed manufacturers' warranties complete with material included and expiration dates upon completion of the Work in accordance with Division 1.

PART 2 - PRODUCTS

- 2.1 MATERIALS: Products, materials and equipment shall be as specified in the pertinent sections of Division 23 of the Specifications. All materials and equipment shall be new and free from defects. Wherever possible, all materials and equipment used in the installation of Work of Division 23 shall be of the same brand of manufacture for each class of material or equipment.

PART 3 - EXECUTION

- 3.1 EXCAVATION AND BACKFILL: Do excavation and backfill required to install the work of this Division 23 inside and outside of building except as shown otherwise. Perform excavation and backfilling in accordance with requirements specified in Division 2. Contaminated soils shall not be used as backfill material. Do not backfill until after final inspection and approval of the piping installation by all legally constituted authorities and complete recording of buried piping and systems on Field Record Set of the Record Drawings. Backfill material shall be as specified under pertinent sections.

3.2 PROTECTION, CARE AND CLEANING:

- A. Protection: Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.
- B. Care: During construction, properly cap all lines and equipment nozzles so as to prevent the entrance of sand and dirt. Protect equipment against moisture, plaster, cement, paint or other work of other trades covering it with polyethylene sheets.
- C. Cleaning: After insulation has been completed, clean all systems as follows:
 - 1. Ductwork, piping and equipment to be insulated: Clean exterior thoroughly to remove rust, plaster, cement and dirt before insulation is applied.
 - 2. Ductwork, piping and equipment to be painted: Clean exterior of piping and equipment exposed in completed structure, removing rust, plaster, cement and dirt by wire brushing. Remove grease, oil and similar materials by wiping with clean rags and suitable solvents.
 - 3. Motors, pumps and other items with factory finish: Remove grease and oil, and leave surfaces clean and polished.

3.3 LUBRICATION: Upon completion of the work and before turning over to the Owner clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacture and as listed in the Manual. Maintain lubrication of all mechanical equipment under the Contract until Work is accepted by the Owner.

3.4 PAINTING: All finish painting of mechanical equipment shall be under Division 1, unless equipment is herein specified to be provided with factory applied finish coats. All equipment shall be provided with factory applied prime finish, unless otherwise specified. Mark the purpose, size, and direction of flow and have the correct labels on pipe.

- A. Touch-up: If the factory finish on any equipment is damaged in shipment or during construction of the building, the equipment shall be refinished to the satisfaction of the Owner. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.
- B. Concealed equipment: All uncoated cast iron or steel that will be concealed or will not be accessible when installations are completed, shall be given one heavy coat of black asphaltum before installation and/or concealment.

3.5 CUTTING AND PATCHING:

- A. Sleeves and inserts: Provide all sleeves, inserts, and openings necessary for the installation of Work of Division 23.
- B. Openings: Special forming, recesses, chases, and curbs, as necessary for the proper reception and installation of the mechanical equipment, as indicated, shall be provided in the structure under other Divisions. Examine all Drawings to ascertain that proper provisions have been made for the Work of Division 23. If such provisions are not made in time, bear all extra costs incurred in later cutting and patching to accommodate this Work.

3.6 CONCRETE WORK: Provide all concrete required under Division 23. Size of housekeeping pads and isolation bases shall be 4" high, extending 6" beyond area of equipment. Furnish all required dimensional drawings for bases and pads and location thereof. Furnish embedded anchor bolts and sleeving and verify installation of same.

3.7 MAINTENANCE MATERIALS AND TOOLS: Conform to Division 1. Spare parts shall be provided to Owner as ordered and receipts obtained and included with Manuals. If any part of the equipment furnished under Division 23 requires a special tool for assembly, adjustment, setting, or maintenance thereof and such tool is not readily available on the commercial tool market, the tool shall be delivered to the Owner in accordance with Division 1.

3.8 COMMISSIONING:

- A. General: Before acceptance tests are performed, the Contractor shall demonstrate to the Owner that all systems and components are complete and fully charged with operating fluid and lubricants. The Systems shall be operable and capable of maintaining continuous uninterrupted operational service during the operating and demonstration periods of operation. All control systems shall be completely operable with calibration and setting properly set and adjusted. All rotating equipment shall be in dynamic balance and alignment as specified by the manufacturer.
- B. Tests: Pressure tests shall be performed as specified in Section 23 05 93 Air and Water Test and Balance. After systems have been completely installed, connections made and tests completed, Contractor shall make arrangements with the Owner to operate the systems for a period of five working days during the hours of a normal working day. The Contractor shall notify the Owner in writing when the operational period may start and the time for this period shall be scheduled by mutual agreement. During this operational test, instruct the Owner's operating personnel. Perform testing as specified and as required by the Architect to prove installation is in accordance with contract requirements. Perform tests in presence of Architect or his representative, and furnish test equipment, facilities, and technical personnel required to perform tests.

3.9 SYSTEM ACCEPTANCE

- A. Final Review: Prior to system acceptance after:
 - 1. Completion of the installation of all Division 23 Work required under the Contract Documents.
 - 2. Submission and approval of Manuals, Record Documents, and warranties.
 - 3. Completion of identification program.
 - 4. Completion of cleaning program.
 - 5. Satisfactory operation of all systems for a period of one week.
- B. Acceptance: Contingent Upon:
 - 1. Completion of final review and correction of all deficiencies.
 - 2. Satisfactory completion of acceptance tests which shall demonstrate compliance with all performance and technical requirements of the Contract Documents.
 - 3. Satisfactory completion of the training program and submissions of all manuals and Drawings required by the Contract Documents.

END OF SECTION

SECTION 23 31 00

DUCTWORK

PART 1 - GENERAL

- 1.1 DESCRIPTION: Division 1, Section 23 00 00 apply to this Section. Provide ductwork, complete.
- A. Related Work Not In This Section:
1. Mechanical General Provisions: Section 23 00 00.
- 1.2 SUBMITTALS: Conform to Section 01300, Section 23 00 00, and as specified in this Section.
- A. Shop Drawings:
1. Ductwork typical construction and coordinated layout drawings.
- B. Product and Equipment Data: Submittal shall include 6 copies of Product and Equipment Data for all the products, materials, and equipment specified in this Section including, but not limited to, the following:
1. Grilles, registers and diffusers,
 2. Dampers.
 3. Air filters.
 4. Flexible ducts.
 5. Ductwork accessories.
 6. Duct sealing.

PART 2 - PRODUCTS

- 2.1 GENERAL
- A. Galvanized Steel Sheets: First quality cold rolled, galvanized, open hearth soft steel sheets, capable of double seaming without fraction, meeting ASTM A526 64T.
- B. Aluminum sheets shall meet requirements of ASTM B209 2, 1,4, mil finish.
- C. Stainless steel sheets shall be Type 304 or 316 as the case may be.
- 22 CIRCULAR DUCTS AND FITTINGS: Galvanized steel of spiral construction as manufactured by United Sheet Metal, Peabody & Wind, Spiromatic. Corrugated or flexible metal duct will not be acceptable.
- 2.3 ACCESS DOORS: Access doors for circular ducts shall be United Sheet Metal Type AR-W, Peabody & Wind, Spiromatic.
- 2.4 MATERIALS
- A. Medium pressure ductwork (NA for this project) shall be galvanized steel.
- B. Low pressure ductwork shall be galvanized steel.
- C. All bracing, angles, bars and straps shall be steel.

- D. Screws and bolts shall be cadmium plated.

2.5 INSULATED FLEXIBLE DUCTWORK:

A. MATERIAL DESCRIPTION

The acoustical flexible air duct for connection between distribution ductwork and ceiling air diffusers shall be a factory fabricated assembly consisting of a porous inner sleeve of spun-bonded nonwoven nylon, insulation and an outer moisture barrier.

B. APPLICABLE STANDARDS AND TEST CONDITIONS

Acoustical performance of the acoustical flexible air duct shall be in accordance with Air Diffusion Council Flexible Air Duct Test FD72R1: Paragraph 3.2.1, Sound Attenuation. The test data shall be made by an accredited independent testing laboratory in accordance with the above testing procedure.

C. SOUND ATTENUATION REQUIREMENTS

The sound attenuation (insertion loss) of the acoustical flexible air duct shall meet or exceed the values tabulated below:

Straight Duct Insertion Loss in Decibels per Length of 10 Feet with No Airflow:

Acoustical Flexible Air Duct Inner Diameter	Octave Band Center Frequency (Hz)						
	125	250	500	1000	2000	4000	8000
6 Inches	20	25	30	33	30	25	22
10 Inches	18	20	25	28	25	22	20
16 Inches	15	18	20	25	22	15	15

D. APPROVED MATERIAL

The material shall be CASCO SilentFlex II Acoustical Flex Duct (C.A. Schroeder, Inc. in San Fernando, CA) or approved equal.

E. INSTALLATION

Installation of the acoustical flexible air duct shall be in accordance with the manufacturer's instructions and recommended procedures. Bends shall not have a radius of curvature smaller than 1.5 duct diameters. Before entering the rear of any diffuser, acoustical flexible duct must be straight and perpendicular to the diffuser for a minimum of 3 duct diameters.

Flexible duct must not be installed directly at the inlet or discharge of any volume control device.

2.6 CONTROL DAMPERS

- A. Volume control dampers:

1. Single blade butterfly dampers: Damper shall be one gauge, over duct gauge, galvanized steel with 3/8" square rod and secured in place with a self-locking regulator. Regulator shall be Ventlock No. 641, or equal by Duro Dyne.
 2. Opposed blade dampers: Frame shall be 12 gauge, minimum, steel channel, 2" wide with 1/2" web welded throughout. Blades shall be steel reinforced with triple 1" diameter beading secured to square or rectangular shafts which turn in teflon or bronze bearings. Seals shall be neoprene supplied to the sealing edge and ends of the blade sealing blade to frame. Finish shall be black enamel.
- B. Backdraft dampers: Extruded aluminum construction with vinyl blade edge seals and blade ends overlapping frame.
- 2.7 FIRE AND SMOKE DAMPERS: Fire and smoke dampers shall be designed and constructed in accordance with NFPA Standard 90A and UL Standard 555, and shall be so labeled with a permanent identification.
- A. Fire dampers:
1. Dampers shall be rated for rating of separation walls.
 2. Damper frames shall be permanently attached to code mounting sleeve.
 3. Damper blades in medium and high velocity ducts shall be out of the airstream, interlocking shutter type.
 4. Fusible link shall be rated for 160° F.
 5. Complete assembly shall be galvanized.
 6. Manufacturer:
 - a. Square or rectangular type shall be Pottorff, or equal, by Ruskin.
 - b. Round duct type shall be Pottorff, or equal, by Ruskin.
- B. Smoke dampers:
1. Dampers shall be motor operated.
 2. Damper frames shall be permanently attached to a 16 gauge minimum mounting sleeve.
 3. Damper blades shall be multi-blade type of 16 gauge minimum steel.
 4. Complete assembly shall be galvanized.
 5. Motor operator shall be UL listed package type with motor enclosed in a 22 gauge minimum housing.
 6. Damper shall be provided with end switch for connection to life safety system by others.
 7. Dampers mounted in a duct shall be furnished with duct mounted smoke detectors.
 8. Square or rectangular duct type shall be Pottorff FSD-142 as appropriate for point of use, or same type and quality by Air Balance or Ruskin.
- 2.8 AIR DISTRIBUTION EQUIPMENT: Refer to additional requirements specified in Section 01600.
- A. General:
1. Equipment shall provide required air flow, throw and spread without excessive drafts or noise in the ventilated or air conditioned areas.
 2. Provide all accessories required to effect these conditions.
 3. Grilles, registers, extractor, dampers or diffusers causing excessive drafts or noise shall be replaced at no additional cost to the Owner.
 4. Noise level ratings shall be in accordance with ANSI/ASHRAE Standard 70/1991. NC value shall not exceed 30 NC based on room absorption of 10 dB re 10⁻¹² watts.
 5. Air distribution equipment shall be of specified types as manufactured by Air Distribution Products, Shoemaker, Titus or Krueger.

B. Types:

1. Refer to equipment schedule for diffuser/register type.

2.9 AIR FILTERS: Filters shall be furnished complete with media, retainer frames and housing certified to meet design requirements. Filters shall be types as specified by Farr Co.

- A. Replaceable filters: Filter shall be replaceable type 24" x 24" complete with frame and retainer, 4" or 2" thick as scheduled. Filter shall be complete with holding frame. Average efficiency shall be a minimum of 30% based on rating in accord with ASHRAE Test Standard 52-76. Initial resistance at rated capacity 0.35" w.g.
- B. High Efficiency Filter: Filter shall be replaceable 24 x 24 complete with frame and retainer, 12" thick as scheduled. Filter shall be complete with holding frame with provisions for 4" prefilter. Average efficiency shall be minimum 80-85% based on rating in accordance with ASHRAE 52-76 test standard. Initial resistance at rated capacity .50" w.g.

PART 3 - EXECUTION

3.1 SHEET METAL DUCTWORK

- A. SHEET METAL DUCTWORK: General: Install ductwork of sizes, runs and connections as indicated. Verify all dimensions at the site, making all field measurements and shop drawings necessary for fabrication and erection of sheet metal work. Dimensions shown are net free areas. Make allowances for beams, pipe or other obstructions in building construction and for work of other contractors. Check plans showing work of their trades and notify the Architect in the event of any potential interference.
 1. Fabrication: Fabricate ductwork in workmanlike manner with airtight joints, presenting smooth surfaces on inside, neatly finished on outside, construct with curves, bends, turning vanes to aid in easy flow of air. Make internal ends of slip joints in direction of air flow. All ducts, duct fittings and materials shall conform to SMACNA recommended practice as specified in the SMACNA Duct Construction Standards latest edition and California Mechanical Code requirements.
 2. Supports: Support and brace ducts and air plenums to prevent sagging and to minimize vibration when fans are operating. Provide seismic bracing per Section 15160.
 3. Sizes: Dimensions of acoustical lined ductwork are clear inside dimensions. Increase size of duct by thickness of acoustic lining.
 4. Cleaning: Blow out all dirt and foreign matter from ductwork, and clean diffusers, registers and grilles, prior to operating system.
- B. Low Pressure Rectangular Galvanized Steel Ductwork: Construct with wall thickness and gages as scheduled by SMACNA Duct Construction Standards latest edition.
- C. Bracing: Provide bracing for all rectangular ductwork. It shall be attached to duct with rivets, bolts or spot welded, and spaced to comply with SMACNA Guidelines for Seismic Restraints of Mechanical Systems, SMACNA Duct Manual and California Mechanical Code.
- D. Circular Galvanized Steel Ductwork: Wall thickness and gauges for circular ducts shall be as scheduled by SMACNA Duct Construction Standards latest edition and California Mechanical Code.
- E. Fittings and Connections for Circular Ducts: Fittings shall be factory fabricated with radii of elbows and angles minimum of 1-1/2 times diameter or maximum width of duct. Tee fittings shall be of conical type change in shape from round to rectangular made with transformation joint with minimum of 1 to 7 taper. Joints between two ducts shall be made with beaded sleeve joint as scheduled with duct sealer applied to

make end, mechanically fastened with sheet metal screws or pop rivets. Over joint and screw or rivet heads, apply coating of duct sealer.

