

CVS/pharmacy # 00329
91 Auburn Street
Portland, ME

BKA Reference No.209017

August 26, 2009

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- 16729 PUBLIC ADDRESS AND MUSIC SYSTEM
- 16740 COMMUNICATIONS EQUIPMENT
- 16750 ENERGY MANAGEMENT SYSTEM

SUBSTITUTION REQUEST FORM

Date: □□□□

To: Architect/Engineer	Project Name: <u> □□□□ </u>
Attention:	Project No.: <u> □□□□ </u>
Address:	

We submit for your consideration the following product as a Substitution for the specified product:

Section No.	Paragraph	Specified Product
<u> □□□□ </u>	<u> □□□□ </u>	<u> □□□□ </u>

Proposed Substitution: □□□□

Reason for Substitution: □□□□

Cost savings to be realized by Owner, if proposed Substitution is accepted:

No Change
 Deduct □□□□ Days
 Other □□□□

Product Data: Attach complete technical data for the proposed Substitution. Include information on changes to Contract Documents, which proposed Substitution will require for its proper installation.

Samples: Attached
 Will be furnished upon request

Does the Substitution affect dimensions shown on Drawings? No Yes (explain)

 □□□□

Affects of proposed Substitution on other Work:

 □□□□

Differences between proposed Substitution and specified Product:

□□□□□

Same Differences (explain) proposed Substitution and specified Products are:

□□□□□

Maintenance service and spare parts are available for proposed Substitution from:

□□□□□

Submittal constitutes a representation the Contractor has read and agrees to the provisions of Section 01600.

Submittal by Contractor:

□□□□□

Signature

□□□□□

Firm

For Use by Architect/Engineer:

Based on the information supplied by the Contractor, the Architect/Engineer has reviewed the proposed Substitution on the basis of design concept of the Work and conformance with information given in Contract Documents.

- Accepted Accepted as Noted Rejected

Submit Additional Information:

□□□□□

By: _____ Date: _____

Comments: □□□□□

□□□□

□□□□

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DIVISION 1

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SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

0.1 WORK INCLUDES

- A. Work of this Project comprises General Construction of a free-standing CVS/Pharmacy as indicated on drawings. All work will be under one contract.
- B. Responsibilities: As outlined in responsibility schedule at end of this section.

0.2 QUALITY ASSURANCE

- A. All work described in these Specifications or shown on the Drawings and all work necessary to complete finish of the work as described or shown is to be executed in a thoroughly substantial and workmanlike manner. All work shall be done by persons who are thoroughly experienced in their particular trade or crafts.

PART 2 - PRODUCTS

0.1 CLARIFICATION OF INFORMATION

- A. Should it appear that the work intended to be described, or any of the matters relative thereto, are not sufficiently detailed or explained on the Drawings, or in the Project Manual, the Contractor shall consult the Architect for such further drawings or explanations as may be necessary, and shall conform to the same as far as they shall be consistent with original Drawings. In the event of any questions arising with respect to the true meaning of the Drawings and Specifications, reference shall be made to the Owner whose decision shall be final and conclusive. In no case shall any work proceed in uncertainty.
- B. It is the intention of the Drawings and the Project Manual to provide a job complete in every respect. Contractor shall be responsible for this result and shall turn over the Project in complete operating condition regardless of whether the Drawings and Project Manual cover every individual item in minute detail.
- C. On all Drawings, figures take precedence over measurements by scale. Large scale details take precedence over small scale details. In the event figures are missing, consult the Architect. Do not scale Drawings. In the event of a conflict between wording in the Project Manual and on the Drawings, please notify Architect/Engineer.
- D. Certain schedules of materials, may accompany the Drawings in order to accommodate the Contractor and to avoid a confusing amount of lettering on the Drawings. Such diagrams are intended to be used in conjunction with the Drawings and Specifications, but are not to be interpreted as in any manner modifying or restricting such Drawings or the Specifications. Schedules of materials are furnished as a convenience only, and there is no guarantee that any schedule includes all of the work or materials required by the Drawings and the Project Manual.

0.2 NATIONAL ACCOUNTS

A. The following is a summary of the Owner's National Accounts for this Project. Refer to each of the following sections for more information including respective manufacturer's name(s), telephone number(s), and product information.

1. Section 04810 – UNIT MASONRY ASSEMBLIES – Face Brick
2. Section 06402 – INTERIOR ARCHITECTURAL WOODWORK: Cabinets, countertops, Laboratory Tops, and Chair Rail.
3. Section 07240 - EXTERIOR INSULATION AND FINISH SYSTEM - EIFS
4. Section 07530 – FULLY ADHERED EPDM ROOFING SYSTEM – Roofing System.
5. Section 08110 – STEEL DOORS AND FRAMES – Steel Doors and Frames
6. Section 08211 – FLUSH WOOD DOORS – Flush Wood Doors
7. Section 08331 – OVERHEAD COILING DOORS: Rolling Service Door.
8. Section 08334 – OVERHEAD COILING GRILLES: Security Grilles and Pharmacy Grille.
9. Section 08381 – TRAFFIC DOORS: Traffic Doors.
10. Section 08410 – ALUMINUM ENTRANCES AND STOREFRONTS: Storefront Windows.
11. Section 08461 – SLIDING AUTOMATIC ENTRANCE DOORS: Telescoping Door
12. Section 08512 – DRIVE-THRU WINDOW: Drive-Thru Window Package.
13. Section 08711 – DOOR HARDWARE: Door Hardware.
14. Section 09511 – ACOUSTICAL PANEL CEILINGS: Acoustical Ceiling and Ceiling Grid.
15. Section 09540 – DIRECT – APPLIED EXTERIOR FINISH SYSTEM – DEFS
16. Section 09651 – RESILIENT FLOORING: Resilient Flooring
17. Section 09680 – CARPET: Wainscot at Columns.
18. Section 09681 – CARPET TILE: Carpet Tile.
19. Section 09950 – WALL COVERINGS: Wall Coverings.
20. Section 10100 – VISUAL DISPLAY BOARDS: Bulletin Boards.
21. Section 10200 – VISUAL DISPLAY WALLS: Steel Pharmacy Bays.
22. Section 10425 – INTERIOR SIGNAGE: Graphics, Aisle Signs and Toilet Signs.
23. Section 10426 – EXTERIOR SIGNAGE: Pylon, Monument, Drive-Thru, and Building Signs.
24. Section 10450 – CART CORRAL: Cart Storage Enclosure.
25. Section 10801 – Toilet Accessories.
26. Section 11020 – SECURITY SAFES: Free-Standing Front Store and Pharmacy Security Safes.
27. Section 11172 – WASTE COMPACTOR.
28. Section 11200 – WALK IN COOLER: Walk in Beverage Display Cooler.
29. Section 11400 – COOLER AND FREEZERS: Cooling and Refrigeration Units.
30. Section 12300 – STEEL GONDOLA – Store display and storage fixtures.
31. Section 13851 – FIRE ALARM: Fire Alarm System.
32. Section 14566 – VERTICAL LIFT – Vertical Freight Lift.
33. Section 14570 – PNEUMATIC TRANSPORT SYSTEM: Tube Delivery System.
34. Section 15430 – PLUMBING SPECIALTIES: Pharmacy Water Purification System.
35. Section 15782 – ROOFTOP UNITS: HVAC Rooftop Units.
36. Section 16442 – PANELBOARDS: Electrical Switchgear.
37. Section 16511 – INTERIOR LIGHTING: Interior Lighting.
38. Section 16521 – EXTERIOR LIGHTING: Exterior Lighting and Photo metrics.

39. Section 16700 – ELECTRONIC DETECTION SYSTEM: EAS and POS Security System.
40. Section 16710 – BURGLAR ALARM SYSTEM.
41. Section 16729 – PUBLIC ADDRESS AND MUSIC SYSTEM
42. Section 16740 – COMMUNICATIONS EQUIPMENT
43. Section 16750 – ENERGY MANAGEMENT SYSTEM

0.3 YEAR 2000 COMPLIANCE WARRANTY

- A. Hardware, software, and firmware products and other products and designs will accurately process date/time data (including calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations to the extent that other information technology, used in combination with the information technology being acquired, properly exchanges date/time data with it.
- B. If the Contract requires that specific listed products must perform as a system in accordance with this warranty, then extend that warranty to those listed products as a system.
- C. If the Contract requires verification through testing that Products provided are Year 2000 compliant, such testing shall include the following dates and transition to and from each: 31 December 1998, 1 January 1999, 31 December 1999, 1 January 2000, 29 February 2000, 1 March 2000, 31 December 2000, 1 January 2001, 31 December 2004, and 1 January 2005. Contractor will provide, upon request, a copy of testing results which verify that Products are Year 2000 compliant.
- D. The duration of this warranty and the remedies available to the Owner for breach of this warranty shall be as defined in and subject to, the terms and limitations of the standard commercial warranty or warranties under this Contract, the remedies available to the Owner under this warranty shall be limited to repair or replacement of any listed product whose noncompliance is discovered and made known in writing within 90 days after acceptance.
- E. Do not construe anything in this warranty to limit any rights or remedies the Owner may otherwise have under this Contract with respect to defects other than Year 2000 performance.

PART 3 – EXECUTION

- 3.1 RESPONSIBILITY SCHEDULE – Refer to the Responsibility Schedule noted on the baseline Prototype Cover Sheet and coordinate with both the CVS Project Manager and CVS Real Estate for approval.