- F. Duct Supports: Support horizontal ducts with hangers of scheduled size and spacing. Install hangers at each change in direction of duct.
1. Extend strap hangers down both sides of duct, turn under bottom one inch minimum. Metal screw hangers to bottom of duct and to upper and lower sides of ducts at not more than 12" on center.
 2. Provide angle hangers formed by extended vertical bracing angles or by rods connecting to bottom angles if size or bracing angles conform to hanger schedule.
 3. Support vertical ducts at every other floor with angles or channels riveted to ducts. Reset angles on channels on floor slab or structural steel members placing in opening, unless otherwise shown.
 4. Hangers shall be constructed of galvanized steel.
 5. Hangers for horizontal rectangular or circular duct shall conform to SMACNA Guidelines for Seismic Restraints for Mechanical Systems dated April 1976, and SMACNA Duct Manual and California Mechanical Code.
 6. Seismic restraints shall be as specified in Section 230548 Vibration Isolation and Seismic Restraints.
- G. Taping Duct Joints: Make supply duct joints airtight by covering all duct joints, including angle iron connections, with 6" wide strips of six (6) ounce canvas cemented on with lagging adhesive. Joints shall be sealed and filled with mastic in punched holes and corner cracks. Alternate methods may be used when permitted.
- H. Tapers: Pitch sides of duct in a "diverging" airflow of 1 to 4 taper.
1. Pitch sides of duct in a "converging" airflow maximum of 1 to 4 taper.
- I. Supply Elbows: Shall be designed for minimum friction with inside radius not less than width of duct. When required radius elbows cannot be obtained, use square elbows with hollow double radius type duct turns. Attach duct turns to duct securely with spot weld screws or rivets. Friction type attachment not acceptable. Special vaned elbows shall be as shown. Turning vanes are not acceptable in other than low velocity, low pressure ducts.
- J. Flexible Duct Connection: Provide 16 ounce neoprene coated glass fabric at all connections to fans. Install with metal collar frames at each end of connections. Attach fabric tightly to ducts. Allow at least 1" slack in connections. Make fabric connections minimum 4" long.
- K. Flashing Ducts Through Roof: Install flashing to cover top and sides of curb and fit closely around duct. Cover top edge of base flashing with collar soldered to duct and turned down over base flashing. Fabricate flashing from 24 gauge galvanized steel.
- L. Test holes: Drill instrument test holes in ductwork for pilot tube tests. Install Ventlok No. 699 or 699-2 instrument test hole as required for insulation thickness.
- M. Access Doors In Rectangular Ducts: Construct with galvanized steel metal of same gauge as duct, with frame, galvanized steel hinges, handles, clamping devices, gasketed for airtight fit. Fabricate double skinned with insulation core where ducts are insulated. Sizes are shown, minimum 12" x 12". Provide where required for access to dampers and other equipment requiring service or inspection, and for cleanouts.
- N. Duct liner: Ducts and plenums shall be lined as specified in Section 233300 Duct and Plenum Lining.

3.2 FLEXIBLE AIR DUCT

- A. Installation: Insulated flexible ducts shall be continuous, single pieces not over 7' in length for low pressure, and shall be adequately supported and shall not be installed with an inside radius of bend less than two duct diameters. Flexible ducts shall be installed in as straight a manner as possible. Cut ducts to lengths required rather than create bends to take up excess lengths.
- B. Joining: Where flexible ducts join other ductwork and air terminals, duct sealer and sheet metal bands shall be used to secure flexible duct and make the joint airtight.

3.3 DIFFUSERS, REGISTERS AND GRILLES INSTALLATION: Coordinate with ceiling features:

- A. Diffusers, plenum boxes, linear grilles, shall be fully coordinated to fit into the ceiling materials shown on the Architectural Drawings.
- B. Drywall plaster ceilings, diffuser, register or grille trim shall overlap the plaster line with overlapped margins.
- C. Acoustic Tile Adhesively Applied to Drywall or Plaster Ceilings: Diffusers, registers or grilles shall be furnished with overlapped margins.
- D. In lay-in t-bar or concealed spline systems: Square or rectangular diffuser and grille edge trim shall be flush with the finished ceilings. Unit frames shall be sized to fit t-bar module or 1/2 module.

3.4 AIR FILTERS

- A. Certification: Include in submittal an individual test report prepared by an independent testing laboratory with test equipment specified in ASHRAE Standard 53-76 using 24 1/2" x 24 1/2" duct section for the filter under test. The test report shall include filter descriptive information and assurance that the construction and performance is in accordance with the specifications. All filters tested shall have been procured by the independent testing laboratory from the open market independent of the manufacturer for these filters, and a statement of this fact must accompany the submittal along with the test report.
- B. Completion: After completion of the testing of the air handling equipment and systems and approval of same, but before final acceptance of the Project, replace all air filters.
- C. Spare filter units: After completion and final acceptance of Work, deliver to the Owner one (1) filter unit for each filter installed.

3.5 JOINT SEALING

- A. Round Duct Joints: In diameters through 50" shall be assembled and sealed as follows:
 - 1. Approved sealer is applied to the male end of the coupling and fittings. After the joint is slipped together, sheet metal screws are placed 1/2" from the joint bead for mechanical strength. Sealer is applied to the outside of the joint, extending 1 on each side of the joint bead and covering the screw heads. Plastic backed tape is immediately applied over the wet sealer.
 - 2. The duct sealer must be specifically formulated for the job of sealing the field joints for high pressure systems. The sealer shall be compatible with plastic-backed duct tape so the two shall cure and bond together. Samples of sealer and tape and the specification data sheets shall be submitted to the engineer for approval.
 - 3. Flanged joints shall be sealed by neoprene rubber gaskets.
- B. Supply ductwork (air conditioning, ventilation, fresh air): Shall have transverse and longitudinal seams sealed with Tuff-Bond No. 12 or United Duct Sealer.
- C. Duct Penetration at Walls and Shafts: The annular space between the duct and building shall be packed with one pound density glass fiber. Seal the edges flush with the wall or shaft with Seal Right Corporation fire-resistant sealant. Ductwork exposed to view shall have escutcheon or collar covering wall opening.

END OF SECTION

SECTION 23 72 00

PTAC SYSTEM AC UNITS

PART 1 - GENERAL

1.1 DESCRIPTION: Division 1, Section 23 00 00 apply to this Section.

***FOR EQUIPMENT OTHER THAN SPECIFIED HEREIN WITHIN, CONTRACTOR SHALL REFER TO MECHANICAL PLANS.

A. Related Work Not In This Section:

1. Mechanical General Provisions: Section 23 00 00.

1.2 SUBMITTALS: Conform to Section 01300, Section 23 00 00, and as specified in this Section.

A. Product and Equipment Data: Submittal shall include 6 copies of Product and Equipment Data for all products, materials, and equipment specified in this Section including, but not limited to, the following:

1. Refrigeration and fan coil units, wiring diagram, foundation drawings and control diagrams.
2. Compressor motor data.
3. Package units.

1.3 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standards 210/240 and 270. Designed in accordance with UL Standard 465.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15.
- C. Unit shall be UL listed and certified.
- D. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- E. Coils shall be leak tested to 350 psig air pressure.

1.4 DELIVER, STORAGE AND HANDLING

- A. Unit shall be stored and handled per manufacturer's recommendations.

PART 2 – PRODUCTS

***Refer to Equipment Schedules on the plans

2.1 Features:

- High energy efficiency rating (13.3 EER)
- R410 refrigerant for eco friendly cooling and ceramic heater for a safe, stable heating platform
- Incredibly quiet due to dual motor configuration (separate indoor/outdoor motors)
- Four sensors provide highly efficient operation to maximize guest comfort
- High efficiency compressor for maintenance-free operation
- Gold-Fin anti-corrosion treatment extends the life of the unit

- Digital control panel with temperature display
- Dip switch setting for temperature limiting
- Front desk control (standard connections for remote thermostat)
- Compatible with most energy management systems
- Fits most standard sleeves for easy installation of replacement units
- 2 cooling, 2 heating and 2 fan modes
- Energy saver mode
- Freeze room protection to monitor and maintain indoor temperature
- Auto restart saves settings during a power outage
- Fresh air ventilation
- Polymeric mesh filter
- ADA compliant

END OF SECTION

Appendix

Product Selection – Supersedes general project specifications



BEYOND SECURITY

KABA®

InSync™ Lock Series SAM RF™ Software

Key Control Systems for Multihousing

InSync Locks & SAM RF Software:

The Perfect Combination of Style and Security

When it comes to residents' needs, developers and property managers know that a facility's amenities are equally important as a well-designed unit. Today's renters want common areas that build a sense of community or concierge services to help manage busy lifestyles. Every amenity, every convenience are selling propositions—and that includes security and access control. Kaba InSync locks and SAM RF software offers developers and property managers the perfect combination of style and security.

Kaba InSync locks are the leading choice for developers and property managers seeking an advanced access control solution that streamlines key management, simplifies operations, and increases community security. InSync locks are ideal for all types of multihousing applications, including affordable housing, garden-style, mid-rise, high-rise, luxury, student, and senior living. With a variety of lock models available, InSync locks are ideal for both retrofit and new construction projects.

InSync locks work together with SAM RF software to create a single system that manages both key and access control at perimeter entries, amenity and utility doors as well as apartment or bedroom doors. With the InSync system, property managers program the locks once; the software programs critical information, such as access codes, onto the key. When a resident presents a newly encoded key to the lock, it voids the previous key. Only one key is required for use at multiple access points, creating a convenient and efficient user experience. InSync lock models accommodate virtually all door types and preparations as well as common area applications, and the locks feature contemporary finishes and lever options to complement today's design trends.

*InSync Locks Work with SAM RF Software,
Key Encoder, and RFID Credential to
Create a Comprehensive Access Control
System.*

InSync Locks

InSync locks cover a full spectrum of hardware offerings to fit a property's design, budget, and security needs. InSync configuration options include:

- Unit function — Designed for apartment entry, offices, utility rooms, and more.
- Suite function — Ideal for multiple leases per apartment, such as student housing. If a resident loses a key, the new key cancels out the lost key and allows continued access by roommates.
- Common function — Used for perimeter entries and amenity spaces, including “pay-for-use” areas, common locks can have restrictions by time schedule and use.

All InSync locks operate using four AA standard alkaline batteries. There is no wiring required. InSync locks fit standard door preparation and meet UL requirements for both 20-minute or three-hour fire ratings. InSync locks maintain entry records by time, date, and key ID information; non-volatile memory maintains programming and audit information.



SAM RF Software

From design to installation, SAM RF software is intuitive and easy to use and includes the following features:

- User interface with drop down menus for programming keys, creating users and authorizations, and generating system transaction reports.
- Customizable authorization group setup to provide management control over employee access and keymaking restrictions.
- ID and password protection for advanced security and administration.
- Multiple database options to enable management of several properties from a single system.
- Multiple and customizable key levels, including Resident, Zone, Master, Limited Use, and Emergency.

In addition, to further aid an effortless system setup, Kaba specialists are available to create a property-specific database that meets both a facility's design layout and access control requirements.

SAM RF Key Fob RFID Technology

- Proximity reader replaces hard contact fobs or readers for reliable reads, longer life, and minimal maintenance.
- Read/write technology enables reusable and reprogrammable keys.
- High-security encryption unique to each property.
- Time-stamp expiration option for increased security.
- Special polymer construction repels moisture and protects embedded access codes.

Dual Technology: Compatibility with Single-Key Convenience

The InSync RFID key with dual technologies contains standard HiTag technology along with either Prox, MIFARE®, or DESFire®. Keys are configured based on the operating protocol of an existing perimeter system. An InSync RFID key with dual technologies lets a property leverage a single credential to work in tandem with a hard-wired access control system.

Applications

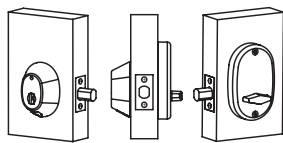
- Apartment Entry Door (D, I, L, M)
- Bedroom Doors (D, I, L, M)
- Patio Storage Closet (D, I, L, M)
- Community Room (CL, CM)
- Pool Gate (CL, CM)
- Pedestrian Gate (CL, CM)
- Roll-up Garage Door (CR)
- Parking Arm (CR)
- Elevator (CR)
- Business Center (CL, CM)
- Exercise Room (CL, CM)
- Store Room (D, I, L, M)
- Mechanical Room (D, I, L, M)
- Office Door (D, I, L, M)
- Stairwell Door (CL, CM, CP)
- Entrance Door (CL, CM, CP, CR)
- Leasing Office (CR, D, I, L, M)



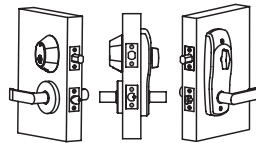
InSync is a complete line of locks for every residential and community living application. Unit locks and Suite locks are able to store an audit trail of up to 200 entries; common locks are designed for heavy-traffic areas and can store up to 2,000 entries.

InSync Lock Hardware Options

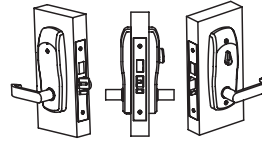
Locks designed for use in all door types and preparations:



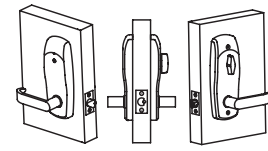
InSync D



InSync I

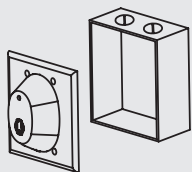


InSync M

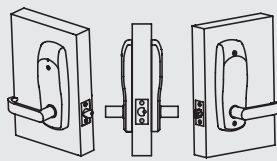


InSync L

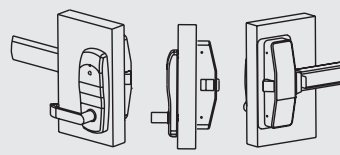
Locks designed for use in different common area applications:



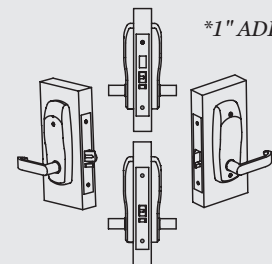
InSync CR



InSync CL



InSync CP



InSync CM

**Optional 1" automatic deadbolt (ADB)*

InSync Lock Model Options



InSync D
Electronic Deadbolt



InSync I
Electronic Interconnect
Lock Set

Note: Passage lever shown above is not included.

Specifications

- 1" deadbolt (**D, I**)
- 2³/₈" (60mm) or 2³/₄" (70mm) backset (**D, I**)
- Interior thumbturn (**D, I**)
- Standard deadbolt door prep (**D, I**)
- Door thickness: 1³/₈" – 2" (**D, I**)
- UL certified for use on fire-rated doors (**D, I**) (20-minute rating)

- Environmental: Indoor/Outdoor approved (**D, I**)
-31 °F to 151 °F (-35 °C to 66 °C)
- Uses 4 AA batteries (**D, I**)
- Interconnected single motion egress (**I**)
When the inside lever is rotated, both latch and deadbolt are simultaneously retracted
- ADA-compliant levers and thumbturns (**I**)



InSync L
Electronic Lock
with Tubular
Deadlatch



InSync M
Electronic Lock with
ASM Mortise

Specifications

- 1/2" tubular deadlatch (**L**)
- 2³/₈" (60mm) or 2³/₄" (70mm) backset (**L**)
- UL certified for use on fire-rated doors:
20-minute rating (**L**)
- Interior thumbturn (**Unit models only**) (**L, M**)
- Complete lever set/single motion egress (**L, M**)
- Uses 4 AA batteries (**L, M**)
- ADA-compliant levers and thumbturns (**L, M**)

- Environmental: Indoor/Outdoor approved (**L, M**)
-31 °F to 151 °F (-35 °C to 66 °C)
- 1" automatic deadbolt (ADB) (**M**)
- 2³/₄" (70mm) backset (**M**)
- UL certified for use on fire doors:
20-minute rating and 3-hour rating (**M**)
- 8" mortise lock (**M**)
- 3/4" dead-locking latch (**M**)
- ADA-compliant levers and thumbturns (**L, M**)

InSync Common Area Locks

InSync C products provide a variety of alternatives when addressing community access control.