END OF SECTION 01010

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SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Owner Occupancy: Allow for Owner occupancy of site.
 - 2. Driveways and Entrances: Keep driveways 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.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01140

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SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

0.1 SECTION INCLUDES

- A. This Section includes the following administrative requirements to be fulfilled by the Contractor for the performance of the Work.
 - 1. Certificate of Insurance.
 - 2. Schedule of Values.
 - 3. Contractor's Certification.

0.2 QUALITY ASSURANCE

- A. Contractor shall complete and submit required documentation and ensure the completeness and accuracy of same.

PART 2 - PRODUCTS

0.1 CERTIFICATE OF INSURANCE

- A. Within seven (7) calendar days after notification to the Contractor by the Owner of the acceptance of the Bid **OR** prior to commencement of any Work at the Project site, whichever is earlier, submit to the Owner a Certificate of Insurance meeting all requirements set forth in the Contract Documents.

0.2 SCHEDULE OF VALUES

- A. Within fourteen (14) days after notification to the Contractor by the Owner of acceptance of the Bid, submit to the Owner a Schedule of Values depicting a complete and correct breakdown of costs covering the various portions of the Work included in the Contract Sum.
- B. The Contractor agrees to revise the submitted breakdown, if necessary, to satisfy the Owner as to the extent and distribution of cost.
- C. This breakdown, once accepted, shall become the basis for submitting the Contractor's Applications for Payment.

0.3 CONTRACTOR'S CERTIFICATION

- A. Submittals will be submitted only by the Contractor. Indicate by signed stamp that the contract documents have been checked, that the work shown in the submittals is in accordance with the contract requirements and that dimensions and relationship with work of other trades have been checked. If submittals are submitted for review that have not been checked and signed by the Contractor, they will be returned for checking before being considered.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01300

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, 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 and activities of other contractors 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.

1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.5 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: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

- B. Preconstruction Conference: Schedule 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. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All 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.

- d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- 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 Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements.

4. 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 regular intervals. Coordinate dates of meetings with preparation of payment requests.
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 conference 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.
 - 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) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
 3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - 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 01310

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SECTION 01340 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

0.1 SECTION INCLUDES

- A. This Section provides for the preparation and submission of product data and shop drawings.
- B. Each Section that has products listed therein incorporates this section by reference and is incomplete without the provisions stated herein.

0.2 FIELD SAMPLES

- A. Field samples shall be submitted to the Architect/Engineer.

0.3 MANUFACTURERS

- A. The listed manufacturers will be acceptable as long as they comply with the specifications.
- B. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to the Architect/Engineer that their products comply with the specifications.
- C. Provide all power distribution and similar equipment of the same manufacturer.

0.4 LETTER OF CONFORMANCE

- A. Where product data, shop drawings, samples, installation instructions, or certificates are required. General Contractor shall have the option of submitting a Letter of Conformance to the Architect/Engineer for each product submitted, provided the submittal complies with the specifications. Refer to sample "Conformance Letter" at the end of this section.
- B. When the conformance letter is submitted for products, no submittal review will be conducted, but General Contractor must maintain product data, shop drawings, samples, installation instructions, certificates, and mock-ups (as applicable) on file at the job site for those products.

0.5 PREPARATION

A. Shop Drawings and Submittal Data:

1. Prior to the start of installation, submit detailed shop drawings, descriptive literature, physical data and performance data for review for the items of equipment and materials listed in this Section. Include identifying symbols and equipment numbers used in plans and specifications, with reference to specification paragraphs, and drawing numbers of all equipment and material submitted. Provide drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment, large piping and clearances for maintenance and code requirements. Design consultants' drawings may not be used for shop drawing backgrounds.
2. Submit all data complete by Section. Each Section will be handled separately. Any unacceptable items will be so noted and the entire package returned for correction and resubmittal. Once these items are corrected, the entire Section shall be resubmitted for review of the unacceptable items only. Partial submittals are unacceptable. Intent of this requirement is that all bound sets of data will be identical and will contain only acceptable information.
3. The review of shop drawings does not relieve or modify the responsibility for compliance with the Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that in the review process, noting of some discrepancies, but overlooking others, does not grant the Contractor permission to proceed in error. Regardless of any information contained in the shop drawings, layout drawings, catalog data and brochures, the Contract Documents govern the Work, and are neither waived nor suspended in any way by the review of shop drawings, layout drawings, catalog data and brochures.
4. A minimum review period of 7 working days, exclusive of transmittal time, is required in the Architect/Engineer's office each time product data or samples are submitted or resubmitted for review. Take this time period into consideration when scheduling the Work.
5. Include in submittals sufficient drawings, plans, elevations, sections, performance data, dimensions, bolt locations, inserts, sound data, weights and schematics to clearly describe the equipment and to show compliance with these specifications. Provide a cover or title sheet for each submittal containing the following:
 - a. Name of Contractor originating the submittal.
 - b. Name of project for which the submittal is made.
 - c. An index of all items submitted.
 - d. Identification of each item of material and equipment.
 - e. Date of submittal.
 - f. Contractor's certification.

6. Send all submittals as follows:
 - a. Send the original submittal, including Fire Protection submittals, by use of an express service overnight to:

Team CVS / Portland, ME
BKA Architects, Inc.
142 Crescent Street
Brockton, MA 02302
Telephone: (508) 583-5603
Fax: (508) 584-2914
 - b. Fire Protection submittals shall also be submitted to the applicable local Building Official or Fire Marshal for information only.
 - c. Submit to Owner a complete copy of the Contractor's test and material certificate.
7. The original submittal shall consist of one (1) reproducible and five (5) prints of shop drawings and layout drawings as described below. Shop drawings and layout drawings which do not comply with these requirements will be returned for re-submittal.
 - a. The Architect/Engineer will retain one (1) copy and Owner will retain one (1) copy of the submittal and the reproducible sepia. Remaining copies will be returned to the Contractor with a "Submittal Review" cover letter marked NOT REVIEWED, FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked NOT REVIEWED, FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is noted REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat the submittal in accordance with the Contract Documents. It is intended that the Contractor submit complete and accurate shop drawing data at the first submittal. If the shop drawings or layout drawings are returned to the Contractor noted REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one (1) additional submission is permitted.
 - b. If the reproducible sepia marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED is altered for any reason after it has been stamped, the REVIEWED stamp shall automatically be voided.
 - c. If the reproducible sepia "Submittal Review" cover letter is altered for any reason after it has been reviewed, the REVIEWED cover letter shall automatically be voided.
 - d. Provide all Work in accordance with shop drawings and layout drawings stamped noted NOT REVIEWED, FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the shop drawings and layout drawings and the Contract Documents, the Contract Documents shall govern the Work.

8. Submit one (1) original color brochure (if applicable) as published by the manufacturer along with five (5) copies of catalog data and brochures as described below. Catalog data and brochures which do not comply with these requirements will be returned for resubmittal. Where brochures published by the manufacturer are part of a submittal, include only information relevant to the particular equipment or materials to be furnished. In all cases where compliance with UL, FM, ARI or other similar organization's standards are required, provide proper documentation of this compliance with the manufacturer's published literature or drawings or by a letter signed by an officer of the company.
 - a. The Architect/Engineer will retain the original manufacturer's brochure copy and Owner will retain one (1) copy of the submittal. Remaining copies will be returned to the Contractor noted NOT REVIEWED, FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked NOT REVIEWED, FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is noted REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat the submittal in accordance with the Contract Documents. It is intended that the Contractor submit complete and accurate catalog data or brochures at the first submittal. If the catalog data or brochures are returned to the Contractor noted REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one (1) additional submission is permitted. Catalog data and brochures will not be accepted after 45 days from the contract date.
 - b. If the catalog data and brochures "Submittal Review" cover letter is altered for any reason after they have been reviewed, the REVIEWED cover letter shall automatically be voided.
 - c. Provide all Work in accordance with catalog data and brochures noted NOT REVIEWED, FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the catalog data and brochures and the Contract Documents, the Contract Documents shall govern the Work.
9. NOTE: Submission of the five (1) copies of the catalog data and brochures is not required when the Contractor provides items consisting of the exact manufacturer, model and type specified. Only a submittal cover and the original color brochure (if applicable) as published by the manufacturer is required describing the item, the manufacturer and model number, along with certifying that it is "furnished as specified," will be sufficient. No review will be conducted.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

0.1 REQUIRED SUBMITTALS BY SECTION

A. Product Data:

1. The term "product data" shall consist of, but not be limited to, the following items as applicable:
 - a. Manufacturer's Product Specifications.
 - b. Standard Details and Construction.
 - c. Finishes and Colors.
 - d. Certified Product Test Results.
 - e. Rough-In and Installation Instructions.
 - f. General Recommendations.
 - g. Maintenance Recommendations.
 - h. Accessories.
 - i. Required Supports.
 - j. Capacities.
 - k. Dimensions.
 - l. Type/Arrangement.
 - m. Performance/Operation.
 - n. Controls.
 - o. Size Capacities.
 - p. Piping Requirements.
 - q. Written Sequence of Controls.
 - r. Wiring Diagrams.
 - s. Pipe, Fittings and Valves.
 - t. Special Fabrications.
 - u. Drains.
 - v. Pressure Regulators.

B. Shop Drawings:

1. The term "shop drawings" shall consist of, but not be limited to, the following items as applicable:
 - a. Drawings, Plan Layout, Elevations, Grid and Spacing of Components.
 - 1) Accessories, Fittings, Anchorages and Schedule of Components.
 - 2) Material Certification.
 - 3) Installation Drawings.
 - 4) Schedules.
 - 5) Piping Diagrams.
 - 6) Wiring Diagrams.

0.2 FINAL SUBMITTAL

- A. In addition to the number of copies of shop drawings and product data required to review submittals, maintain a separate file of final reviewed copies of such material. Deliver approved submittals in a hard-back binder for the Owner's use. Incorporate changes and revisions made throughout the construction period. Delivery of reviewed copies is a condition of final acceptance for the project.

END OF SECTION 01340

LETTER OF CONFORMANCE

Date: _____

Project Name: _____

Project Number _____

Project Location: _____ City/ State: _____

Specification Section Number: _____ Specified Product: _____

This letter of Conformance is offered in lieu of Shop Drawings, Product Data, cut Sheets or Samples in accordance with Section 01300 – Submittals. The undersigned hereby declares that the Product identified above by manufacturer’s name and model number is an acceptable product, suitable for the intended use as defined within the Contractor Documents and will be provided, installed and placed in operational condition in accordance with the manufacturer’s printed instruction and Contract Documents.

General Contractor understands that he/she is not relieved of responsibility of acquiring and maintaining manufacturer’s information necessary to coordinate installations.

(Contact name of Subcontractor offering above product)

(Signature)

Phone: _____

(Contact name of General Contractor)

Phone: _____

(Signature)

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SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for 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. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

- A. Qualification Data: 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 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
 - 1. 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.

1.6 QUALITY CONTROL

- A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - 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.
- B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- C. 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. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of Contractor.
- D. 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.
- E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-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.
- F. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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 Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

- 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 01400

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

0.1 SECTION INCLUDES

- A. Temporary facilities and utilities required for the execution of the Work.
- B. Temporary facilities shall be provided, maintained and paid for by the responsible Contractor or Subcontractor as specified herein and on completion of the Project the responsible Contractor or Subcontractor shall remove these temporary facilities from the premises.

0.2 QUALITY ASSURANCE

- A. Comply with requirements of local laws and regulations governing construction and local industry standards in the installation and maintenance of temporary services and facilities.
 - 1. Building Codes, including local requirements for permits, testing and inspection.
 - 2. Health and safety regulations as governed by OSHA.
 - 3. Utility company regulations and recommendations governing temporary utility services.
 - 4. Police and Fire Department rules and recommendations.
 - 5. Environmental protection regulations governing use of water and energy, and the control of dust, noise and other nuisances.
- B. Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications.
- C. During progress of the Work, submit copies of reports and permits required by governing authorities, or necessary for installation and efficient operation of temporary services and facilities.
 - 1. Submit copies of reports of tests, inspections, meter readings and similar procedures performed on temporary utilities before, during and after performance of the Work. Submit copies of permits, easements and similar documentation necessary for the installation, use and operation of temporary utility service.
- D. Provide each temporary service and facility ready for use at each location when the service of facilities is first needed to avoid delay in performance of the Work. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

- E. Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not permit them to interfere with the progress of the Work. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

PART 2 - PRODUCTS

0.1 TEMPORARY ACCESS

- A. Locate, provide, and maintain temporary access to the construction site where such access will not interfere with the progress of the Work. The temporary access shall be for the free use of Subcontractors, vendors, the Owner and the Architect. The temporary access shall be adequate to sustain the loads to be carried and shall be maintained in a useable condition at all times. Such access shall be coordinated with the work being performed by other forces elsewhere on the site or adjacent property.
 - 1. Provide snow removal where required to maintain temporary access to the Project.
- B. Contractor and Subcontractors shall confine their construction activities to occur within the construction limits and staging area.
- C. Maintain a temporary construction opening at the main entrance to the building for the use of Subcontractors.

0.2 TEMPORARY UTILITIES

- A. Utility Permits:
 - 1. Pay for, and make all necessary arrangements for, the securing of any temporary permits for the installation of electric light, power, and water during the term of building operation under the Contract.
- B. Electric Service:
 - 1. Provide, maintain, pay for, and arrange with the local utility company for electrical service of adequate capacity for the needs of all Contractors on the site during the construction period.
 - 2. Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
 - a. Use only grounded extension cords. Use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths.
 - b. Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets.

- c. Provide ground-fault protection for plug-in connection of power tools and equipment.
 - d. Protect lamps where fixtures are exposed to breakage by construction operations. Provide exterior fixtures where fixtures are exposed to the weather or moisture.
3. The Electrical Subcontractor shall maintain light bulbs and extension cords sufficient to light the building for safety purposes and to carry on the Work properly.
 4. Any Contractor who requires temporary electrical service for tools and equipment, other than lighting and fractional horse power motors, shall make installation arrangements with an electrical contractor. Contractors with equipment which utilizes 3/4 HP or larger motors and/or 3 phase power shall make similar arrangements. Any Contractor who requires these special power connections shall arrange and pay for the cost of installation and removal such services upon completion of the Work.
 5. Owner will pay costs of energy used.

C. Heating and Ventilating:

1. During the construction of the building and until Substantial Completion of the Work, provide, pay for, and maintain all heat, fuel, and services necessary to protect work and material against injury from dampness and cold. Temporary heating units shall be approved types that will not stain or damage building materials.

D. Sanitary Facilities:

1. Provide and maintain adequate chemical toilet facilities in a clean and sanitary condition for the use of Subcontractors. Comply with governing regulations including safety and health codes for the type, number, location, operation, and maintenance of toilets.
2. The Contractor and each Subcontractor shall provide their own drinking water from a proved safe source, so piped or transported as to be kept clean and fresh and service from single service containers or satisfactory types of sanitary drinking stands or fountains.

0.3 TEMPORARY CONSTRUCTION

- A. Maintain equipment such as temporary stairs, barricades, ladders, ramps, scaffolds, runways, derrick, chutes, and the like, as required for proper execution of Work by trades. Such apparatus, equipment and constructions shall be as required by all State and local laws applicable thereto.

0.4 TEMPORARY STORAGE

- A. Each Subcontractor shall provide storage sheds as their needs may require and shall coordinate the location with the Contractor. All temporary structures shall be removed before final acceptance of the Work.

- B. Contractors are advised that there is limited storage at the project site. Contractors shall bring only the amount of product necessary for the completion of the immediate work.

0.5 SIGNS

- A. No signs, billboards, or other advertisements shall be erected on the premise by the Contractor.
- B. Furnish and maintain all necessary signs required for the performance of the Work such as "Office", "Men", "Danger", "High Voltage", etc.

0.6 WATER

- A. Provide water to the site.
- B. Subcontractors shall furnish their own hoses.
- C. Site water will be available for general use upon completion of utilities.
- D. The Contractor shall pay for temporary meter and/or water consumption.

0.7 FIRST AID FACILITIES

- A. Provide and maintain adequate first aid facilities and clearly visible signage identifying location of first aid facilities.

0.8 PROTECTION OF WORK AND PROPERTY

- A. Contractor shall be responsible for care and protection of the Work, equipment, and adjacent property until installation is complete and accepted by Owner.
- B. Contractor shall not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio. Damage to the structural members of the building by any Contractor shall be made good at that Contractor's expense. Contractors shall obtain written approval from the Owner before cutting, drilling, or driving anchors into columns and before penetrating any beams.
 - 1. Where damage occurs and responsibility for damage can be determined, the cost shall be charged to the party responsible. If responsibility cannot be determined, the cost shall be prorated among all contractors in proportion to their activities at the building at the time the damage was done, as determined by the Owner.

0.9 SAFETY

- A. Contractor agrees to conduct work in a safe manner at all times, taking the precautions necessary to prevent injury and loss to employees at the project site, the Owner's employees, as well as to members of the public who may be near the project site.
- B. Contractor will comply with regulations and standards, laws, ordinances, codes and rules with reference to safety and accident prevention.
- C. Contractor accepts responsibility for enforcing the standards and regulations of the Occupational Safety and Health Act or other Acts pertaining to safety.

0.10 FIRE PROTECTION

- A. Contractor shall be responsible for the maintenance of the following fire prevention steps.
 - 1. SMOKING is not allowed in the building.
- B. Each Contractor shall recognize the utmost importance of extraordinary precautions necessary to prevent a fire in, or adjacent to, the Project. Each Contractor, Subcontractors and workmen shall provide sufficient fire fighting devices, watchman, standby helpers, or other precautions while temporary heating devices are being used during operations such as welding, brazing, testing, or other phases of Work which present a fire hazard or potential fire hazard.

0.11 TEMPORARY CONTROLS

- A. Maintain the following protection/controls:
 - 1. Dust and noise control
 - 2. Protection of adjacent property.
 - 3. Traffic and Parking control.
 - 4. Rodent and pest control.
 - 5. Waste disposal services.
- B. Consumption of food and beverage within the building after enclosure shall be limited to an isolated area determined by the Contractor and approved by the Owner. This area shall be left broom clean at the end of each day and all refuse removed daily.

PART 3 - PRODUCTS – Not Used

END OF SECTION 01500

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SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: Selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

1.3 DEFINITIONS

- A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- D. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 3. Initial Submittal: Within 15 days after date of commencement of the Work, submit 4 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. Completed List: Within 30 days after date of commencement of the Work, submit 4 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.
- B. Substitution Requests: Submit four 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. Substitution Request Form: Use form provided at end of Section.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications 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. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. 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 lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week 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 7 days of receipt of additional information or documentation, whichever is later.
- a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products to allow for inspection and measurement of quantity or counting of units.
 6. Store materials in a manner that will not endanger Project structure.
 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 9. Protect stored products from damage.
- B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
 - a. Substitutions may be considered, unless otherwise indicated.
 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.