InSync CR Series

Electronic
Common Reader



InSync CP Series

Electronic Lock
for Exit Devices



InSync CL
Electronic Lock
with Tubular
Deadlatch



InSync CM
Electronic Lock with
ASM Mortise

Specifications

- Remote control unit (RCU) switch works with electrified locking devices (**CR**)
- Controls electronic strikes and magnetic latches up to 24 volts AC/DC (**CR**)
- Functions as elevator control unit (ECU) with a single relay (**CR**)
- Environmental: Indoor/Outdoor approved (**CR, CP**)
-31 °F to 151 °F (-35 °C to 66 °C)
- Available in flush or surface mount (**CR**)
- Works in conjunction with rim and vertical exit hardware for common area doors (**CP**)
- Interfaces with industry-leading exit devices* (**CP**)
- Compatible with a variety of rim and surface mount vertical rod panic hardware* (**CP**)
- ½" tubular dead latch (**CL**)
- Single motion egress with common area electronics (**CL, CM**)
- ¾" anti-pick latch (**CM**)
- Available with UL 20-minute or 3-hour rating (**CM**)

** See Multihousing Price Book or www.kaba-adsamericas.com for compatibility*

Hardware Finish and Lever Options



Apogee™



Arc



Gala



Troy



Continental



Vintage



Bright Chrome **26**



Bright Brass **U3**



Satin Chrome **26D**



Satin Brass **U4**



Satin Nickel **U15**



Dark Mahogany **10B**

Note: Continental and Vintage Levers are NOT available in Satin Nickel. All other lever styles are available in all finishes
Extra heavy chrome (EHC™ – PVD) finish – available on Apogee satin chrome lever ONLY
Custom lever options are also available – contact Kaba Access and Data Systems Americas for all availability and lead times

BEYOND SECURITY



Kaba Access & Data Systems Americas
2941 Indiana Ave.
Winston-Salem NC 27105
USA
1-800-849-8324

www.kaba-adsamericas.com

KAA1245 0815

Electronic Door Hardware and Key Management Systems Specification

ELECTRONIC DOOR HARDWARE - KEY MANAGMENT SYSTEM

PART I – GENERAL

1.01 FORM & FUNCTION OF InSync D & I

- A. InSync D & I is a stand-alone electronic lock powered by a local battery source. Tubular deadbolt by design, incorporating software characteristics that enable its compatibility with the Saflok SAM RF operating system.
- B. InSync D & I inside escutcheons shall be secured with two tamper proof screws.
- C. The outside housing should appear as a standard deadbolt housing or similar aesthetic design.
- D. InSync D & I shall feature an environmentally hardened key reader and PC board communicating using RF technology utilizing a RF credential configured electronic key. The design makes the InSync D & I and RF Keys impervious to all weather conditions.
- E. Average power consumption of standard 4 AA battery source is 18 – 24 months between battery change outs.
- F. D & I Dead bolt to be grade 2
- G. I Latch bolt to be grade 2

PART 2 – PRODUCT

2.01 MANUFACTURED DEAD BOLT UNITS

- A. Electronic Dead Bolt Locks. InSync D & I shall have the following characteristics.
 - 1. The programmed and operationally functional D & I locks shall be capable of recognizing 64 individual resident key ID's, 193 individual master/zone key ID's and an unlimited amount of limited use key ID's at any given time.
 - 2. Audit trail shall record the last 300 entries in the locks non-volatile memory; each transaction will include time, date, and key ID identification. Programming and Audit events shall also be recorded by time, date, and user name.
 - 3. Locks shall utilize a memory key with RF communication abilities.
 - 4. The unit's internal clock shall operate in real-time. Changes in lock function shall not reset the clock.
 - 5. Power supplied by four (4) standard AA alkaline batteries.
 - 6. Lock to have LED diagnostics key providing battery and lock status.
 - 7. Non-volatile memory to secure programming and audit trails features.

Electronic Door Hardware and Key Management Systems

8. Deadbolt shall retract after insertion of correctly coded RF key and physical rotation of key in locks keyway.
9. Deadbolt shall operate by release of locks internal motor and physical rotation of key from outside or thumb turn from inside.
10. InSync I locks will provide two points of latching and single motion interconnected egress when exiting.
11. Full complement of finishes to include satin brass, satin chrome, satin stainless, satin nickel, polished brass, polished chrome.
12. All locks shall permit free exit by mechanical turn of thumb turn.
13. All locks shall be weatherized for environmental considerations.
14. Lock shall indicate low power signal with access key insertion.
15. External power supply powers lock from exterior should battery power fail for any reason. This procedure bypasses dead batteries and does not attempt to recharge internal batteries.
16. RF Keys allow access to optional suite or common area function locks.
17. Limited Use service keys to allow access up to 20 multiple units.
18. InSync D & I locksets are to conform to ANSI Grade II and meet Underwriters Laboratories Fire Rating C through A.
19. Lost keys in system shall be recoded and upon insertion of the appropriate new key or user ID inhibit key. The lost key shall be invalidated from access. An issuance of a new encoded key shall be differentiated in the audit trail of the lock. Invalidation process shall not require reprogramming of lock by Utility Device.
20. Lock escutcheon shall be designed to allow liquids to move around unit.
21. Batteries shall be located in the interior escutcheon, accessible only from the interior of the door.
22. Use of authorized resident access keys shall allow deadbolt retraction and extension from the exterior of the door.
23. Use of optional master/zone level keys shall allow deadbolt retraction and extension, unless the option is not requested prior to installation.
24. Use of optional Emergency Services Key to allow retraction and extension to all installed units, unless the option is not requested prior to install.
25. Locks shall be programmed by the use of the Utility Device. The Utility Device may not have the option of opening any doors.
26. The locks universal PC board will shall be programmable to residence Unit function or Suite/Foyer function.
27. Lock shall include the option of Emergency level, Master level and Zone levels.

B. Physical Characteristics InSync D

1. Weight - 1 lbs. InSync D
2. Exterior lock dimensions – 3 ½” h x 2 ½” w x 1¼” d
3. Interior lock dimension – 4 ½ “ h x 3 ½” w x 1” d
4. Temperature range – -32 degrees F / +161 degrees F with 4 AA standard alkaline batteries.
5. Humidity – up to 99% with condensation.
6. Power supply – 4AA alkaline batteries.

Electronic Door Hardware and Key Management Systems

Physical Characteristics InSync I

1. Weight – 9 lbs. InSync I.
2. Exterior lock dimensions – 8 15/16” h x 3 1/16” w x 2.5” d / InSync I.
3. Temperature range – -32 degrees F / +161 degrees F with standard alkaline batteries.
4. Humidity – up to 95% without condensation.
5. Power supply – 4AA alkaline.
6. Power consumption – 0.05 mA in standby mode.

C. Product

1. Product shall be the SAFLOK InSync D OR I Electronic Deadbolt with SAM RF Security Access Manager Windows based software and key encoding equipment.

PART 3 - WARRANTY

3.01 WARRANTY

A. Warranty: From date of delivery.

1. InSync electronic hardware product: One (1) year.
2. SAM RF operating system and peripherals: One (1) year.
3. RF Keys and other miscellaneous electrical equipment. One (1) year.

PART 4 - SUMMARY

4.01 SUMMARY

The product shall be known as the Saflok InSync D electronic deadbolt or InSync I interconnecting deadbolt and latch and will operate with SAM RF software.

A full line extension of InSync lock assemblies is available to complement any type entry or door requirements. Additional specifications are available for InSync M (mortise), InSync I (interconnect), InSync L (tubular latch), InSync C (Common Area Control Products) to include CR (common area 110V AC/DC control units), CM (common area mortise), CL (common area latch) & CP (common area panic trim)

DOOR HARDWARE - ELECTRONIC KEY ACCESS LOCKING SYSTEM

PART I – GENERAL

1.01 SUMMARY

Key Management operating system specified as Security Access Manager, SAM RF Encoding System.

Door Hardware specified as Saflok InSync M, InSync L, InSync CR and InSync CM

1.02 REFERENCES

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI)
2. Builders Hardware Manufacturers Association (BHMA)
3. Door and Hardware Institute (DHI)
4. Factory Mutual (FM)
5. National Fire Protection Association (NFPA)
6. Underwriters' Laboratories, Inc. (UL)

B. Industry standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336, (ADA)
2. ANSI A117.1: Providing Accessibility and Usability for Physically Handicapped People, 1986 edition.
3. Federal Register Part III, Department of Justice, Office of the Attorney General, 28 CFR Part 36: Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities; Final Rule, July 26, 1991.
4. Federal Register Part II, Architectural and Transportation Barriers Compliance Board, 36 CFR Part 1191: Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Amendment to Final Guidelines, September 6, 1991.

1.03 SYSTEM DESCRIPTION

Furnish and install an electronic lock system, complete and including without limitation, the following components:

1. Complete programming, data base design, storage, and software.
2. Operating system package, encoder and cables, as necessary, to interface with minimum recommended computer system.
3. Lock units as specified.
4. Batteries.
5. Utility Device or portable programmer for lock units.
6. Special tools.
7. Operating manuals.
8. Training of staff.
9. Emergency Lock Power Supply.
10. RFID Memory Keys.

1.04 SUBMITTALS

Submittal packages by request.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer shall have had experience in the installing and servicing of electronic lock systems and shall be approved by the manufacturer of the system.

B. Regulatory requirements:

1. Furnish locksets for fire-rated openings in compliance with requirements of NFPA 80-1990 and NFPA 101-1991.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. System components, including locksets must be stored in a dry temperature controlled environment.

1.07 WARRANTY

A. Warranty:

1. Door locksets: One (1) year.
2. Keys and other electrical equipment. One (1) year.
3. Commences from date of delivery.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Subject to full compliance with requirements, provide electronic lock system and electronic keys by one of the following manufacturers:

KABA

Call (800) 849-8324 for information.

Fax information requests to (800) 346-9640

Substitution:

If a qualified bidder proposes to furnish material of another manufacturer, he must receive prior approval by the owner and submit the manufacturer's name, catalog information and an explanation of the substitution no less than fifteen working days, prior to the bidding to the general contractor. The owner (upon examination of the catalog information for proposed substitution) will issue an addendum to the specification if he considers the proposed substitution to be equivalent to the material specified. If no addendum is issued, it is understood that the bidder will supply the hardware exactly as specified.

2.02 MANUFACTURED LOCK UNITS

A. Electronic Auto Dead Bolt Locks. InSync M:

Keying: Locks shall be opened upon insertion of a correctly coded RFID memory key.

1. Unit or Suite locks shall be capable of recognizing up to 256 individual key ID's plus unlimited "Limited Use Key" ID's at any time.
2. Audit trail shall consist of the last 200 entries to the lock. Each transaction must include time, date and key identification or user name. Programming events shall also be recorded with time, date, and user name.
3. Locks shall utilize a RFID memory key.
4. The unit's internal clock shall operate in real-time. Changes in lock function shall not reset the clock.
5. Power supplied by four (4) standard size AA alkaline batteries.
6. Non-volatile memory for programming and audit trail features.
7. Deadbolt shall operate by closure of door (ADB – Automatic Deadbolt) and retract along with the latch upon single motion lever rotation during ingress or egress.
8. Choice of satin chrome US26D, satin brass US4, polished brass US3 finishes with no additional charge.
9. All M locks shall permit free egress by mechanical rotation of inside lever.
10. All locks shall be weatherized for environmental considerations.
11. Lock shall indicate low power signal with access key insertion. External Power Supply powers lock from exterior should battery power fail for any reason.
12. Keys to allow access to optional Suite or Common Area function locks.
13. InSync M locksets are to conform to ANSI Grade I and meet Underwriters Laboratories Fire Rating C through A.
14. Lost keys in system shall be replaceable and upon insertion of the appropriate user-inhibit key, the lost key shall be invalidated for access. An issuance of a new encoded key shall be differentiated in the audit trail of the lock. Invalidation process shall not require reprogramming of lock by Utility Device.
15. Lock escutcheon shall be designed to allow liquids to move around unit.
16. Batteries shall be located under the interior escutcheon. Accessible from the interior of the door secured by two tamper resistant screws.
17. SAM RF software can be provide with, or without Master Keying levels and must be specified prior to ordering.
18. Locks shall be programmed by the insertion the Utility Device into the locks USB port. The Utility Device may not have the option of opening any doors.
19. The lock functions shall be programmable to Unit function or Suite function.
20. Minimum of two RFID keys to be specified with each specified lockset.

B. Physical Characteristics:

1. Weight – 9 lbs. InSync M.
2. Exterior lock dimensions – 8 15/16" h x 3 1/16" w x 2.5" d / InSync M.
3. Temperature range – -32 degrees F / +161 degrees F with standard alkaline batteries.

Saflok SAM RF System - InSync M, L, CR, CM

Door Hardware and Key Management Locking Systems

4. Humidity – up to 95% without condensation.
5. Power supply – 4AA alkaline.
6. Power consumption – 0.05 mA in standby mode.

C. Product:

1. Product shall be the SAFLOK InSync M Mortise Lock with SAM RF Security Access Manager Windows based software and key encoding equipment.

2.03 MANUFACTURED LOCK UNITS

A. Electronic Tubular Dead Latch Lock. InSync L:

Keying: Locks shall be opened upon insertion of a correctly coded RFID memory key.

- a. Unit or Suite locks shall be capable of recognizing up to 256 individual key ID's plus unlimited "Limited Use Key" ID's at any time.
- b. Audit trail shall consist of the last 200 entries to the lock. Each transaction must include time, date and key identification or user name. Programming events shall also be recorded with time, date, and user name.
- c. Locks shall utilize a RFID memory key.
- d. The unit's internal clock shall operate in real-time. Changes in lock function shall not reset the clock.
- e. Power supplied by four (4) standard size AA alkaline batteries.
- f. Non-volatile memory for programming and audit trail features.
- g. Dead Latching bolt shall operate by closure of door and retract the latch upon single motion lever rotation during ingress or egress.
- h. Choice of satin chrome US26D, satin brass US4, polished brass US3 finishes with no additional charge.
- i. All L locks shall permit free egress by mechanical rotation of inside lever.
- j. All locks shall be weatherized for environmental considerations.
- k. Lock shall indicate low power signal with access key insertion. External Power Supply powers lock from exterior should battery power fail for any reason.
- l. Keys to allow access to optional Suite or Common Area function locks.
- m. InSync L locksets are to conform to ANSI Grade 2 and meet Underwriters Laboratories Fire Rating C through A.
- n. Lost keys in system shall be replaceable and upon insertion of the appropriate user-inhibit key, the lost key shall be invalidated for access. An issuance of a new encoded key shall be differentiated in the audit trail of the lock. Invalidation process shall not require reprogramming of lock by Utility Device.
- o. Lock escutcheon shall be designed to allow liquids to move around unit.
- p. Batteries shall be located under the interior escutcheon. Accessible from the interior of the door secured by two tamper resistant screws.
- q. SAM RF software can be provide with, or without Master Keying levels and must be specified prior to ordering.
- r. Locks shall be programmed by the insertion the Utility Device into the locks USB port. The Utility Device may not have the option of opening any doors.
- s. The lock functions shall be programmable to Unit function or Suite function.

Saflok SAM RF System - InSync M, L, CR, CM

Door Hardware and Key Management Locking Systems

- t. Minimum of two RFID keys to be specified with each specified lockset.

B. Physical Characteristics:

- a. Weight – 8 lbs. InSync L.
- b. Exterior lock dimensions – 8 15/16” h x 3 1/16” w x 2.5” d / InSync L.
- c. Temperature range – -32 degrees F / +161 degrees F with standard alkaline batteries.
- d. Humidity – up to 95% without condensation.
- e. Power supply – 4AA alkaline.
- f. Power consumption – 0.05 mA in standby mode.

C. Product:

- a. Product shall be the SAFLOK InSync L Dead Latch Lock with SAM RF Security Access Manager Windows based software and key encoding equipment.

2.04 SOFTWARE – SAM RF, ENCODER & UTILITY DEVICE

A. Software requirements minimum:

- 1. Win 98 SE or Windows NT 4.0, 2000, XP or Server 2003.
- 2. A Pentium II or greater processor, 64 MB RAM, 10 gigabyte hard drive.
- 3. CD ROM,
- 4. 3.5 inch floppy disk drive.
- 5. V.90 internal or external modem.
- 6. USB port for connecting the electronic key encoder device.
- 7. Anti-virus protection program (e.g., Norton Anti-virus, McAfee Anti-virus).
- 8. UPS and surge protection with equipment warranty is suggested.