5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
7. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
8. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. 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.

2.3 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

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SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 1. Construction layout.
 2. General installation of products.
 3. Coordination of Owner-installed products.
 4. Progress cleaning.
 5. Starting and adjusting.
 6. Protection of installed construction.
 7. Correction of the Work.

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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. 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.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.3 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.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

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.
- G. 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.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 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.
- D. 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.

- E. 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.
- F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- G. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- H. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- I. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- J. 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.
- K. 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.
- L. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

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

3.8 CORRECTION OF THE WORK

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

END OF SECTION 01700

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SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITION

- A. The Developer is the person or entity identified as such in the agreement and is referred to throughout the contract documents as if singular in number. The term "Developer" means the developer or the developer's authorized representative.
- B. The CVS Representative is the person or entity identified as such in the agreement and is referred to throughout the contract documents as if singular in number. The term "CVS Representative" means the CVS Representative or the CVS authorized representative.
- C. Contract conditions from project to project may allow that the two above definitions be interchangeable. The "Developer" shall complete actions listed in this section for Fee-for-Service program contracts. The "CVS Representative" shall complete actions listed in this section for other contract types.

1.3 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. List of Required Documents
 - 6. Final Documentation on CD-Rom.
 - 7. Instruction of Owner's personnel.
 - 8. Final cleaning.

1.4 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 3. Obtain and submit assignments and permits allowing Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar permits and assignments.
 4. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, and similar final record information.
 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions and provide manuals, security codes and keys.
 7. Complete startup testing of systems.
 8. Submit test/adjust/balance records.
 9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, construction signs, and similar elements.
 10. Advise Owner of changeover in electric, gas, water, sewer, and other utilities.
 11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 12. Complete final cleaning requirements, including touchup painting.
 13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Developer will either proceed with inspection or notify Contractor of unfulfilled requirements. Developer 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 Developer, 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.

1.5 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit an Application for Final Payment. (See subsection 1.9).
 2. Submit certified copy of Developer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Developer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Developer will either proceed with inspection or notify Contractor of unfulfilled requirements. Developer 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.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1.7 PROJECT RECORD DOCUMENTS (AS-Built Drawings)

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Developer's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings to Developer.
 - 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity that obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 - 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 - 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 - 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system to Developer. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
 2. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.9 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated. All warranties from manufactures, suppliers, contractors, and others to be assigned and delivered to owner.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch 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.

1.10 LIST OF REQUIRED DOCUMENTS FOR FINAL PAYMENT

- A. The following list of documents shall be submitted by the General Contractor to the Developer before CVS will release final payment:
 1. Permanent Certificate of Occupancy
 2. Execute and deliver certificate from the developer and the general contractor confirming completion (form COMP)
 3. As Built Survey (ALTA, CVS Standards)
 4. Waiver of Liens from Developer, General Contractor, and for all Sub Contractor & material suppliers, (Attached is a list of sub contractors with their Names, Addresses, and Phone Numbers)
 5. Affidavit of release of liens (6706A G.C.)
 6. Final Draw request and CVS approval (including and remaining Soft Costs)
 7. Sign off from CVS Construction Project Manager
 8. Execution and deliver Site Engineer Certification (form ENG)
 9. Title date down to be obtained by CVS (not earlier than 5 business days prior to date of payment)
- B. A copy of the above list is attached to the end of this section.

1.11 FINAL DOCUMENTATION

- A. Final Documentation: The developer shall provide final documentation in the form of a CD-Rom to CVS upon the completion of the project. The information shall be included in the following format and submitted to the payment group within CVS/pharmacy. CVS will distribute this information to each applicable store location.
 1. Cover Page
 2. Index
 3. Section A
 - a. Permanent Certificate of Occupancy
 - b. Building Permit

4. Section B
 - a. Certificate of Completion (form COMP)
 - b. Contractors Affidavit
 - c. Site Engineers Certification (form ENG)
5. Section C-Waiver of Liens
 - a. Final Waiver of Liens
 - b. List sub-contractors with Names, Addresses and Phone Numbers
6. Section D-Warranties
 - a. List sub-contractors with Names, Addresses and Phone Numbers
7. Equipment Vendors
 - a. List vendors with Names, Addresses and Phone Numbers
8. AS-Built Drawings
 - a. List as-built drawings

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove 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; shampoo 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. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

- q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

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Store #:

Developer:

Location:

Attn:

The Following is a list of required documents for CVS to release final payment:

We have checked off what we have received:

Please furnish the remainder of the documents. Final payment **will not be executed** until this has been received.

Permanent Certificate of Occupancy

Certificate from the Developer and the General Contractor confirming completion form (COPM)

As Built Survey (ALTA, CVS Standards)

Waiver of Liens from Developer, General Contractor, all Sub Contractors & material suppliers (Attach a list of sub contractors with their Names, Addresses, and Phone Numbers)

Affidavit of release of liens (6706A G.C.)

Final Draw request and CVS approval (including any remaining Soft Costs)

Sign off from CVS Construction Project Manager

Site Engineer Certification (form ENG)

Title update by CVS

COMMENTS:

By: _____

Date:

Send to: Payment Group Manager

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SECTION 01800 – REQUEST FOR INFORMATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section provides for the preparation and submission of a Request For Information (RFI).
- B. Each Section incorporates this Section by reference and is incomplete without the provisions stated herein.

1.2 ORIGINATION

- A. Requests for Information (RFIs) are generated by General Contractor for a project and are numbered accordingly. Questions from subcontractors shall be directed to the General Contractor, rather than directly to architect.
 - 1. All contractual relationships shall be clarified by the Owner.
 - 2. RFIs shall be generated using the established attached form describing pertinent project data and contractor information, concerns, and proposed solutions.
 - 3. The General Contractor shall fax clarifications, or correspond directly with the architect.

1.3 SUBMISSION

- A. General Contractor shall fax the RFI to the architect. The fax to the architect shall be addressed to the Construction Coordinator. The standard Request for Information form shall be utilized.
 - 1. Owner shall introduce this process to the General Contractor for the project.
 - 2. For a phoned-in RFI, the standard RFI form shall be completed by the recipient of the call and processed through normal channels. Phoned-in RFIs are discouraged to minimize errors in interpretation of the question.
- B. The Construction Coordinator shall promptly deliver the RFI to the appropriate Design Team member who will then review and initiate the research process. Additionally, the Construction Coordinator and Project Manager shall monitor the status of the RFI throughout the day to ensure that the appropriate action is underway.
- C. A reply or status report shall be provided to the General Contractor and Owner within 24 hours.

- D. The Design Team member shall study the RFI and formulate a cursory reply. Once the Team member reaches a conclusion or questions arise, the Team member shall consult with the appropriate Project Manager for confirmation of the desired solution or to obtain the most appropriate solution. Any Discipline Leader, Project Manager and/or Program Manager will be utilized for instructions, opinion, and guidance.
- E. The subject matter contained in an RFI may require additional data from other sources.
 - 1. The subject matter contained in an RFI may be unclear and require additional data from the General Contractor.
 - a. In this case, the appropriate Project Manager and/or Program Manager shall accompany the Team member in contacting the General Contractor and/or the Owner.
 - b. A telephone conversation record of all calls shall be recorded and copied to the General Contractor and the Owner and always be attached to the RFI response.
 - 2. Should the subject matter contained in an RFI require input from the Owner, the Project Manager will fax the RFI form to the Owner along with the original RFI and all supportive documentation.
 - a. The information requested as needed from the Owner should be so noted under the category heading "ADDITIONAL INFORMATION REQUIRED".
 - b. Any RFI containing a major product substitution must be discussed with the Owner prior to resolution. In any event, the Owner shall be notified of the RFI status within 24 hours of receipt at architects office.
- F. Once the Design Team member has concluded research into the RFI and formulated a final response in adequate detail (referencing drawing plans, sections, and details as well as specification paragraphs), the reply shall be prepared using the Master RFI Reply Form. RFI responses should contain clear and concise written replies with details, specifications, sketches, etc., if appropriate. All categories of the RFI shall be addressed. The intent of the RFI response is to completely resolve the issue and eliminate the need for further discussions.
- G. The RFI shall then be delivered to the Project Manager for approval and signature prior to returning it to the General Contractor. The complete RFI package will include a Fax Transmittal Form appropriately filled out. In the event that the Project Manager is not immediately available, the RFI shall be submitted directly to the Program Manager.
- H. Under no circumstances shall the Team member allow the absence of the Discipline Leader, Project Manager, or Program Manager to hold up release of the RFI. If no one is available, the next appropriate party in the chain of command outside the immediate design team and/or discipline shall be pursued.

1.4 RESPONSE

- A. The response or acknowledgment of the RFI must be faxed by the Construction Coordinator to the General Contractor and the Owner within 24 hours of receipt. The RFI response is immediately logged out by the project manager.
 - 1. The fax coversheet must contain a notice of each affected project, the master specifications, and/or each prototype.
 - 2. If the RFI cannot be addressed and responded to within the 24 hour mandated time frame, an acknowledgment of receipt along with a status describing the anticipated completion time shall be faxed to the General Contractor and the Owner.
 - 3. Under no circumstances shall an RFI be forwarded to the General Contractor and the Owner with pending questions or need for clarification. General Contractor and Owner shall be immediately contacted for consultation in this instance.