B. Software & Encoder Base must have the following:

- 1. Capable of tracking 259,328 key ID's plus unlimited "Limited Use Key" users per site.
- 2. Capable of 4,000 unit locks and 2,000 suite locks, 50 optional Zones, 1 Master level and 1 Emergency Master level per site.
- 3. Common Areas to accommodate 64 separate identifiers.
- 4. Transaction report of all system transactions on computer.
- 5. No moving parts in key encoder.
- 6. Key encoder must code and validate keys.
- 7. Key encoder must have the ability to read all keys.
- 8. Software package must have a unique key way code, unlike any other site and unlike that which is duplicable by manufacturer's employees.
- 9. Limited Use service keys to allow access to multiple rooms.
- 10. System shall include the option of master levels and zone levels.
- 11. Password protected for each user.
- 12. System transactions specially tailored by system administrator.
- 13. Work Order Program.

Saflok SAM RF System - InSync M, L, CR, CM

Door Hardware and Key Management Locking Systems

C. Hand Held Utility Device:

1. Shall upload programming information from locks to software.
2. Shall set the time and date in the lock automatically with insertion.
3. Shall be restricted from opening any lock.
4. Shall capture the lock voltage and critical information.
5. Shall upload audit trail information from locks to software.
6. Shall contain a unique key way code and site code non-duplicated at any other site in the world.
7. Shall reside in the Encoders charger platform or base.
8. Shall be a hand held unit.
9. Audit trail memory storage records any combination of three 2,000 Common Area audit trails, 200 Unit or 200 Suite audit trail transaction lists in a non-volatile memory.

D. Physical Characteristics Encoder & Utility Device Combined:

1. Weight – 1.88 lbs. Encoder & Utility Device Combined.
2. Dimensions – 5.313” h x 3.875” w x 8.375” d.
3. Temperature range – +50 degrees F / +104 degrees F.
4. Humidity – 10% to 90% without condensation.
5. Power supply – 4AA NiCad and/or 110VAC Adapter.
6. Display: 3 x 25 character LCD.

E. Product:

1. Product shall be the SAM RF Key Manager/Encoder/Utility Device.

2.05 EXTERNAL LOCK POWER SUPPLY

A. Shall be a hand held unit:

1. Weight: .06 lbs.
2. Dimensions: 2.5” x 4” x 1”.
3. Connects to lock via USB cable.
4. ELPS will not allow access to the lock unit.

B. Product:

1. Product shall be the SAM ELPS Emergency Lock Power Supply.

2.06 MANUFACTURED COMMON REMOTE UNITS

A. The InSync CR Common Remote with Relay shall have the following characteristics:

1. Shall include a form ‘C’ contact, including three contacts, normally closed, normally open, and common contacts.
2. Shall accommodate a maximum of 24 Volts DC or 12 Volts DC devices.
3. Shall be capable of recognizing any of 259,328 individual key ID’s plus unlimited “ Limited Use Key” users.
4. Shall utilize a RFID memory key.
5. Shall require time and date programming.

Saflok SAM RF System - InSync M, L, CR, CM

Door Hardware and Key Management Locking Systems

6. Power supplied by AC/DC and include UPS.
7. Shall use non-volatile memory for programming.
8. All readers shall be provided with weatherized version for environment facing applications.
9. Lost keys in system shall be replaceable and upon insertion of the appropriate new user key, the lost key shall be invalidated for access. Invalidation process shall not require reprogramming of lock by Utility Device or USB cable.
10. Housing escutcheon shall be designed to allow liquids to move around unit.
11. Use of unauthorized keys shall not allow device operation.
12. Shall be programmed by the use of the Utility Device and USB cable.
13. The key reader shall be removable from the interior without removing the outside chassis or escutcheon for maintenance considerations.
14. Reader can be programmed to operate for a range of hours during a 24-hour period.

B. Physical Characteristics:

1. Weight – 0.8 lbs.
2. Box dimensions – 2” h x 4” w x 3” d.
3. Temperature range – -32 degrees F / +161 degrees F.
4. Humidity – up to 95% without condensation.
5. Power supply – 4AA batteries in conjunction with a 110VAC to DC UPS.

C. Product:

Product shall be the SAFLOK InSync CR (Common Remote).

2.07 MANUFACTURED LOCK UNITS

A. Common Area Electronic Mortise Lock. InSync CM:

1. Locks shall be capable of recognizing up to 259,328 Key ID's plus unlimited "Limited Use Key" users.
2. The lock unit shall require time and date programming.
3. Power supplied by four (4) standard size AA alkaline batteries with snap in connector.
4. Lock shall use non-volatile memory for programming.
5. Lock shall operate by a motorized mortise release.
6. Choice of satin chrome or satin brass finishes with no additional charge.
7. All locks shall permit free egress.
8. All locks shall be applicable in interior applications. Weatherized version for environment facing applications available.
9. Lock shall indicate low power to user. External power supply powers lock from exterior should battery fail for any reason.
10. Mortise lockset to conform to ANSI Grade I and meet Underwriters Laboratories Fire Rating C through A.
11. Lost keys in system shall be replaceable and upon insertion of the appropriate new user key, the lost key shall be invalidated for access.

Saflok SAM RF System - InSync M, L, CR, CM

Door Hardware and Key Management Locking Systems

Invalidation process shall not require reprogramming of lock by Utility Device or USB cable.

12. The lock shall reset to operating mode within five seconds should the handle not be activated.
13. Lock escutcheon shall be designed to allow liquids to move around unit.
14. Batteries shall be located and accessible from the interior of the door and shall not be located in the exterior.
15. When the electronic lock is in a locked condition, the exterior handle shall not allow play or movement.
16. Use of authorized keys shall allow deadbolt retraction from the exterior of the door.
17. To meet fire codes, the exterior lock escutcheon depth from the front face of the door to key reader location shall be less than 1".
18. Locks shall be programmed by use of Utility Device and USB cable.
19. Automatic deadbolt option shall throw the deadbolt each time the door closes.

B. Physical Characteristics:

1. Weight - 9 lbs. InSync CM Common Area Locksets.
2. Exterior lock dimensions – 8 15/16" h x 3 1/16" w x 2 1/2" d.
3. Temperature range – -32 degrees F / +161 degrees F.
4. Humidity – up to 95% without condensation.
5. Power supply – 4AA alkaline batteries.
6. Power consumption – 0.05 mA in standby mode.

C. Product:

Product shall be the SAFFLOK InSync CM Common Area Electronic Lockset(s).

PART 3 – EXECUTION

3.01 INSTALLATION

1. Comply with manufacturer's templates, written instructions and recommendations for installation of system components.
2. Install electronic lock units as directed.
3. Check and adjust operation of lock units in place, to ensure proper latching and locking.
4. Replace units if any are not fully functional as received.
5. Inventory all material must be completed before installation begins.

3.02 TRAINING

Provide instruction material to the owner's personnel to insure that the electronic lock system is operated properly. This training should be accomplished before owner's personnel are allowed to operate the system, and shall be accomplished by the end user or owner. On site training can be arranged and shall be at the standard company rate and may be requested as part of the system quotation.

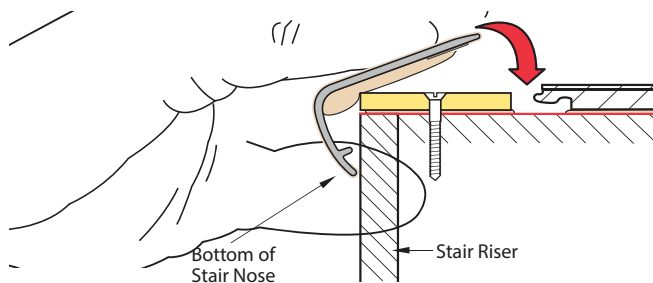
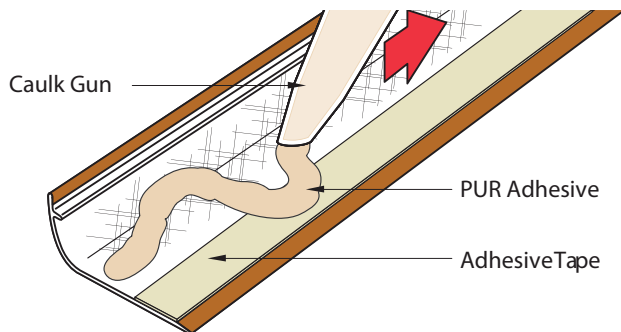
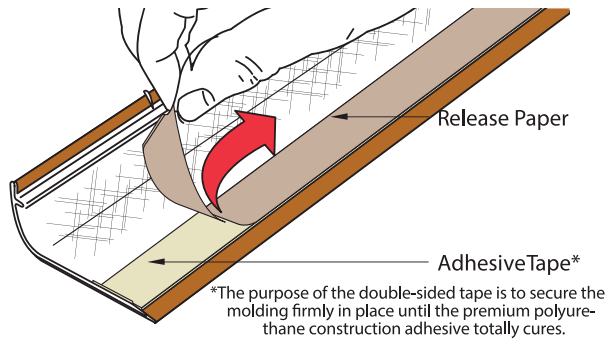
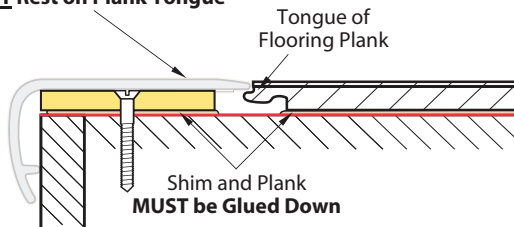
STAIR NOSE

Sound-Tec Stair Nose combines style and function to enhance the beauty of a staircase or step.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	PVC
LENGTH	94"
DIMENSIONS	2" WIDE X 1" TALL X 3/8" THICK



Molding **MUST** Rest on Plank Tongue

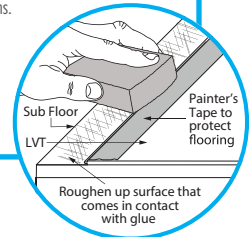


Step 1

Install the molding flush to the stair. Use stair nose and shim to determine where to start your flooring. Tongue side of flooring plank **MUST** face stair nose so stair nose can fit snugly onto Tongue. Remove stair nose and glue the flooring plank and shimdown. Clean flooring and molding as directed below:

Cleaning Preparation

1. Use a damp cloth (water only) to clean both surfaces of loose particles or surface films.
2. Roughen the surfaces with sandpaper (100-150 grit), sanding sponge or metal brush. For flooring, only roughen up area that will be covered (1.25" to 1.5").
3. Degrease both surfaces to remove all traces of oil, grease, dust, and fingerprints by using a light solvent such isopropyl alcohol.
4. Let both surfaces dry thoroughly before applying adhesive.



Step 2

Turn stair nose over and roughen the inside surface of the stair nose to increase bond by means of 60 grit sandpaper, sanding sponge, or a metal brush. Then, gently peel the release paper all the way off the adhesive tape.

Step 3

Next, apply a generous bead of a premium polyurethane construction adhesive along the entire inside corner. Be sure to overlap the tape with the adhesive. Reveal edge of plank may show when stair nose is installed. To compensate, apply a little more adhesive to the molding.

Step 4

Touch the bottom of molding to the stair riser and carefully roll the stair nose in place. Make any final adjustments before you push the molding all the way down. Once it's in the final position, press down firmly with your hands and make your way down the entire stair nose. It may take 2 or 3 passes to set it firmly in place.

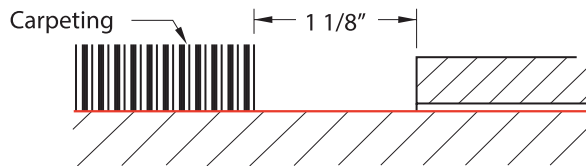
Step 5

The tape may not sufficiently adhere to the rougher stair or subfloor surfaces. Allow at least 24 hours for the construction adhesive to form a bond. You should always start at top of stairs and work your way down to avoid contact with the installed moldings until cured. **NOTE: Complete cure takes 48-72 hours.**

END CAP

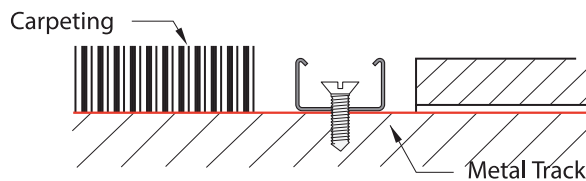
Used to transition from Sound-Tec to carpet, masonry (fireplaces), sliding doors and other exterior door jambs.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	MOISTURE RESISTANT MDF
LENGTH	94"
DIMENSIONS	1-3/8" WIDE X 1/2" TALL



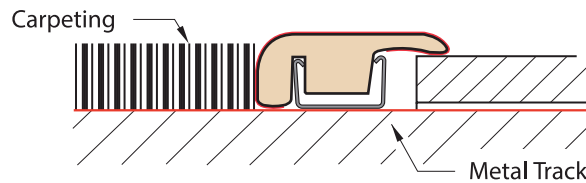
Step 1

Install the flooring planks including the underlayment by leaving a 1-1/8" inch (28mm) gap for the installation of the End Cap molding.



Step 2

Center the U-track between the carpet and the flooring planks and screw it to the sub-floor by using #6x5/8" screws.



Step 3

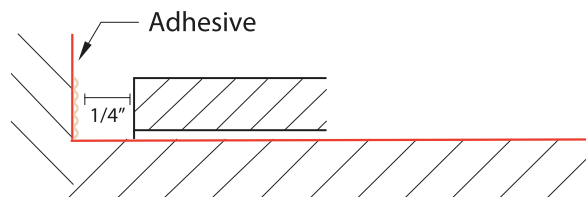
Gently press the molding into the track starting from one end to the other.

NOTE: Do not try to push the entire molding in at once by pressing it in from the top.

LOW PROFILE END CAP

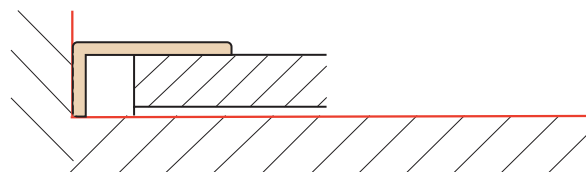
Used to finish Sound-Tec against bathtubs, sliding glass doors, etc.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	PVC
LENGTH	94"
DIMENSIONS	1" WIDE x 3/8" TALL



Step 1

Install flooring planks by leaving a 1/4" gap and apply premium polyurethane construction adhesive to the wall which you will be using the low profile end cap on.



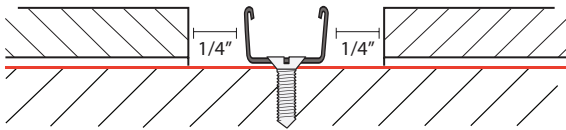
Step 2

Gently press the molding into the adhesive. Clean any excess adhesive and let dry.

T-MOLDING

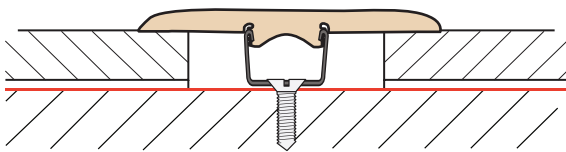
Used to cover expansion gaps in a Sound-Tec installation and interior door thresholds.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	PVC
LENGTH	94"
DIMENSIONS	1-1/2" WIDE X 1/2" TALL



Step 1

Center U-track between flooring planks and screw it to the sub-floor by using #6x5/8" screws. Leave a 1/4" gap on each side of the U-track.



Step 2

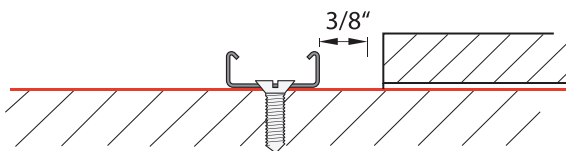
Gently press the molding into the track starting from one end to the other.

NOTE: Do not try to push the entire molding in at once by pressing it in from the top.