- B. The project manager shall serve as the individual who is responsible for recognizing any RFI not logged out within the required 24 hour period. In the event an RFI is not logged out within 24 hours, the project manager shall consult with the appropriate Design Team member as to the status. The Project Manager and the Program Manager will be notified via a status log of all outstanding RFIs. This outstanding RFI log will be created at 4:00 p.m. each day and delivered to the appropriate Team Member, Project Manager, and Program Manager, and may be faxed directly to the General Contractor and Owner as appropriate.

1.5 FEEDBACK

- A. Where responses to RFIs consist of options or directions given to the field which require feedback, an explanation of the action taken in the field shall be sent back to the architect in order that an up-to-date set of documents can be maintained.

1.6 RFI LOG

- A. An updated RFI log in complete format, along with hard copies of the week's RFIs, will be provided to the General Contractor and Owner weekly. This is the responsibility of the architect.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION 01800

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REQUEST FOR INFORMATION

RFI Date:

Project Name: CVS / Portland, ME

RFI No.:

Project No.: 209017

To:

BKA Architects, Inc. – Team
CVS

508-584-2914

FAX

From:

General Contractor

FAX

Information Requested (Summary)

Topic:

The A/E will review formal requests from the General Contractor for information regarding the Work. Each Request for Information will be reviewed according to the contract requirements and a notification in writing will be made or progress underway will be reported.

Information Requested

Drawing/Specification:

Existing Condition/Statement of Concern:

Proposed Solution:

By:

Signature:

Title:

cc:

Request for Information

_____ **A/E RFI #** _____

Response

Contractor RFI# _____

PROJECT: _____ CVS Portland, ME _____

PROJECT NO.: _____ 209017 _____

RFI REPLY DATE: _____

TO: _____ Team CVS – Portland, ME _____

FAX NO.: _____ 508-584-2914 _____

FAX NO.: _____

FROM: _____

Telephone Number: () -

FAX Number: () -

TOPIC:

DRAWING/SPECIFICATION REFERENCE:

EVALUATION OF CONDITIONS:

DISCUSSION OF ALTERNATIVES:

ADDITIONAL INFORMATION REQUIRED:

RECOMMENDATIONS:

ATTACHMENTS:

DIVISION 2

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SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.

1.2 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: As specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

- A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
- B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted. Arrange to provide temporary utility services.
- C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding 8-inch (200-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230

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SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades.
 - 2. Excavating and backfilling.
 - 3. Drainage course for slabs-on-grade.
 - 4. Subbase course for concrete walks and pavements.
 - 5. Base course for asphalt paving.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
- B. Base Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- H. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
- I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- J. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner's representative and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups [**GW, GP, GM, SW, SP, and SM**] <Insert satisfactory soil groups>, or a combination of these group symbols; free of rock or gravel larger than [**3 inches**] <Insert size> in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Backfill and Fill: Satisfactory soil materials.
- D. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- G. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.
- H. Detectable Warning Tape: Polyethylene film warning tape encasing a metallic core, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.2 EXCAVATION

- A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Excavate for structures, pavements, and walks to indicated elevations and dimensions. Extend excavations for placing and removing concrete formwork, for installing services and other construction, and for inspections. Trim bottoms to required lines and grades to leave solid base to receive other work.
- C. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.
 - 1. Excavate trenches deeper than bottom of pipe elevation, 6 inches deeper in rock, 4 inches deeper elsewhere, to allow for bedding course. Hand excavate for bell of pipe.
- D. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

- F. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.
- G. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

3.3 BACKFILLS AND FILLS

- A. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
 - 1. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
 - 2. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- B. Fill: Place and compact fill material in layers to required elevations.
- C. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
- D. Compaction: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- E. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
 - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

- F. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus 1/2 inch.
- G. Subbase and Base Courses: Under pavements and walks, place subbase course on prepared subgrade. Place base course material over subbase. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
- H. Under slabs-on-grade, place drainage course on prepared subgrade. Compact to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.5 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- D. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300
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SECTION 02361 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following for termite control:
 - 1. Soil treatment.
 - 2. Bait station system. (If required by the CVS Project Manager)

1.3 DEFINITIONS

- A. EPA: Environmental Protection Agency.
- B. PCO: Pest control operator.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.
- B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.6 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

- B. Install bait station system after construction and landscaping is completed. (If required by the CVS Project Manager)

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Five years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Continuing Service: Provide a proposal for continuing service, including monitoring, inspection, and retreatment for occurrences of termite activity, from applicator to Owner, in the form of a standard yearly (or other period) continuing service agreement, starting on the date of Substantial Completion. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AgrEvo Environmental Health, Inc.; a Company of Hoechst and Schering, Berlin.
 - 2. American Cyanamid Co.; Agricultural Products Group; Specialty Products Department.
 - 3. Bayer Corp.; Garden & Professional Care.
 - 4. DowElanco.
 - 5. FMC Corp.; Pest Control Specialties.
 - 6. Zeneca Professional Products.

2.2 BAIT STATION SYSTEM (If required by the CVS Project Manager)

- A. General: Provide bait stations and, if applicable, monitoring stations, according to manufacturer's EPA-Registered Label for product, manufacturer's written instructions, and the following:
 - 1. Provide number of stations, based on the dimensions of building perimeter indicated on Drawings, according to manufacturer's written instructions.
 - 2. Comply with manufacturer's written instructions for termite management system. Provide not less than one cluster of stations per **20 linear feet (6 linear meters)**, based on the linear dimensions of building perimeter indicated on Drawings, consisting of not less than three stations per cluster.
- B. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, the following:
 - 1. Hexaflumuron: Sentricon System, Recruit II; DowElanco.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.
- C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.
 - 1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, and piers; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Masonry: Treat voids.
 - 4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 INSTALLING BAIT STATION SYSTEMS (If required by the CVS Project Manager)

- A. Place bait stations and, if applicable, monitoring stations, according to the EPA-Registered Label for the product and manufacturer's written instructions, in areas that are conducive to termite feeding and activity, as follows:
 - 1. Areas of high soil moisture.
 - 2. Each area where roof drainage system, including downspouts and scuppers, drains to soil.
 - 3. Along driplines of roof overhangs without gutters.
 - 4. Where condensate lines from mechanical equipment drip or drain to soil.
 - 5. At plumbing penetrations through ground-supported slabs.

6. Other sites and locations as determined by the PCO.
 7. Reference site plan of other locations.
- B. Inspect and service stations from time of their application until completion of the time period established by continuing service agreement, according to the EPA-Registered Label for the product and manufacturer's written instructions for termite management system and bait products.
1. Service Frequency: Inspect monitoring stations not less than once every three months.
- C. Inspect and service stations from time of their application until completion of the time period established by continuing service agreement, according to the EPA-Registered Label for the product and manufacturer's written instructions for termite bait products.
1. Service Frequency: For supplementary and preventive treatment, inspect not less than once every three months.

END OF SECTION 02361

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SECTION 02810 - IRRIGATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes piping, valves, sprinklers, specialties, controls, and wiring for automatic-control irrigation system.

1.3 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Irrigation Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

1.4 SUBMITTALS

- A. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:
 - 1. General-duty valves.
 - 2. Specialty valves.
 - 3. Control-valve boxes.
 - 4. Sprinklers.
 - 5. Irrigation specialties.
 - 6. Controllers.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. 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 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPES, TUBES, AND FITTINGS

- A. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 40.
 - 1. PVC Socket Fittings, Schedule 40: ASTM D 2466.
- B. PE, Controlled OD Pipe: ASTM F 771 and ASTM D 3035, PE 3408 compound, **[DR 9]** **[DR 9 and DR 11]** **[DR 11]**.
 - 1. PE Socket Fittings: ASTM D 2683.
 - 2. PE Butt-Fusion Fittings: ASTM D 3261.
- C. PE, Controlled ID Pipe: ASTM F 771 and ASTM D 2239; PE 3408 compound; **[SIDR 7]** **[SIDR 9]** **[SIDRs 9, 11.5, and 15]**.
 - 1. Insert Fittings for PE Pipe: ASTM D 2609, PA or PP. Include bands or other fasteners.

2.3 GENERAL-DUTY VALVES

- A. PVC Ball Valves: MSS SP-122, **[union]** **[nonunion]** type, with full-port ball, **[socket]** **[threaded]** **[socket or threaded]** detachable end connectors, and pressure rating not less than **[125 psig]** **[150 psig]** **<Insert other>**.
 - 1. Material Option: MSS SP-122, of plastic other than PVC and suitable for potable water. Include threaded ends and pressure rating not less than 150 psig, unless otherwise indicated.
 - 2. Manufacturers:
 - a. American Valve, Inc.
 - b. Sloane, George Fischer.

2.4 SPECIALTY VALVES

- A. Plastic Automatic Control Valves: Molded-plastic body, normally closed, diaphragm type with manual flow adjustment, and operated by 24-V ac solenoid.
 - 1. Manufacturers:
 - a. Nelson, L. R. Corporation.
 - b. Rain Bird Sprinkler Mfg. Corp.
 - c. Toro Company (The); Irrigation Div.
- B. Automatic Drain Valves: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig.
- C. Quick-Couplers: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
- D. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch minimum to 3 inches maximum.