SLIM TRIM (SLT)

Our Slim Trim 2 in 1 Molding functions as a Reducer and T-molding. Comes with SlimTrack and Versatrack Shim.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	PVC
LENGTH	94"
DIMENSIONS	2" WIDE X 1/4" TALL

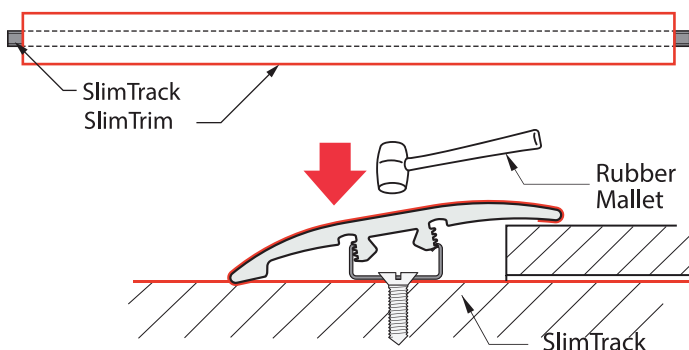


FOR USE AS A REDUCER

Step 1

Install the flooring plank. Then place the SlimTrack 3/8" from the floor and screw it to the sub-floor using #6x5/8" screws.

IMPORTANT: Rock SlimTrim back & forth to make sure it is sitting inside the track BEFORE hammering in!



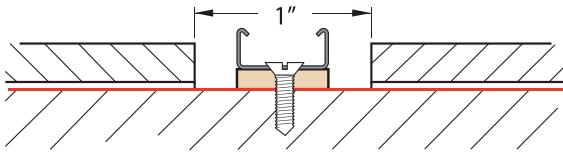
Step 2

Line the SlimTrim molding up with the SlimTrack and fit one end into the molding. Using a rubber mallet, tap the molding until it engages with the track. Use your hand to guide the molding into the track as you work your way down, tapping it in along the way.

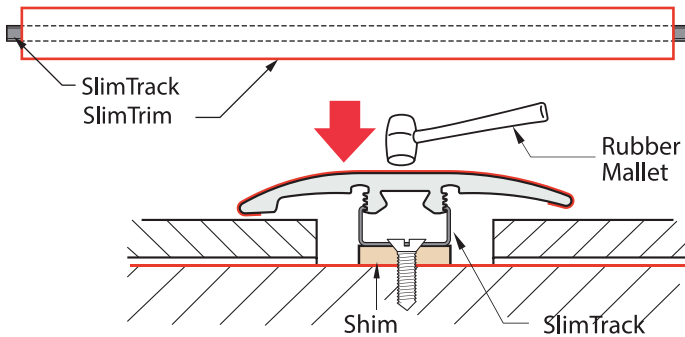
Step 3

Next, go up and down the molding several times, tapping the Slim Trim all the way into the track. You can use a little more force once you are sure it is properly engaged in the track.

FOR USE AS A T-MOLDING



IMPORTANT: Rock SlimTrim back & forth to make sure it is sitting inside the track **BEFORE** hammering in!



Step 1

Install the flooring planks by leaving a 1" inch (25mm) gap for the installation of the SlimTrim. Center the SlimTrack and Shim between the two laminate floors and screw them to the sub floor by using #6x5/8" screws.

Step 2

Line the SlimTrim molding up with the SlimTrack and fit one end into the molding. Using a rubber mallet, tap the molding until it engages with the track. Use your hand to guide the molding into the track as you work your way down, tapping it in along the way.

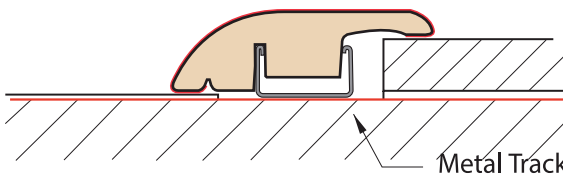
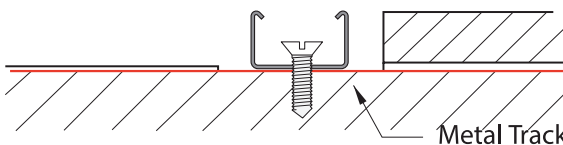
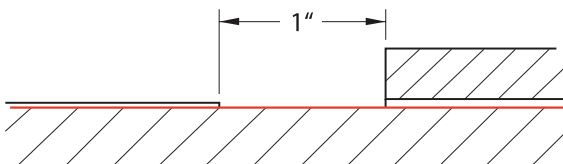
Step 3

Next, go up and down the molding several times, tapping the Slim Trim all the way into the track. You can use a little more force once you are sure it is properly engaged in the track.

REDUCER

Used to transition from Sound-Tec to sheet vinyl, LVT, concrete or other low profile floor coverings.

SURFACE MATERIAL	HIGH WEAR RESISTANT ALUMINUM OXIDE LAMINATE
CORE MATERIAL	PVC
LENGTH	94"
DIMENSIONS	1-3/8" WIDE x 1/2" TALL



Step 1

Install the flooring planks by leaving a 1" inch (25mm) gap for the installation of the reducer.

Step 2

Center the U-Track and screw it to the sub-floor by using #6x5/8" screws.

Step 3

Gently press the molding into the track starting from one end to the other.

NOTE: Do not try to push the entire molding in at once by pressing it in from the top.



SPECIFICATIONS

Product Line	Sound-Tec
Construction	Stone Polymer Composite (SPC)
Class	ASTM F1700, Class III, Type B
Wear layer Thickness	20 mil
Edge	Beveled
Overall Thickness	6 mm – 0.236"
Size	7" wide x 48" long
Finish	UV-Polyurethane + EZ-Clean
Installation	Floating

PACKAGING

Square Feet per Carton	23.47
Pieces per Carton	10
Weight per Carton	45 lbs
Cartons per Pallet	50

PERFORMANCE TESTING

Slip Resistance / ASTM D2047	≥ 0.5 (Dry)
Radiant Flux / ASTM E648	Class I
Static Load / ASTM F970-07	Passes
Abrasion Resistance / ASTM D3389	Passes
Light Resistance / ASTM F1515	Passes
Heat Resistance / ASTM F1514	Passes
Chemical Resistance / ASTM F925	Passes
Smoke Density / ASTM E662-09	Passes
Subfloor RH/MVER Requirements	85% RH/8lbs. MVER

WARRANTY

Manufacturer's Warranty	Lifetime
Residential Warranty	20 Year

ENVIRONMENTAL

Indoor Air Quality	FloorScore® Certified
LEED Scorecard	EQ4.3
CHPS 01350	Passes

Specifications are subject to nominal manufacturing variance. Material supply and/or manufacturing processes may necessitate changes without notice.



THE **MODERN FLOORING** SOLUTION

SOUND-TEC FULL INSTALL GUIDE

In any floor covering installation there are six basic requirements to insure a proper long lasting and attractive floor. These requirements are the same for Urban Surfaces Commercial and residential products.

1. Choose the Appropriate Product for the Job.....(1)
2. Conduct Proper Product Inspection.....(1)
3. Ensure Job-Site is Ready for Flooring.....(2)
4. Conduct Proper Sub floor Preparation.....(2-5)
5. Use the Right Tools for the Job.....(7)
6. Install Product per Installation Guide.....(8-13)

Choose the Appropriate Product for the Job

1. Always select the proper product for the job, which you plan to install. Do not use a residential product for a commercial installation. Urban Surfaces' Sound-Tec Line offers an unparalleled selection of some of the most beautiful and practical flooring available anywhere. Flooring products are a long-term investment. Choose wisely.

Conduct Proper Product Inspection

1. Ensure that Sound-Tec comes in its original packaging and is free from any visible damage or defects.
2. Check all material for correct color, design, size, and that the correct quantity is available to finish the job.
3. All products should be visually inspected before installation for color and style, to minimize possible shade variations mix flooring from several different cartons upon installation.

WARRANTY NOTE:

Urban Surfaces warrants that flooring products shall be free from visual defects. *Do not install Sound-Tec with visual defects. The installation of defective flooring is the error of the installer, therefore, no extra labor, material, or shipping costs will be paid by Urban Surfaces due to installation errors. (Refer to warranty for specifics)



Ensure Job-Site is Ready for Flooring

Clean Area:

1. Areas to receive Sound-Tec flooring must be clean, fully enclosed, well lit, and weather tight.

Temperature & Humidity:

2. The permanent HVAC system set at a minimum room temperature of 50°F and a maximum of 90°F for 48 hours prior to, during and after the installation. The floor temperature should stay between 50°F and 90°F before, during, and after installation.
3. A relative humidity no greater than 95% for at least 48 hours is required before, during, and after installation.
4. Sound-Tec is to be installed inside a climate-controlled structure. Sound-Tec products are not designed to be installed outdoors and the installation of them outdoors will void all warranty.

Job Scheduling:

5. The installation should not begin until the works of all other trades have been completed, especially overhead trades.

Conduct Proper Sub floor Preparation

Prepare Sub floor:

1. No floor covering installation is better than the sub-floor over which it is installed. The preparation of the Sub-Floor is one of the most important parts of the installation process. The quality of the sub-floor will affect the levelness and durability of the flooring.
2. If the old flooring must be removed, make sure it is done properly and responsibly.
3. The sub-floor should be weather tight, rigid, finished smooth, clean, free of moisture, oil, dust, and solvents.
4. All cracks and holes larger than 1/8" should be filled with a non-shrinking water resistant Portland Cement Patching Compound or Floor leveler.
5. The responsibility for determining the suitability of the sub-floor rests solely with the flooring installer.

NOTE: Urban Surfaces does not manufacture floor patch, and therefore does not warrant its performance. Be sure to refer to the correct floor patch manufacturer's installation instructions that was used in your particular installation.



A. Concrete/Lightweight Concrete Sub-Flooring

Clean Surface:

1. Surfaces must be clean, dry and flat; free of voids greater than 1/8", projections, loose materials, oil, grease and all other harmful surface contaminants.
2. Mechanically remove all harmful surface contaminants by grinding the substrate if necessary.

Floor Patching:

3. Surface areas requiring patching or leveling must be treated using fast setting, high strength floor patch. Refer to the technical data sheets of respective products for proper installation.

Concrete Strength:

4. Concrete shall have a minimum compressive strength of 3000psi.

Surface Flatness:

5. Surfaces need to be as flat as possible; to ensure visual aesthetics, and to keep wear-down from happening prematurely as higher points will wear fast.
6. Variations in sub floor flatness should not exceed 3/16" 10' (4.76 mm in 3.05 m) or 1/8" in 6' (3.17 mm in 1.83m). Level floors with a suitable cement-based self-leveling underlayment following the manufacturer's recommended guidelines.

B. Wood Sub-Flooring

Structurally Sound:

1. Wood sub floors must be structurally sound and in compliance with local building codes.
2. Wood sub floors, if suspended off grade, should be a minimum of 18" of well-ventilated air space below.
3. Wood sub floors directly fastened to concrete, or sleeper construction, are not recommended.
4. APA rated Sturdi-Floor panels are designed as combination sub floor/underlayment, but exposure to construction conditions including weather may necessitate installation of an underlayment panel prior to installation.



5. Urban Surfaces' flooring is not recommended directly over- fire-retardant treated plywood or preservative treated plywood.

6. Not for use over particle board, cip wood, Luan or pressboard.

WARRANTY NOTE: Installation over these sub floor types will void warranty.

Floor Flatness:

7. A floor flatness tolerance is cited in the "Performance Standards for Wood Floors" published by the National Association of Home Builders. This states that floors shall not have more than 1/4 - inch ridge or depression within any 32 - inch measurement when measured parallel to the joists; and that no point on the surface of a wood floor shall be more than 1/2" higher or lower than any other point on the surface within 20 feet, or proportional multiples of the preceding dimensions.

C. Moisture Test

Moisture Emission:

1. On concrete use the Calcium Chloride Moisture Emission Test. Test must be conducted in accordance with ASTM-F1869. The moisture emission results must not exceed 8.0 pounds, the installation should not proceed until the problem has been corrected. Relative humidity should not exceed 95%. Be sure to record your results and keep them for your own records.

2. When testing floor for alkalinity ASTM F710 it must be 7.0 to 10.0 PH to be acceptable. (Mopping with a vinegar/water solution of 1 pint of vinegar to 2 gallons of water can sometimes reduce a higher PH.)

WARRANTY NOTE: It may not be the floor covering installer's responsibility to conduct the tests listed above. It is, however, the floor covering installer's responsibility to make sure these tests have been conducted and that the results are acceptable prior to installing the floor covering. When moisture tests are conducted, it indicates the conditions only at the time of the test.

E. Radiant Heating System

1. Sound-Tec may be installed over Radiant Heating Systems.

2. Several days prior to installing resilient products over newly constructed radiant heated systems, make sure the radiant system has been on and operating at maximum temperature to reduce residual moisture within the concrete.

3. Radiant-Heated sub straights may not exceed a maximum surface temperature of 85°F



WARNING! DO NOT SAND, DRY SWEEP, DRY SCRAPE, DRILL, SAW, BEAD-BLAST OR MECHANICALLY CHIP OR PULVERIZE EXISTING RESILIENT FLOORING, BACKING, LINING FELT, ASPHALT "CUTBACK" ADHESIVES OR OTHER ADHESIVES.

These products may contain either asbestos fibers and/or crystalline silica. Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. Unless positively certain that the product is a non-asbestos-containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content and may govern the removal and disposal of material. See current edition of the Resilient Floor Covering Institute (RFCI) publication Recommended Work Practices for Removal of Resilient Floor Coverings for detailed information and instructions on removing all resilient covering structures. For current information go to www.rfci.com

Installing Over Resilient Floor Covering

Existent Resilient Floor Covering Must Be:

1. Single layered, non-cushion backed, fully adhered and smooth.
2. Free of moisture or alkalinity.
3. Free of waxes, polishes, grease or grime.
4. Free of cuts, cracks, gouges, dents or other irregularities.
5. Do not install over rubber based substrates.

NOTE: The responsibility of determining if the existing flooring is suitable to be installed over top of with resilient, rests solely with installer/flooring contractor on site. If there is any doubt as to suitability, the existing flooring should be removed, or an acceptable underlayment installed over it. Installations over existing resilient flooring may be more susceptible to indentation.

Underlayment

Some Sound-Tec products already have attached pad underlayments, some do not.

- If an underlayment is already attached, no other underlayments are necessary. If an additional underlayment is desired the density of it must be at least 62lbs. Per cubic foot and must have a thickness of .056'(1.42mm) or less. Urban Surfaces offers "Whisper Step" underlayment which meets these requirements.
- If no underlayment is attached to the Sound-Tec product, then rolled out underlayments must be a maximum of 2mm thick and within a range of 40 – 100 kilograms per square meter in density. Underlayments that fall outside of these ranges may undermine the Sound-Tec clip system and will therefore void the warranty. Acceptable underlayment types are cork, rubber, and various types of foam.



Quarry Tile, Ceramic Tile, Poured Floors (Epoxy, Polymeric, Seamless):

Existing Tile Must Be:

1. Totally cured and well bonded to the concrete.
2. Free of any residual solvents and petroleum derivatives.
3. Free of waxes, polishes, grease, grime and oil.
4. Show no signs of moisture or alkalinity.
5. Free of cuts, cracks, gouges, dents, and other irregularities.
6. Flat. Fill any low spots, holes, chips and seams that may telegraph through the new flooring.
7. Smooth. Grind any highly polished or irregular/smooth surfaces. Quarry tile or Ceramic tile grout joints and textured surfaces must be filled with an embossing leveler or substrate manufacturer approved material.



Use the Right Tools for the Job

✓	Tool Checklist
	Safety Glasses
	Knee Pads
	Floor Scraper
	Chalk / Chalk Line
	Expansion Spacers
	Paper and Pencil
	Tape Measure
	Straight Edge / Square
	Pull Bar
	Mineral Spirits
	Razor Knife with Additional Blades
	Tapping Block
	Broom and Dustpan
	Marking Pen
	Hammer and Nails
	LVT Cutter (Optional)
	Hand Saw (Optional)
	Power Saw (Optional)



Installation

24 Hours

1. Sound-Tec flooring is more dimensionally stable than typical floating wood or vinyl based flooring products. Acclimation of Sound-Tec flooring is generally not required. However, Sound-Tec flooring subjected to extreme hot or cold conditions can cause the material to become too flexible or rigid, making the material difficult to install and potentially causing damage to the locking system. Optimum material temperature range for installation is 50F - 90F.
2. Use the acclimation time to unpack the planks and inspect the product. Look for visual defects. It is always wise to order 5% to 10% more than the required square footage to account for damaged planks, waste and spares for future repairs.

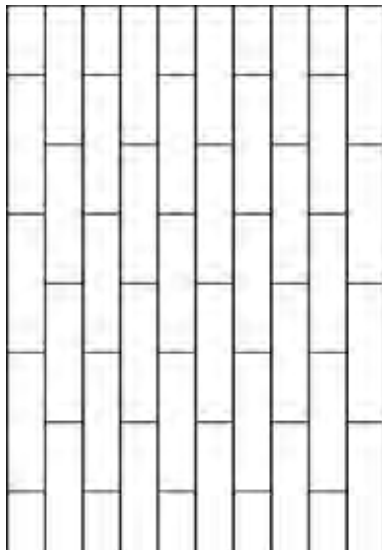
WARRANTY NOTE: Urban Surfaces does not warrant against shrinkage or expansion of any type.

Layout

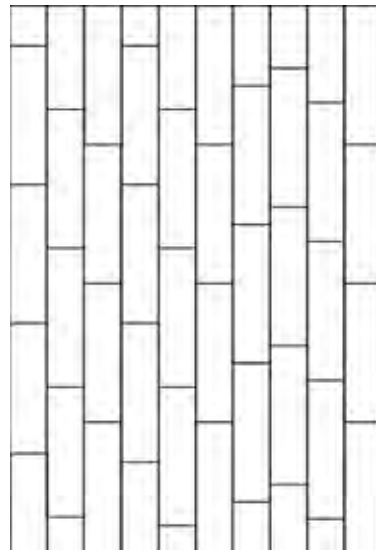
Plan:

1. Before you start with the installation, it is important to determine the layout of the flooring. Proper planning and layout will prevent having narrow plank widths at wall junctures or very short length pieces at the end of rows.
2. To minimize pattern repeats in the floor, always pull from at least three cartons of flooring while installing and pay attention to the pattern on the planks. For best aesthetics, make sure to not place planks with the same pattern too close together. A "random look" actually has to be installed very intentionally.

Uniform:



Random:





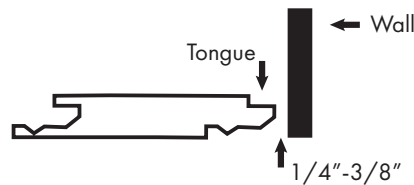
Align with Longest Wall:

4. Sound-Tec flooring is more dimensionally stable than typical floating wood or vinyl based flooring products. Acclimation of Sound-Tec flooring is generally not required. However, Sound-Tec flooring subjected to extreme hot or cold conditions can cause the material to become too flexible or rigid, making the material difficult to install and potentially causing damage to the locking system. Optimum material temperature range for installation is 50F - 90F.

Layout the First Row

1. Installation of the product must start from the left side of the room, working to the right.

2. Lay the first full piece with the long tongue side facing the wall.



3. Install the subsequent piece in the first row by first angling the tongue down into the receiving groove to align the edges then lay the plank flat so the end joints come together tightly. Continue row and cut last piece to fit, maintaining the necessary expansion gap.



4. The planks should come together nicely, but to be sure, gently use a pull bar and tap the end of the second plank towards the first plank to ensure a tight fit.

5. Use spacers along all sides that butt up against walls to maintain a $1/4'' - 3/8''$ expansion zone.

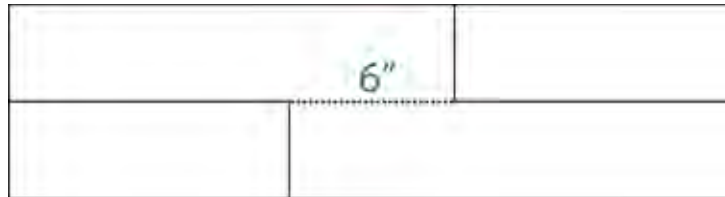
6. Continue laying planks in the first row in this fashion until you need to cut the last piece.



7. Measure the distance between the wall and the face surface of the last plank. Subtract $3/8"$, and cut the plank.
8. If this distance is less than 6" go back to the first full plank and cut approximately 6" from the end closest to the starting wall. This will leave a longer piece at the end of the first row.

Laying Remaining Rows

Whenever practical, use the piece cut from the preceding row to start the next row. End joints of all planks should be staggered 6" or more.



1. Working left to right, place the long edge of a new plank into the receiving groove of the plank in the previous row. Angle down and lay plank flat. Maintain a minimum end joint stagger of 6" throughout the installation process.



2. Work the tongues of the planks into the receiving grooves of adjoining planks by first connecting the short edges followed by the long edges. Continue until the plank lays flat and the joints are tight. If small joint gaps appear, close them by gently using a tapping block and hammer. Install the remaining material, one row after the other. Always press, tap and square as you go.

1
short
end



2
long
end





3. Continue installing full planks in the second and subsequent rows in this way.
4. The last row in the installation may need to have some width cut off it.
5. Remember to use a 1/4" - 3/8" spacer against the wall to ensure the correct gap needed for expansion.

Cutting

When using a Hand Saw:

1. Cut with the decorative side of the plank facing up.
2. Use a square to keep your cut line straight.

When using a Power Saw:

1. A good quality carbide-tipped cutting blade that has been designed for composition and laminate materials such as melamine, core-board, or other hard, dense, man made materials is recommended.
2. Cut with the decorative side of the plank facing up.
3. Use a square to keep your cut line straight.

Install Moldings

Baseboards / Base shoe

1. Protect all exposed edges of the flooring by installing wall molding and/or transition strips. Make sure that no plank will be secured in any way to the sub floor. Sound-Tec needs to be able to expand / contract based on various atmospheric conditions. Do not fasten wall moldings to the planks.



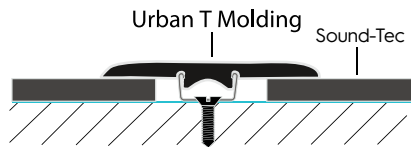
Other Moldings

T-Molding:

Use T-Moldings on any continuous run of over 40 feet.

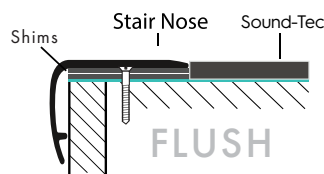
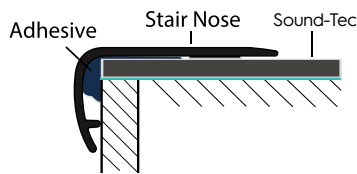
Wood Door jambs: Use T-Moldings at every door threshold when there is a run of 40' or more. Undercut all door jambs so the Sound-Tec product can free float and has at least 1/4" for expansion on all sides.

Metal Door jambs: Use T-Moldings at every door threshold. Allow the planks to free float under moldings.



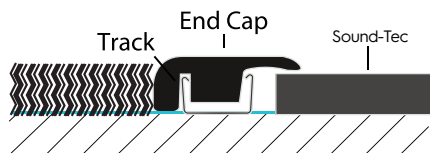
Stair Nose:

Use a Stair Nose to round the edge of a stair.



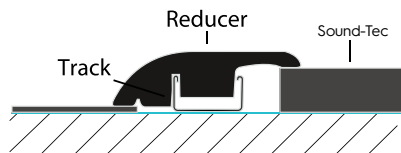
End Cap:

Use an End Cap to transition from laminate to carpet, fireplaces, sliding doors or to end a floor.



Reducer:

Use a Reducer to smoothen a gap between two floors that are not level.



Cabinets:

Install permanent cabinets, vanities, inland counters and similar items first, then fit Sound-Tec around them, leaving a space for expansion and contraction.

Caulking:

Do not caulk in the floor around the perimeter as this does not allow for the movement that the floor requires. Use silicon caulking at doorways or wet areas that remain flexible, allowing product to contract and expand freely.

Proper Moldings:

Use proper moldings such as end-caps, reducers, T-moldings, tub moldings, and base shoe where necessary (next to sliding glass doors, bath-tubs, etc.)

GE® 24" Standard Clean Free-Standing Gas Range



Model# JGAS02SENS



FEATURES

Configuration	Range with Broiler Drawer
Ignition System	Electronic
Oven Cleaning Type	Standard Clean
Cooktop Burner Type	Standard
Cooktop Surface	Lift-Up; Porcelain-Enamel
Burner - Left Front	9,100 BTU
Burner - Left Rear	9,100 BTU
Burner - Right Front	9,100 BTU
Burner - Right Rear	9,100 BTU
Cooktop Burner Grate Material	2 Doubles; Heavy Cast
Valves (Degree of Turn)	140
Control Location	Front
Broiler Drawer	Yes
Broiler Pan and Grid	Yes
Fuel Type	Natural Gas (factory set)
Leveling System	4 Leveling Legs
Oven Rack Features	2 Oven Racks; 4 Embossed Rack Positions
Porcelain-Enameled Subtop	Yes
Slide - Out Broiler Drawer	Yes

- Standard clean oven - Smooth surface and rounded corners make clean-up quick and easy
- All purpose burners - Deliver a wide range of heat output ideal for most cooking needs
- Heavy-cast grates - Durable cast iron offers lasting performance
- Porcelain upswept cooktop - Raised edges and porcelain-enameled surface makes cleaning incredibly easy

Have more questions? Please contact 1-800-626-2005

GE® 24" Standard Clean Free-Standing Gas Range



Model# JGAS02SENS

APPROXIMATE DIMENSIONS (HxDxW)

- 44 3/4 in x 26 1/2 in x 24 3/8 in

CAPACITY

- Total Capacity (cubic feet) 3 cu ft

WARRANTY

- Parts Warranty - Limited 1-year entire appliance
- Labor Warranty - Limited 1-year entire appliance

Have more questions? Please contact 1-800-626-2005

GE® ENERGY STAR® 14.6 Cu. Ft. Top-Freezer Refrigerator



Model# GTE15CTHRBB



FEATURES

Defrost Type	Frost Free
Control Type	Upfront Temperature Controls
Icemaker	Optional (IM4D Ready)
Fresh Food Cabinet Shelves	1 Glass Drawer Cover; 2 Adjustable; 2 Full-Width; 2 Wire; 3 Total
Fresh Food Door Shelves	2 Full-Width; 2 Total; 2 with Gallon Storage
Fresh Food Cabinet Drawers	2 Total; Clear
Fresh Food Door Features	Dairy Compartment
Freezer Door Shelves	2 Full-Width Fixed
Freezer Features	1 Adjustable Shelf; Spillproof Freezer Floor
Exterior Style	Free-Standing
Leveling System	Leveling Legs
Performance Features	Easily Removable Door Gaskets; Never Clean Condenser

- #1 in Quality and Dependability - Among 14-18 cu. ft. refrigerators based on an independent study of property maintenance personnel. Source: The Stevenson Company, 2016—Market research company with over 20 years of experience in the appliance industry
- Upfront temperature controls - Easy-to-use controls regulate both fresh food and freezer sections
- Adjustable wire shelves - Moveable racks can handle a variety of foods
- Clear drawers - Transparent drawers make finding your favorite items quick and easy
- Large door storage - Offers ideal space for storing large containers in the door, freeing up valuable shelf space
- Adjustable wire freezer shelf - Easily adjusts between two positions to accommodate items of all shapes and sizes
- Spillproof freezer floor - Seamless design of the freezer floor wipes up easily for quick cleanup

Have more questions? Please contact 1-800-626-2005

GE® ENERGY STAR® 14.6 Cu. Ft. Top-Freezer Refrigerator



Model# GTE15CTHRBB

APPROXIMATE DIMENSIONS (HxDxW)

- 61 3/4 in x 31 5/8 in x 28 in

CAPACITY

- Total Capacity (cubic feet) 14.60 cu ft
- Fresh Food Capacity 10.60 cu ft
- Freezer Capacity 4 cu ft

WARRANTY

- Parts Warranty - Limited 1-year entire appliance
- Labor Warranty - Limited 1-year entire appliance
- Warranty Notes - For models produced on or after January 1, 2006; See written warranty for full details

Have more questions? Please contact 1-800-626-2005

GE® ENERGY STAR® 11.6 cu. ft. Top-Freezer Refrigerator



Model# GPE12FSKSB



FEATURES

Temperature Management Features	Air Tower
Defrost Type	Frost Free
Control Type	Electronic
Icemaker	Optional (IM4D Ready)
Fresh Food Cabinet Shelves	2 Adjustable; 2 Full-Width; 2 Total - Glass with Trim; Spill-Proof
Fresh Food Door Shelves	3 Full-Width Fixed; 3 Total
Fresh Food Cabinet Drawers	2 Total; Clear
Freezer Cabinet Shelves	1 F/W (3 pos.); 1 Total; Step Shelf; Wire
Freezer Door Shelves	2 Full-Width; 2 Total; Fixed
Freezer Features	1 Ice Tray; Spillproof Freezer Floor
Exterior Style	Free-Standing
Leveling System	Yes
Performance Features	Easily Removable Door Gaskets; Never Clean Condenser

- 11.6 cu. ft. capacity -
- ENERGY STAR® qualified - Cool down your monthly utility bills by using less energy
- ADA-compliant - Designed for easy operation and access
- Equipped for optional icemaker - Easily accommodates the installation of an icemaker
- Upfront electronic temperature controls - Controls are located in an easy-to-reach position
- LED interior lighting - Spotlights foods inside making them easy to see
- 3 glass fresh food shelves - 2 are adjustable spillproof holding up to 12 oz. of spilled liquids for easy cleanup and adjust to provide additional food-storage options
- 2 clear freezer door bins - Transparent shelves on the door make finding items convenient
- 2 clear crisper drawers - Transparent drawers make finding your favorite items quick and easy
- Wire freezer step-shelf - Sturdy shelving provides additional storage for frozen foods
- Recessed handles - A streamlined design offers a clean appearance
- Reversible doors - Doors can be installed to open from the right or left, depending on space configuration
- Removable door gaskets - Easily keep the refrigerator clean and ensure a good temperature seal

Have more questions? Please contact 1-800-626-2005

GE® ENERGY STAR® 11.6 cu. ft. Top-Freezer Refrigerator



Model# GPE12FSKSB

APPROXIMATE DIMENSIONS (HxDxW)

- 59 7/8 in x 28 5/8 in x 24 in

CAPACITY

- Total Capacity (cubic feet) 11.60 cu ft
- Fresh Food Capacity 8.40 cu ft
- Freezer Capacity 3.10 cu ft
- Shelf Area 11.30 sq ft

WARRANTY

- Parts Warranty - Limited 1-year entire appliance
- Labor Warranty - Limited 1-year entire appliance
- Warranty Notes - See written warranty for full details

Have more questions? Please contact 1-800-626-2005

Features

- With overflow.
- 4" (102 mm) centers.
- 20-1/8" (511 cm) x 16-1/2" (419 cm)

Material

- Vitreous china.