2.5 SPRINKLERS

- A. Description: Brass or plastic housing and corrosion-resistant interior parts designed for uniform coverage over entire spray area indicated, at available water pressure.
 - 1. Manufacturers:
 - a. Hunter Industries Incorporated.
 - b. Nelson, L. R. Corporation.
 - c. Rain Bird Sprinkler Mfg. Corp.
 - d. Toro Company (The); Irrigation Div.
 - 2. Flush, Surface Sprinklers: Fixed pattern, with screw-type flow adjustment.
 - 3. Bubblers: Fixed pattern, with screw-type flow adjustment.
 - 4. Shrubbery Sprinklers: Fixed pattern, with screw-type flow adjustment.
 - 5. Pop-up, Spray Sprinklers: Fixed pattern, with screw-type flow adjustment and stainless-steel retraction spring.
 - 6. Pop-up, Rotary, Spray Sprinklers: Gear drive, full-circle and adjustable part-circle types.
 - 7. Pop-up, Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.
 - 8. Aboveground, Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.

2.6 SPRINKLER SPECIALTIES

- A. Strainer/Filter Units: Brass or plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.

- B. Emitters: PE or vinyl body.
 - 1. Manufacturers:
 - a. Agrifim.
 - b. Amiad Filtration Systems.
 - c. Netafim USA.
 - d. NIBCO INC.
 - e. Rain Bird Sprinkler Mfg. Corp.
 - f. Toro Company (The); Irrigation Div.
 - 2. Single-Outlet Emitters: To deliver the following flow at approximately 20 psig:
 - a. Flow: 1/2 gph.
 - b. Tubing Size: 1/8-inch minimum ID and 10 feet long.
 - 3. Outlet Caps: Plastic, for outlets without tubing.
- C. Drip Tubes: NPS 1/2, flexible PE or PVC tubing for emitters and other devices, of length indicated and with plugged end.
 - 1. Manufacturers:
 - a. Netafim USA.
 - b. NIBCO INC.
 - c. Rain Bird Sprinkler Mfg. Corp.

2.7 AUTOMATIC-CONTROL SYSTEM

- A. Manufacturers:
 - 1. Nelson, L. R. Corporation.
 - 2. Rain Bird Sprinkler Mfg. Corp.
 - 3. Toro Company (The); Irrigation Div.
- B. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
 - 1. Material: Enameled-steel, sheet metal.
 - 2. Mounting: As indicated..
- C. Interior Control Enclosures: NEMA 250, Type 12, dripproof, with locking cover and two matching keys.
 - 1. Material: Enameled-steel, sheet metal.
 - 2. Mounting: As indicated.
- D. Control Transformer: 24-V secondary, with primary fuse.

- E. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 120 minutes. Include switch for manual or automatic operation of each station.
- F. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate 2 or more times daily.
 - 1. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
 - 2. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
- G. Wiring: UL 493, Type UF-B multiconductor, with solid-copper conductors and insulated cable; suitable for direct burial.
 - 1. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
 - 2. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
 - 3. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.
- B. Install warning tape directly above pressure piping, 12 inches below finished grades, except 6 inches below subgrade under pavement and slabs.
- C. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads.
- D. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches, to 12 inches below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
- E. Provide minimum cover over top of underground piping according to the following:
 - 1. Irrigation Main Piping: Minimum depth of **[36 inches]** <Insert other> below finished grade, or not less than **[18 inches]** <Insert other> below average local frost depth, whichever is deeper.
 - 2. Circuit Piping: **[12 inches]** <Insert other>.
 - 3. Drain Piping: **[12 inches]** <Insert other>.

4. Sleeves: **[24 inches]** <Insert other>.

3.2 PIPING APPLICATIONS

- A. Piping in control-valve boxes and aboveground may be joined with flanges instead of joints indicated.
- B. Underground Irrigation Main Piping: Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
- C. Circuit Piping: Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
- D. Drain Piping: Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
- E. Sleeves: Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
- F. Transition Fittings: Use transition fittings for plastic-to-metal pipe connections according to the following:
 1. Couplings:
 - a. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
 - b. Underground Piping NPS 2 and Larger: AWWA transition coupling.
 2. Fittings:
 - a. Underground Piping: Union with plastic end of same material as plastic piping.
 3. Transition fittings are specified in Division 2 Section "Piped Utilities -- Basic Materials and Methods".

3.3 VALVE APPLICATIONS

- A. Underground, Shutoff-Duty Valves: Use the following:
 1. NPS 2 and Smaller: Curb stop with tee head, curb-stop service box, and shutoff rod.
 2. NPS 3 and Larger: Gate valve with elastomeric gaskets and stem nut, valve box, and shutoff rod.
- B. Underground, Manual Control Valves: Bronze globe valve with control-valve box and valve key.
- C. Control Valves: Plastic ball valve.
- D. Drain Valves: Plastic ball valve.

3.4 INSTALLATION

- A. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install unions adjacent to valves and to final connections to other components.
- F. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- G. Underground Gate Valves: Install in valve box with top flush with grade.
 - 1. Install valves and PVC pipe with restrained, gasketed joints.
- H. Underground Curb Stops: Install in service box with top flush with grade.
- I. Underground, Manual Control Valves: Install in manual control-valve box.
- J. Control Valves: Install in control-valve box.
- K. Drain Valves: Install in control-valve box.
- L. Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.
- M. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries, unless otherwise indicated.
- N. Install freestanding controllers on precast concrete bases not less than 36 by 24 by 4 inches thick, and not less than 6 inches greater in each direction than overall dimensions of controller.
- O. Install control cable in same trench as irrigation piping and at least 2 inches below[**or beside**] piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas if irrigation piping is installed in sleeve.

3.5 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding".
- B. Connect wiring according to Division 16 Section "Conductors and Cables".

3.6 LABELING AND IDENTIFYING

- A. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tape over underground piping, during backfilling of trenches.
- B. Refer to Division 2 Section "Earthwork" for warning tapes.

3.7 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace units and retest as specified above.

3.8 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers so they will be flush with, or not more than 1/2 inch above, finish grade.

END OF SECTION 02810
CVS 9/00

SECTION 02821 - CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized steel chain-link fabric.
 - 2. Galvanized steel framework.
 - 3. Privacy slats.
 - 4. Gate operator.

1.3 DEFINITIONS

- A. CLFMI: Chain Link Fence Manufacturers Institute.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Chain-Link Fences and Gates: Obtain each grade, finish, type, and variety of component for chain-link fences and gates from one source with resources to provide chain-link fences and gates of consistent quality in appearance and physical properties.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Privacy decorative slatting chain link fence.
 - a. PDS Fence Products.

2.2 CHAIN-LINK FENCE FABRIC

- A. Steel Chain-Link Fence Fabric: Height indicated on Drawings. Provide fabric fabricated in one-piece widths for fencing in height of 8 feet and less. Comply with CLFMI's "Product Manual" and with requirements indicated below:
1. Mesh and Wire Size: 2-inch mesh, 9 ga. diameter.
 2. Zinc-Coated Fabric: ASTM A 392, with zinc coating applied to steel wire before weaving according to ASTM A 817, Type II, zinc coated (galvanized) with the following minimum coating weight:
 - a. Class 1: Not less than 1.2 oz./sq. ft. of uncoated wire surface.

2.3 INDUSTRIAL FENCE FRAMING

- A. Round Steel Pipe: Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc; and the following strength and stiffness requirements:
1. Line, End, Corner, and Pull Posts and Top Rail: Per requirements for Light Industrial Fence.
- B. Post Brace Rails: Match top rail for coating and strength and stiffness requirements. Provide brace rail with truss rod assembly for each gate, end, and pull post. Provide two brace rails extending in opposing directions, each with truss rod assembly, for each corner post and for pull posts. Provide rail ends and clamps for attaching rails to posts.
- C. Top Rails: Fabricate top rail from lengths 21 feet or longer, with swaged-end or fabricated for expansion-type coupling, forming a continuous rail along top of chain-link fabric.
- D. Intermediate Rails: Match top rail for coating and strength and stiffness requirements.

2.4 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations:
 - 1. Location: Extended along bottom of fence fabric.
- B. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire complying with ASTM A 824 and the following:
 - 1. Coating: Type II, zinc coated (galvanized) by the hot-dip process, with the following minimum coating weight:
 - a. Class 1: Not less than 0.8 oz./sq. ft. of uncoated wire surface.

2.5 INDUSTRIAL SWING GATES

- A. General: Comply with ASTM F 900 for the following swing-gate types:
 - 1. Single gate.
 - 2. Double gate.
- B. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1083 and ASTM F 1043 for materials and protective coatings.
- C. Frames and Bracing: Fabricate members from round galvanized steel tubing with outside dimension and weight according to ASTM F 900 for the following gate fabric height:
 - 1. Gate Fabric Height: More than 6 feet.
- D. Frame Corner Construction: As follows:
 - 1. Welded.
- E. Gate Posts: Fabricate members from round galvanized steel pipe with outside dimension and weight according to ASTM F 900 for the following gate fabric heights and leaf widths:
- F. Hardware: Latches permitting operation from both sides of gate, hinges, center gate stops and, for each gate leaf more than 5 feet wide, keepers. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.6 FITTINGS

- A. General: Provide fittings for a complete fence installation, including special fittings for corners. Comply with ASTM F 626.
- B. Post and Line Caps: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide weathertight closure cap for each post.

- C. Rail and Brace Ends: Hot-dip galvanized pressed steel or hot-dip galvanized cast iron. Provide rail ends or other means for attaching rails securely to each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Hot-dip galvanized pressed steel or round steel tubing. Not less than 6 inches long.
 - 2. Rail Clamps: Hot-dip galvanized pressed steel. Provide line and corner boulevard clamps for connecting intermediate rails in the fence line to line posts.
- E. Tension and Brace Bands: Hot-dip galvanized pressed steel.
- F. Tension Bars: Hot-dip galvanized steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Hot-dip galvanized steel rod and turnbuckle or other means of adjustment.
- H. Tie Wires, Clips, and Fasteners: Provide the following types according to ASTM F 626:
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch- diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.
 - 2. Round Wire Clips: Hot-dip galvanized steel for attaching chain-link fabric to H-beam posts.
 - 3. Round Wire Hog Rings: Hot-dip galvanized steel or aluminum for attaching chain-link fabric to horizontal tension wires.