Installation

- Drop-in

Recommended Accessories

K- 7107 Decorative Drain
K- 7108 Decorative Drain
K- 7129 Drain
K- 9018 P-Trap



ADA

CSA B651

Codes/Standards











ASME A112.19.2/CSA B45.1
ADA
ICC/ANSI A117.1
CSA B651

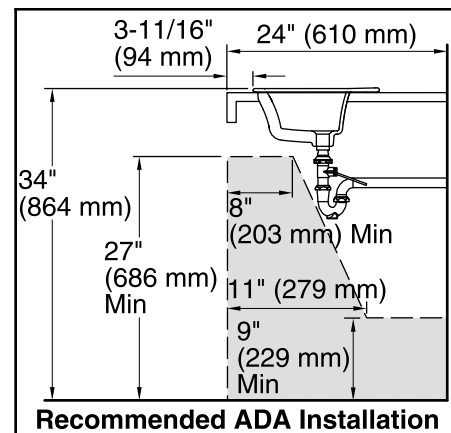
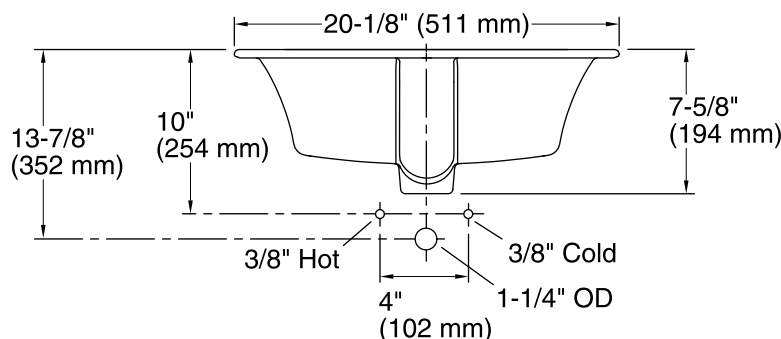
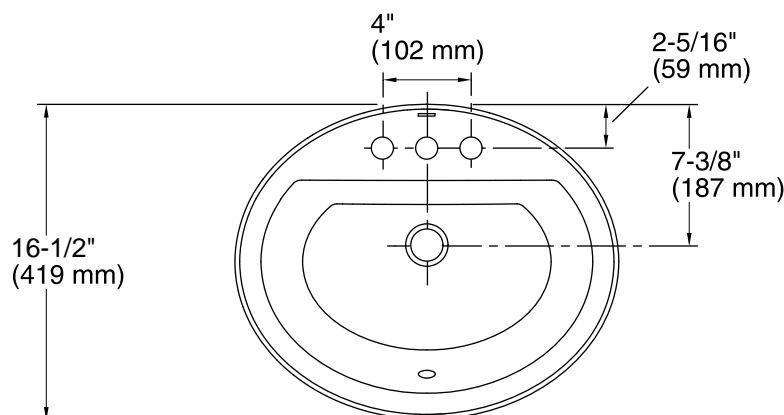
KOHLER® One-Year Limited Warranty

See website for detailed warranty information.

Available Color/Finishes

Color tiles intended for reference only.

Color	Code	Description
	0	White
	96	Biscuit
	47	Almond
	NY	Dune
	95	Ice™ Grey
	G9	Sandbar
	33	Mexican Sand™
	K4	Cashmere
	58	Thunder™ Grey
	7	Black Black™



Technical Information

All product dimensions are nominal.

Installation:	Drop-In
Bowl area	Length: 17-3/8" (441 mm) Width: 11-1/8" (283 mm) Water depth: 5-5/8" (143 mm)
Number of deck holes:	3
Faucet hole(s):	1-1/4" (32 mm)
Drain hole:	7/8" (22 mm)
Template:	Drop-in, 1155261-7, required, included

Notes

Install this product according to the installation guide.

Spout must be 5" (12.7 cm) long (min) for adequate clearance into the lavatory when installed with the centerline as shown.

Spout must be tall enough to clear 3" (7.6 cm) rim height and provide a 1" (2.5 cm) air gap per ASME A112.1.1.

NOTICE: Countertop manufacturer or cutter must use the cut-out template provided with the product, or a current one provided by Kohler Co. (call 1-800-4-KOHLER). Kohler Co. is not responsible for cutout errors when the incorrect cut-out template is used.

ADA, CSA B651 compliant when installed to the specific requirements of these regulations.

LUCERNE™ WALL-HUNG LAVATORY

- Wall-hung sink
- Vitreous china
- Front overflow
- D-shaped bowl
- Self-draining deck area with contoured back and side splash shields
- Faucet ledge

Faucet holes on 203mm (8") centers (Illus.):

- ☐ **0356.028** For exposed bracket support
Shown with 4801.862 Amarilis Heritage faucet with Triune Cross handles (not included)
- ☐ **0356.015** For wall hanger (included) or concealed arms support
- ☐ **0356.037** For wall hanger (included) or concealed arms support
 - Extra right-hand hole
- ☐ **0356.073** For wall hanger (included) or concealed arms support
 - Extra left-hand hole

Faucet holes on 102mm (4") centers:

- ☐ **0355.027** For exposed bracket support
- ☐ **0355.012** For wall hanger (included) or concealed arms support
- ☐ **0355.034** For wall hanger (included) or concealed arms support
 - Extra right-hand hole
- ☐ **0355.056** For wall hanger (included) or concealed arms support
 - Extra left-hand hole

Single center faucet hole (Illus.):

- ☐ **0356.041** For exposed bracket support
Shown with 1340.000 metering faucet (not included)
- ☐ **0356.421** For wall hanger (included) or concealed arms support
- ☐ **0356.137** For wall hanger (included) or concealed arms support
 - Extra right-hand hole
- ☐ **0356.115** For wall hanger (included) or concealed arms support
 - Extra left-hand hole

Nominal Dimensions:

521 x 464mm
(20-1/2" x 18-1/4")

Bowl sizes:

381mm (15") wide
254mm (10") front to back
165mm (6-1/2") deep

Compliance Certifications -

Meets or Exceeds the Following Specifications:

- ASME A112.19.2 for Vitreous China Fixtures



0356.028



0356.041

SEE REVERSE FOR ROUGHING-IN DIMENSIONS

To Be Specified:

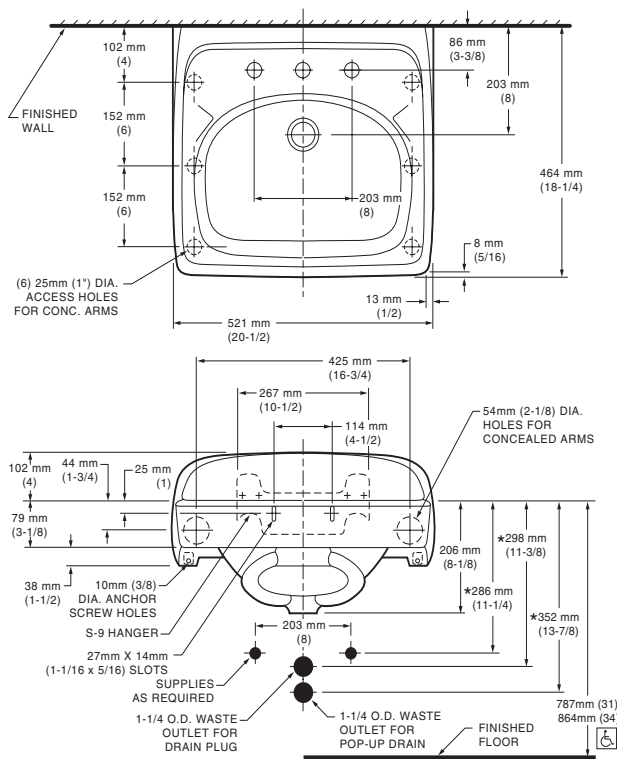
- ☐ Color: ☐ White ☐ Bone ☐ Silver
☐ Black ☐ Linen
- ☐ Faucet*:
- ☐ Faucet Finish:
- ☐ Supplies:
- ☐ 1-1/4" Trap:
- ☐ Nipple:
- ☐ Bracket Support (by others):
- ☐ Concealed Arms Support (by others):

* See faucet section for additional models available

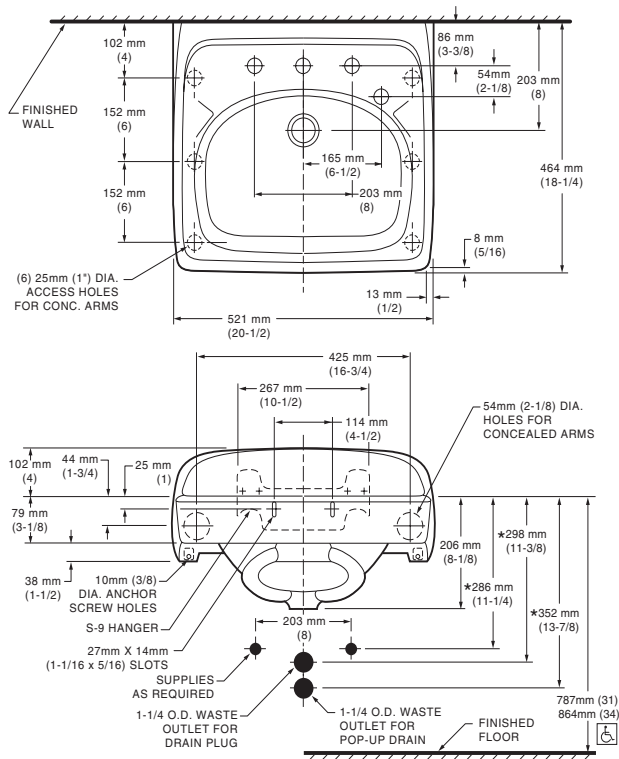


MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES - CHECK LOCAL CODES.
Top of front rim mounted 864mm (34") from finished floor.

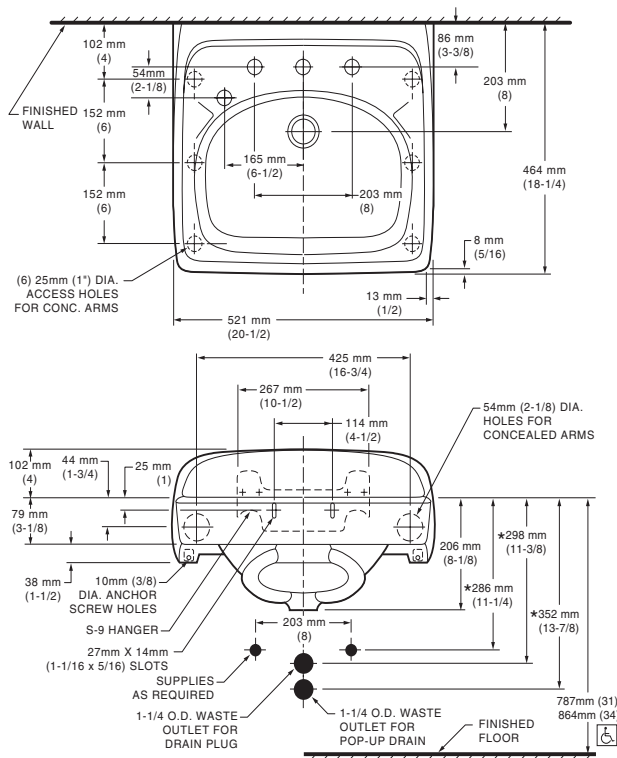
0356.015 8" CTRS FOR WALL HANGER OR CONCEALED ARMS



0356.037 8" CTRS FOR WALL HANGER OR CONCEALED ARMS EXTRA RIGHT HAND HOLE



0356.073 8" CTRS FOR WALL HANGER OR CONCEALED ARMS EXTRA LEFT HAND HOLE



NOTES:

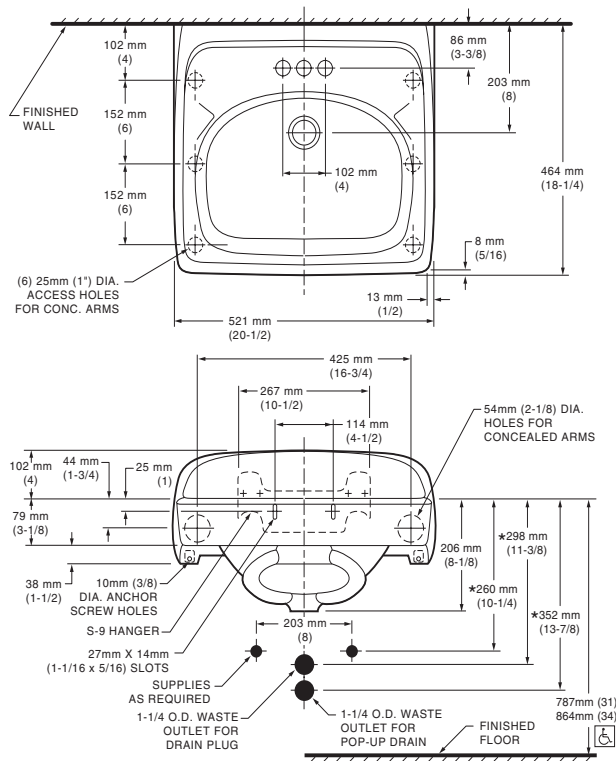
* DIMENSIONS SHOWN FOR LOCATION OF SUPPLIES AND "P" TRAP ARE SUGGESTED. PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORTS. FITTINGS NOT INCLUDED AND MUST BE ORDERED SEPARATELY. CONCEALED ARM SUPPORT AS REQUIRED TO BE FURNISHED BY OTHERS.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

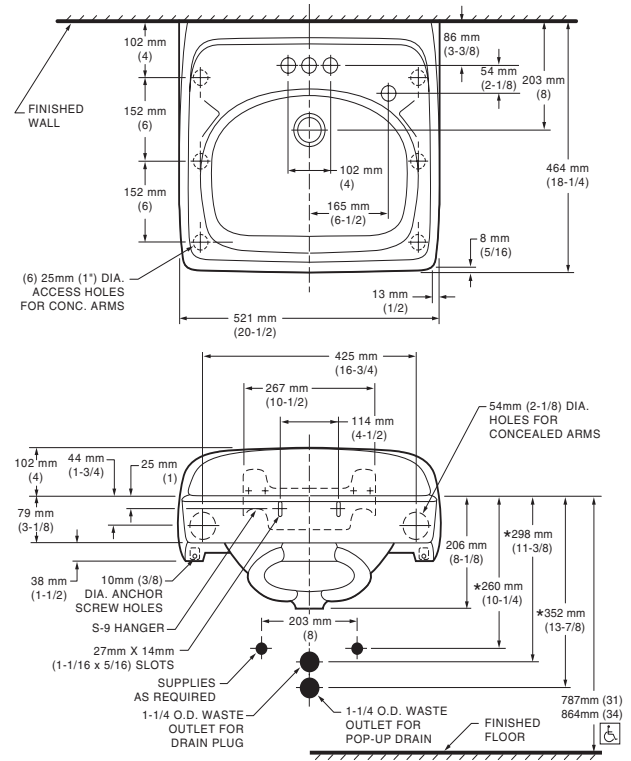


LAVATORY DESIGNED TO MEET ADA HANDICAPPED GUIDELINES WITH MOUNTING HEIGHT SET AT 864MM (34") ABOVE FINISHED FLOOR.