2.7 PRIVACY SLATS

- A. Material: PVC, UV-light stabilized, not less than 0.023 inch thick, sized to fit mesh specified for direction indicated.
- B. Color: To match building brick.

2.8 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance.
 - 1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
 - 1. Install fencing on established boundary lines inside property line.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
- C. Post Setting: Hand-excavate holes for post foundations in firm, undisturbed or compacted soil. Set posts in concrete footing. Protect portion of posts aboveground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Using mechanical devices to set line posts per ASTM F 567 is permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.
 - 1. Dimensions and Profile: As indicated on Drawings.
 - 2. Exposed Concrete Footings: Extend concrete 2 inches above grade, smooth, and shape to shed water.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings.
- B. Line Posts: Space line posts uniformly at 8 feet o.c.
- C. Post Bracing Assemblies: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail. Install so posts are plumb when diagonal rod is under proper tension.
- D. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.
 - 1. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same gage and type of wire.
- E. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
- F. Intermediate Rails: Install in one piece at post-height center span, spanning between posts, using fittings, special offset fittings, and accessories.
- G. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- H. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- I. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to braces 24 inches o.c.
- J. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

- K. Privacy Slats: Install slats in direction indicated, securely locked in place.
 - 1. Diagonally, for privacy factor of 80 to 85 .

3.5 GATE INSTALLATION

- A. General: Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 02821

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SECTION 02870 – SITE AND STREET FURNISHINGS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes outdoor trash receptacle and recycle container.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide outdoor trash receptacle and recycle container as manufactured by Allied Fiberglass at (800) 226-3072 or approved equal.

0.2 COMPONENTS

- A. Outdoor Trash/Ash Hide-A-Butt Receptacle shall have the following features:

1. Model No.: SLC-2648 STD HAB
2. Size: 26"x26"x48"
3. Trash capacity: 45 gallons
4. Material: Aggregate fiberglass composite.
5. Weight: 150 lbs.
6. All hardware: to be stainless steel.
7. Trash Liner: Poly rigid liner with UL94HB rating.
8. Side door access for trash liner with positive lock system.
9. 4 side entry trash openings that are 6.25"x.17"
10. Hide a butt ash urn with flip top that keeps rain out and butts hidden.
11. Color: Greystone

- B. Recycle Container (Only in Rhode Island) shall have the following features:

1. Model No.: 11R-361832
2. Size: 36"x18"x32"
3. Material: ABS plastic.
4. Weight: 75 lbs.
5. Color: PD-8 Dove Gray

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install outdoor trash receptacle and recycle container at building entrance in location selected by CVS project manager.

0.2 CLEANING

- A. Clean all surfaces of the outdoor trash receptacle and recycle container. Exercise care to avoid damage to the finish.

0.3 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, outdoor trash receptacle and recycle container will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 02870

SECTION 02920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes **seeding and sodding**.
- B. Verify with CVS Project Manager on which method to be used.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding."

PART 2 - PRODUCTS

2.1 SEED

- A. Seed Species: State-certified seed of grass species, as follows:
1. Full Sun: **<Insert species.>**
 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. **<Insert percentage>** percent **<Insert species.>**.
 - b. **<Insert percentage>** percent **<Insert species.>**.
 - c. **<Insert percentage>** percent **<Insert species.>**.
 3. Shade: Proportioned by weight as follows:
 - a. **<Insert percentage>** percent **<Insert species.>**.
 - b. **<Insert percentage>** percent **<Insert species.>**.
 - c. **<Insert percentage>** percent **<Insert species.>**.

2.2 TURFGRASS SOD

- A. Turfgrass Sod: Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: **<Insert species.>**
- C. Turfgrass Species: Sod of grass species as follows:
1. Full Sun: **<Insert species.>**
 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. **<Insert percentage>** percent **<Insert species.>**.
 - b. **<Insert percentage>** percent **<Insert species.>**.
 - c. **<Insert percentage>** percent **<Insert species.>**.
 3. Shade: Proportioned by weight as follows:
 - a. **<Insert percentage>** percent **<Insert species.>**.
 - b. **<Insert percentage>** percent **<Insert species.>**.
 - c. **<Insert percentage>** percent **<Insert species.>**.

2.3 PLANTING MATERIALS

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Import topsoil from either of the following sources:
1. Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Verify suitability of stockpiled surface soil to produce topsoil.
 2. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources.
- B. Inorganic Soil Amendments:
1. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
 2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.
- C. Organic Soil Amendments
1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8.
 2. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with pH range of 3.4 to 4.8.
 3. Peat: Finely divided or granular texture, with pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having water-absorbing capacity of 1100 to 2000 percent.
 4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- D. Fertilizer:
1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.
 2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
 3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soils reports from qualified testing agency.

4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soils reports form qualified testing agency.

E. Mulches:

1. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
2. Peat Mulch: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with pH range of 3.4 to 4.8.
3. Peat Mulch: Finely divided or granular texture, with pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having water-absorbing capacity of 1100 to 2000 percent.
4. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8.

2.4 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the following soil amendments **[and fertilizers]** in the following quantities:
 1. Ratio of Loose Compost to Topsoil by Volume: **[1:4] [1:3] [1:2] <Insert ratio.>**
 2. Ratio of Loose Peat to Topsoil by Volume: **<Insert ratio.>**
 3. Ratio of Loose Wood Derivatives to Topsoil by Volume: **<Insert ratio.>**
 4. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**
 5. Weight of Sulfur per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**
 6. Weight of Bonemeal per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**
 7. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**
 8. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**
 9. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): **<Insert weight.>**

PART 3 - EXECUTION

3.1 LAWN PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 1. Apply superphosphate fertilizer directly to subgrade before loosening.
 2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

3. Spread planting soil mix to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least of 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches (150 mm) of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.2 SEEDING

- A. Sow seed at the rate of [2 lb/1000 sq. ft. (0.9 kg/92.9 sq. m)] [3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m)] [5 to 8 lb/1000 sq. ft. (2.3 to 3.6 kg/92.9 sq. m)] <Insert rate>.
- B. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.
- C. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.
- D. Protect seeded areas from hot, dry weather or drying winds by applying peat mulch within 24 hours after completing seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) and roll to a smooth surface.

3.3 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across angle of slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.4 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding **[90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm)]** <Insert coverage>.
- B. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.
- C. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

END OF SECTION 02920

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SECTION 02930 - EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Trees.
 - 2. Shrubs.
 - 3. Ground cover.
 - 4. Plants.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer who maintains an experienced full-time supervisor on Project site when exterior planting is in progress.
- B. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
- B. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.

1.6 WARRANTY

- A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
 - 1. Warranty Period for Trees and Shrubs: One year from date of Substantial Completion.
 - 2. Warranty Period for Ground Cover and Plants: Six months from date of Substantial Completion.

1.7 MAINTENANCE

- A. Trees and Shrubs: Maintain during warranty period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease.
- B. Ground Cover and Plants: Maintain during warranty period by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings.

PART 2 - PRODUCTS

2.1 EXTERIOR PLANTS

- A. Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Provide balled and burlapped trees and shrubs.

- B. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.
- C. Annuals: Provide healthy, disease-free plants of species and variety shown or listed. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.
- D. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.

2.2 PLANTING MATERIALS

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 5 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Import topsoil from either of the following sources:
 - 1. Topsoil Source: Reuse surface soil stockpiled on-site and supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Verify suitability of stockpiled surface soil to produce topsoil.
 - 2. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources.
- B. Inorganic Soil Amendments:
 - 1. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
 - 2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.
- C. Organic Soil Amendments:
 - 1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve.
 - 2. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.
 - 3. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
 - 4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- D. Fertilizer:
 - 1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soils reports from qualified testing agency.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soils reports from qualified testing agency.

E. Mulches:

1. Organic Mulch: Shredded hardwood, ground or shredded bark, wood and bark chips or pine needles.
2. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve.

F. Weed-Control Barriers:

1. Nonwoven Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum.

PART 3 - EXECUTION

3.1 EXTERIOR PLANTING

A. Bed Establishment:

1. Loosen subgrade of planting beds to a minimum depth of 8 inches.
2. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
3. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
4. Spread planting soil mix to a depth of 8 inches but not less than required to meet finish grades after natural settlement, unless otherwise indicated. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
5. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

B. Trees and Shrubs:

1. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation. Excavate approximately three times as wide as ball diameter.
2. Set trees and shrubs plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
 - a. Balled and Burlapped: Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - b. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
3. Organic Mulching: Apply 4-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.