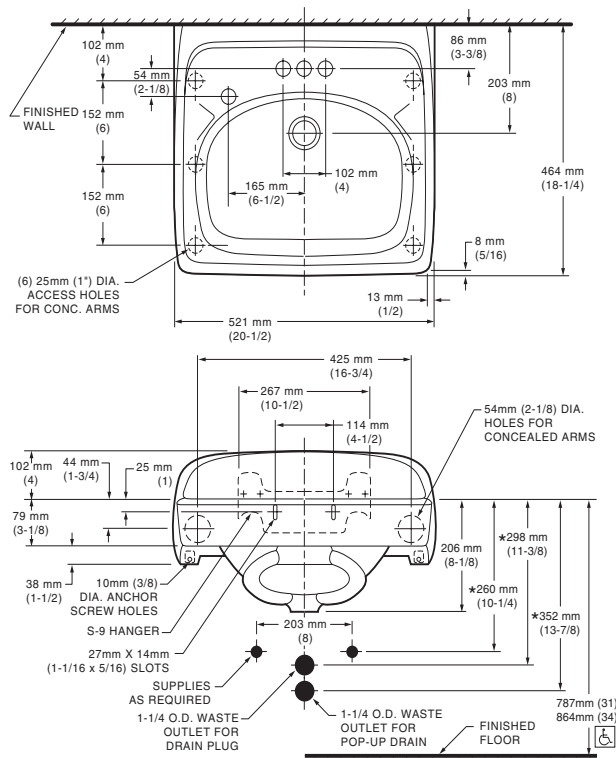
0355.012 4" CTRS FOR WALL HANGER OR CONCEALED ARMS



0355.034 4" CTRS FOR WALL HANGER OR CONCEALED ARMS EXTRA RIGHT HAND HOLE



0355.056 4" CTRS FOR WALL HANGER OR CONCEALED ARMS EXTRA LEFT HAND HOLE



NOTES:

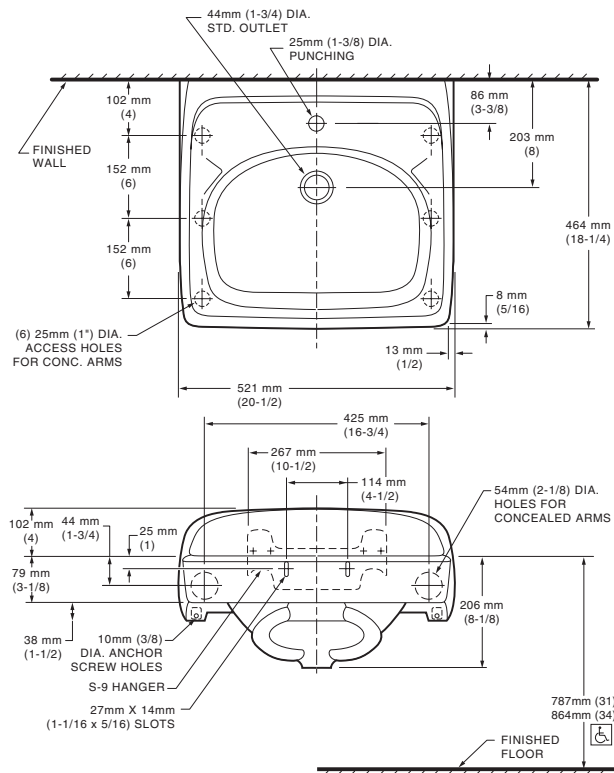
* DIMENSIONS SHOWN FOR LOCATION OF SUPPLIES AND "P" TRAP ARE SUGGESTED. PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORTS. FITTINGS NOT INCLUDED AND MUST BE ORDERED SEPARATELY. CONCEALED ARM SUPPORT AS REQUIRED TO BE FURNISHED BY OTHERS.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

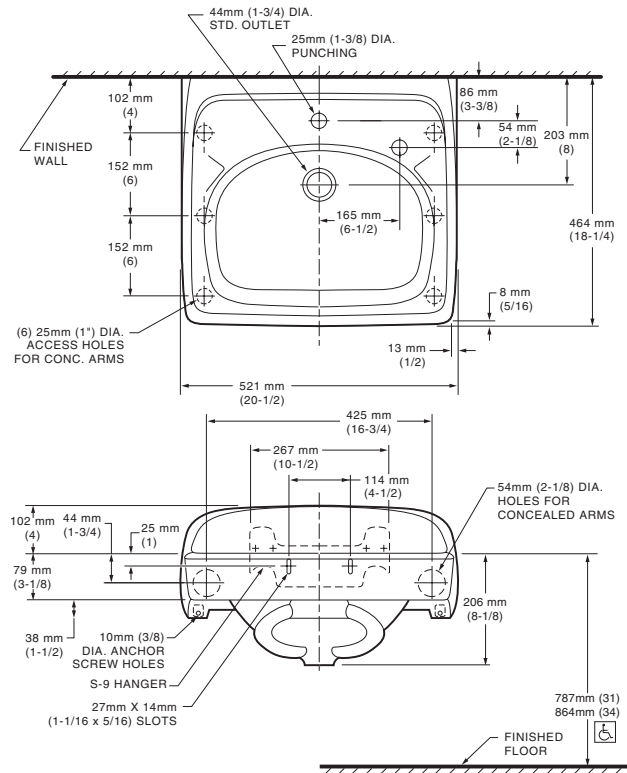


LAVATORY DESIGNED TO MEET ADA HANDICAPPED GUIDELINES WITH MOUNTING HEIGHT SET AT 864MM (34") ABOVE FINISHED FLOOR.

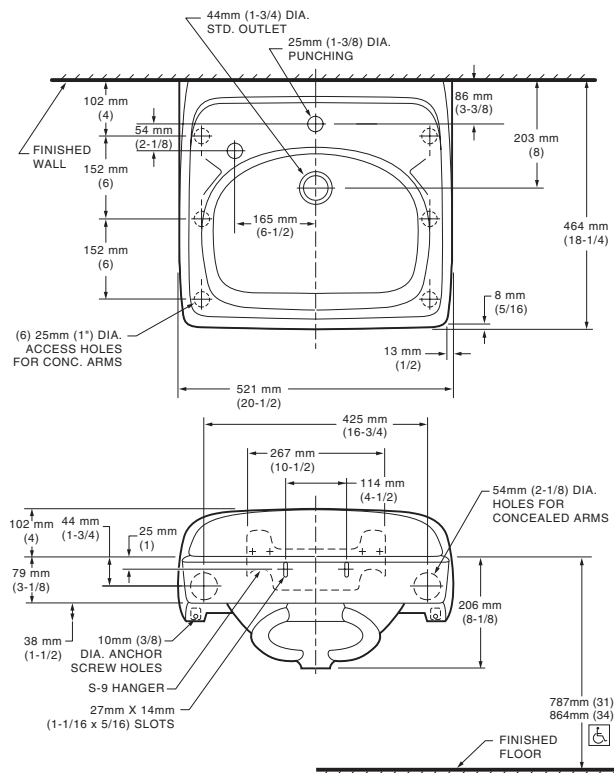
0356.421 SINGLE CENTER HOLE FOR WALL HANGER OR CONCEALED ARMS



0356.137 SINGLE CENTER HOLE FOR WALL HANGER OR CONCEALED ARMS WITH EXTRA RIGHT HAND HOLE



0356.115 SINGLE CENTER HOLE FOR WALL HANGER OR CONCEALED ARMS WITH EXTRA LEFT HAND HOLE



NOTES:

* DIMENSIONS SHOWN FOR LOCATION OF SUPPLIES AND "P" TRAP ARE SUGGESTED. PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORTS. FITTINGS NOT INCLUDED AND MUST BE ORDERED SEPARATELY. CONCEALED ARM SUPPORT AS REQUIRED TO BE FURNISHED BY OTHERS.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.



LAVATORY DESIGNED TO MEET ADA HANDICAPPED GUIDELINES WITH MOUNTING HEIGHT SET AT 864MM (34") ABOVE FINISHED FLOOR.

CADET® PRO™ ELONGATED TOILET

☐ **215CA.104**

- Features the **Cadet® Flushing System**
- Vitreous china
- High Efficiency Toilet (HET), ultra-low consumption (4.8 Lpf/1.28 gpf), utilizes 20% less water
- Meets EPA WaterSense® criteria
- Trade exclusive tank
- PowerWash® rim scrubs bowl with each flush
- Robust metal trip lever & metal shank fill valve
- Includes EZ-Install Tools w/color match bowl caps
- EverClean® surface included
- 3" flush valve
- Fully-glazed 2-1/8" trapway
- 12" (305mm) rough-in
- Generous 9" x 8" water surface area
- Chrome finish trip lever is supplied
- 1,000g MaP Score** at 1.28 gpf
- 5 year warranty

☐ **3517C.101** Elongated Bowl

☐ **4188A.104** Tank

Nominal Dimensions:

767 x 441 x 733mm (30-1/8" x 17-3/8" x 28-7/8")

Fixture only, seat and supply sold separately

Alternative Tank Configurations Available:

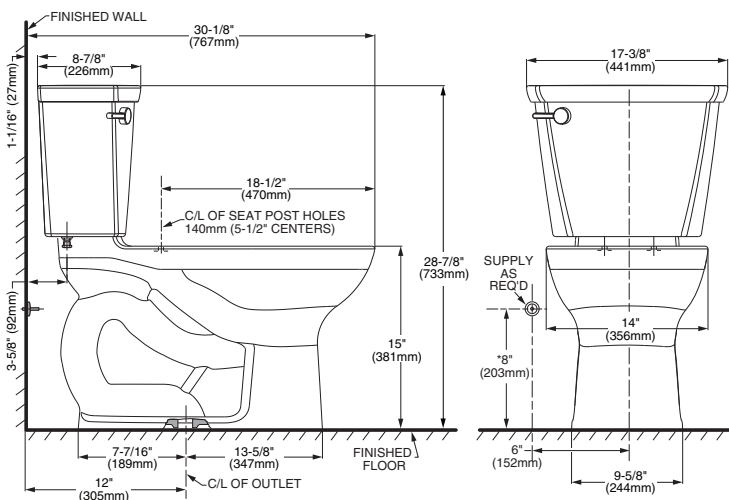
- ☐ **4188A.154** Tank complete with Aquaguard Liner
- ☐ **4188A.155** Tank complete with Aquaguard Liner and trip lever located on right side
- ☐ **4188A.164** Tank complete with tank cover locking device
- ☐ **4188A.174** Tank complete with Aquaguard Liner and tank cover locking device
- ☐ **4188A.105** Tank complete with trip lever located on right side
- ☐ **4188A.165** Tank complete with tank cover locking device and trip lever located on right side

Compliance Certifications -

Meets or Exceeds the Following Specifications:

- ASME A112.19.2-2008/CSA B45.1-08 for Vitreous China Fixtures
- US EPA WaterSense® Specification for HETs

** Maximum Performance (MaP) testing performed by IAPMO R&T Lab. MaP Report conducted by Veritec Consulting, Inc. and Koeller and Company.



NOTES:

THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET. SUPPLY NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. * DIMENSION SHOWN FOR LOCATION OF SUPPLY IS SUGGESTED.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

To Be Specified:

- ☐ Color: ☐ White ☐ Bone ☐ Linen ☐ Black
- ☐ Seat: #5321.110 EverClean® Elongated Seat with Slow Close Snap-Off Hinges
- ☐ Supply with stop:



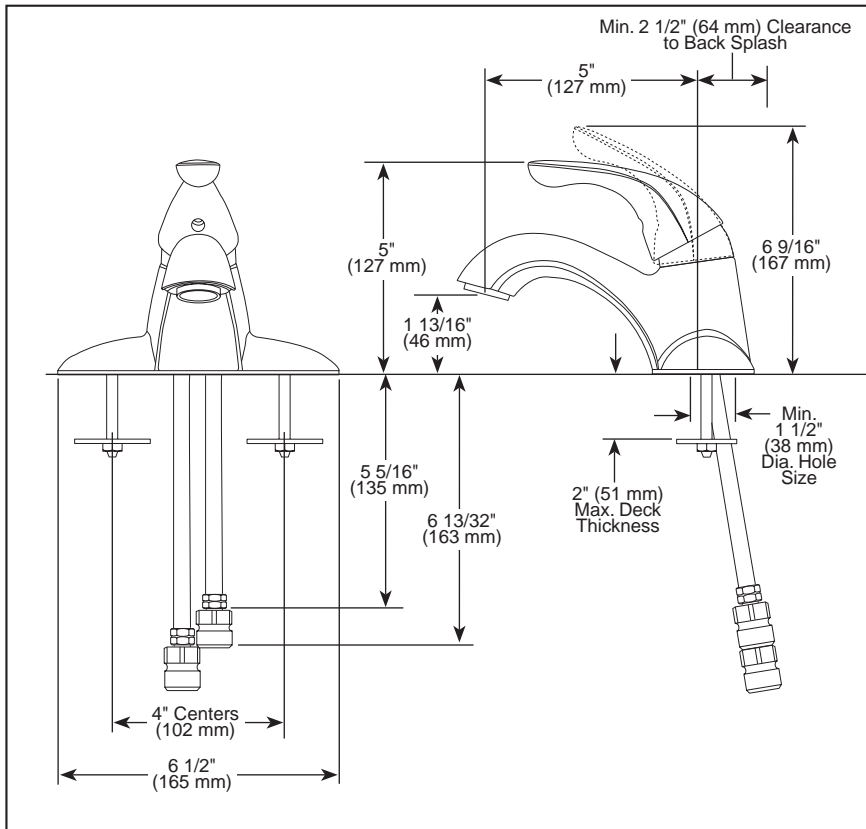
Cadet® PRO



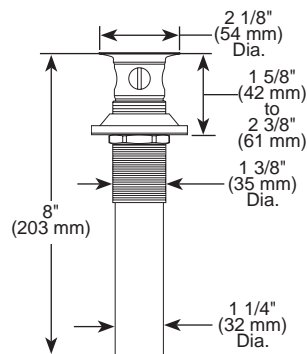


Submitted Model No.:

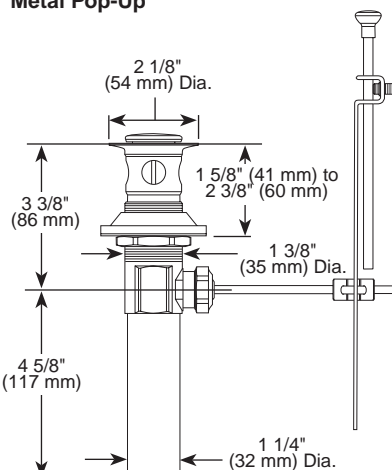
Specific Features:



Metal Grid Strainer



Metal Pop-Up



▲ Designate proper finish suffix

DELTA COMMERCIAL LAVATORY FAUCETS

- Single Handle
- 3 Hole Sink Applications
- 4" (102 mm) Centerset

STANDARD SPECIFICATIONS:

- Single handle lavatory deck faucets for exposed mounting on three hole sinks.
- 4" (102 mm) centerset.
- All metal fabricated body.
- 5" (127 mm) spout.
- Vandal resistant aerator or spray outlet.
- Metal grid strainer (523).
- Metal pop-up drain (520).
- Lift rod hole (520).
- Vandal resistant lever handle. Red/blue colored graphics indicate hot/cold temperature.
- Control mechanism is the diamond embedded ceramic disc cartridge.
- Control handle shall return to the neutral position when valve is turned off.
- Adjustable handle limit stop.
- 3/8" O.D. straight, staggered copper supply tubes with 3/8" fittings.
- Available options for field conversion:
6" (152 mm) long elbow handle-red/blue colored graphics indicate hot/cold temperature. Order RP54687.
- Maximum 1.5 gpm flowrate @ 60 PSI.
HGM (models only) max. 0.5 gpm flowrate @ 60 PSI.
TGM (models only) max. 0.35 gpm flowrate @ 60 PSI.

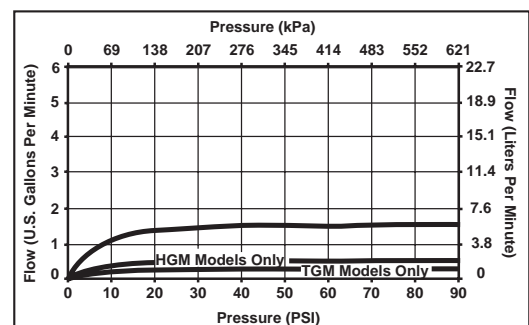
WARRANTY

- Lifetime Faucet and Finish Limited Warranty to the original consumer purchaser to be free from defects in material and workmanship.
- 5 Year Limited Warranty for usage in all industrial, commercial and business applications.



COMPLIES WITH:

- ASME A112.18.1 / CSA B125.1
- ASME A112.18.2 / CSA B125.2
- Indicates compliance to ICC/ANSI A117.1
- EPA WaterSense®
- Verified compliant with .25% weighted average Pb content regulations.



DELTA FAUCET COMPANY

55 E. 111th Street, Indianapolis, Indiana 46280
350 South Edgeware Road, St. Thomas, ON N5P 4L1
© 2012 Masco Corporation of Indiana

Delta reserves the right (1) to make changes in specifications and materials, and (2) to change or discontinue models, both without notice or obligation. Dimensions are for reference only. See current full-line price book or www.specselect.com for finish options and product availability.