C. Tree and Shrub Pruning: Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

D. Ground Cover and Plant Planting:

1. Set out and space ground cover and plants as indicated.
2. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
3. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
4. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
5. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

E. Planting Bed Mulching:

1. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches.
2. Mulch backfilled surfaces of planting beds and other areas indicated. Apply 3-inch average thickness of mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

F. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

- G. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02930
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DIVISION 3

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SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the various classes of concrete.
- B. Class Application $f'c$ Exposure
 - 1. Footings and Foundation walls; exposed to moderate sulfate, no exposure.
 - 2. Interior slabs on grade, no exposure.
 - 3. Exterior walks and slabs; exposed to freeze-thaw, deicing chemicals, and moderate sulfate, no exposure.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix, include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Concrete Mix Data:
 - 1. Submit field or laboratory test records used to document that proposed mixture will achieve the required average compressive strength for each class of concrete.
 - 2. Specified compressive strength, $f'c$
 - 3. Average compressive strength of proposed mixture(s), $f'cr$
 - 4. Documentation of strength test results of similar concrete mixtures indicating the standard deviation in accordance with ACI 318
 - 5. Slump
 - 6. Air content
 - 7. Density
 - 8. w/cm ratio
 - 9. Maximum aggregate size
 - 10. Sources and designations of ingredient materials proposed for use.

11. Submit delivery ticket for each batch of concrete delivered to the jobsite in accordance with ASTM C 94 and indicate:
 - a. The maximum quantity of jobsite water addition permitted.
 - b. Document the actual amount water added at the jobsite with initials of the person requesting the addition.
 12. Indicate amounts of mix water to be withheld for later addition at Project site.
- D. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- E. Welding Certificates: Copies of certificates for welding procedures and personnel.
- F. Material Test Reports:
1. Cementitious materials and aggregates.
 2. Admixtures.
 3. Curing materials.
 4. Floor and slab treatments.
 5. Vapor retarders.

1.4 QUALITY ASSURANCE

- A. Installer shall employ an on-site supervisor of the finishing crew who is qualified as ACI Certified Concrete Flatwork Technician or equivalent. Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be certified as ACI Concrete Field Testing Technician Grade I or equivalent.

2. Personnel conducting laboratory tests shall be certified as ACI Concrete Strength Testing Technician or ACI Concrete Laboratory Testing Technician – Grade I or equivalent.
 3. Test results for the purpose of acceptance shall be certified by a Registered Professional Engineer employed with the Testing Agency.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. Tolerances: Comply with the following, unless more stringent provisions are indicated:
1. ACI 301, "Specifications for Structural Concrete."
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Coordinate all foundation penetrations with Architect, plumbing, mechanical, electrical contractors and local agencies.
- H. Pre Installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including:
 - a. Architect
 - b. Structural Engineer
 - c. Contractor
 - d. Concrete Contractor
 - e. Pumping Contractor
 - f. Ready-mix concrete producer
 - g. Independent testing agency

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Prefabricated Forms (Void Forms):
1. Wall/Grade Beam and Structural Slab Void Forms: (for structurally suspended slabs only)

- a. Function: Create void space directly under grade beams, structural slabs or walls.
 - b. Composition: Corrugated paper material with a moisture resistant exterior and having an interior fabrication of a uniform, cellular configuration composed of non-wax impregnated components.
 - c. Depth: As indicated on the drawings.
 - d. Profile: Provide trapezoidal, Trapvoid form.
 - e. Strength: Forms must be capable of sustaining a working load of 1,600 psf.
 - f. Accessories: Seam pads to eliminate concrete flow in void forms and end caps to seal off void form end.
 - g. Acceptable Manufacturer: Trapvoid, seam pads and end caps as manufactured by Sure Void Products, Inc., Englewood, Co., phone (800) 458-5444.
2. Void Forms at Entry Paving: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, assembled with clips.
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: use materials meeting the following requirements with limitations specified in Section 2 "Concrete Mixtures."
 1. Cement: ASTM C 150 or ASTM C 1157 or ASTM C 595
 2. Fly Ash: ASTM C 618, Type C.
 3. Ground Granulated Blast-Furnace Slag: ASTM C 989
 4. Silica Fume: ASTM C 1240

- B. Normal weight Aggregate: ASTM C 33
- C. Water: ASTM C 1602
- D. Admixtures:
 - 1. Air-Entraining Admixtures: ASTM C 260.
 - 2. Water-Reducing Admixture: ASTM C 494, Type A.
 - 3. Retarding Admixture: ASTM C 494, Type B.
 - 4. Accelerating Admixtures: ASTM C 494, Type C (non chloride).
 - 5. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 6. Water-Reducing and Accelerating Admixtures: ASTM C 494, Type E.
 - 7. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 8. Plasticizing Admixture: ASTM C 1017, Type I
 - 9. Plasticizing and Retarding Admixture: ASTM C 1017, Type II
 - 10. Other admixtures for specific use with the permission of the design professional

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Fibrillated Fibers:
 - a. Fibrasol F; Axim Concrete Technologies.
 - b. Fibermesh; Fibermesh, Div. of Synthetic Industries.
 - c. Forta; Forta Corporation.
 - d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Volclay Waterstop-RX; Colloid Environmental Technologies Co.
 - b. Conseal CS-231; Concrete Sealants Inc.
 - c. Swellseal Joint; De Neef Construction Chemicals (U.S.) Inc.
 - d. Hydrotite; Greenstreak.
 - e. Mirastop; Mirafi Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
 - f. Adeka Ultra Seal; Mitsubishi International Corporation.
 - g. Superstop; Progress Unlimited Inc.

2.7 VAPOR RETARDERS

- A. Vapor Retarder: ASTM E 1745, Class A with a water vapor transmission rate of 0.012 perms or less as tested by ASTM E 96, not less than 10 mils thick.

2.8 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A; 25 percent solids minimum.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 22 percent solids.
- F. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Cimfilm; Axim Concrete Technologies.
 - b. Finishing Aid Concentrate; Burke Group, LLC (The).
 - c. Spray-Film; ChemMasters.
 - d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - e. Sure Film; Dayton Superior Corporation.
 - f. Eucobar; Euclid Chemical Co.
 - g. Vapor Aid; Kaufman Products, Inc.
 - h. Lambco Skin; Lambert Corporation.
 - i. E-Con; L&M Construction Chemicals, Inc.
 - j. Confilm; Master Builders, Inc.
 - k. Waterhold; Metalcrete Industries.
 - l. Rich Film; Richmond Screw Anchor Co.
 - m. SikaFilm; Sika Corporation.
 - n. Finishing Aid; Symons Corporation.
 - o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
 - 2. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
 - a. Cureseal 1315 WB; Burke by Edoco,
 - b. Sealcure 1315 WB; Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company
 - c. Super Diamond Clear VOX; Euclid Chemical Company
 - d. Lumiseal WB Plus; L&M Construction Chemicals
 - e. Vexcon Starseal 1315; Vexcon Chemicals, Inc."

2.9 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.10 CONCRETE MIXES

- A. Prepare design mixtures for each class of concrete on the basis of laboratory trial mixtures or field test data, or both according to ACI 318, Chapter 5. Design mixtures shall meet the following requirements.

1. Class 1 (Footings and foundation walls, exposed to moderate sulfate):
 - a. Specified Compressive Strength: As noted on structural drawing.
 - b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
 - c. Cement: ASTM C 150 Type II or ASTM C 595 (MS designation).
 - d. Maximum w/cm: 0.50
 - e. Admixtures: no calcium chloride containing admixtures

2. Class 1 (Footings and foundations walls, no exposure):
 - a. Specified Compressive Strength: As noted on structural drawing.
 - b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.

3. Class 2 (Interior Slabs on Grade, no exposure):
 - a. Specified compressive strength: As noted on structural drawing.
 - b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
 - c. Non air entrained. Air content shall not exceed 3%.

4. Class 3 (Exterior walks and slabs, exposed to freeze-thaw, deicing chemicals, and moderate sulfate):
 - a. Specified Compressive Strength: As noted on structural drawing.
 - b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.
 - c. Air content: 5.5% +/- 1.5% or adjusted for max aggregate size from ACI 211.1
 - d. Cement: ASTM C 150, Type II, ASTM C 1157 Type MS, or ASTM C 595 (MS designation)
 - e. As appropriate, the following limits shall be complied with:
 - 1) Fly Ash: Maximum 25% by weight
 - 2) Slag: Maximum 50% by weight

- 3) Silica Fume: Maximum 10% by weight
- 4) Total of fly ash, slag, and silica fume: Maximum 50% by weight
- 5) Total of fly ash and silica fume: Maximum 35% by weight

- 6) Maximum w/cm: 0.45
- 7) Admixtures: no calcium chloride containing admixtures

5. Class 3 (Exterior walks and slabs, no exposure):

- a) Specified Compressive Strength: As noted on structural drawing.
- b. Nominal maximum aggregate size: 1-1/2 in. Smaller size maximum aggregate may be used.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.
2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.
 - 1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless:
 - 1. Batch ticket indicates an amount of mixing water that was withheld for later addition at Project site.
 - 2. Addition of water at Project site must be certified by the Testing Agency that the maximum water/cement ratio per the approved mix design is not exceeded.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, or another thin film-finish coating system
 2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.
 3. Finish and measure surface so gap at any point between concrete surface and an unlevelled freestanding 10-foot- long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following:
 - a. 1/4 inch.
 - b. 3/16 inch.
 - c. 1/8 inch.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- C. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 Cu. Yd. or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 - 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
 - 5. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
 - a. Test two field-cured specimens at 7 days and two at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- D. When the average strength of two cylinders tested at 7 days is less than 70 percent of the specified compressive strength the contractor shall evaluate mix designs and construction procedures and make appropriate adjustments to assure strength requirements are met at 28 days for subsequent concrete work.
- E. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests conducted at 28 days equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

- F. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

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DIVISION 4

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 04810 – UNIT MASONRY ASSEMBLIES – Face Brick.

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SECTION 04200

UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete masonry units for single wythe and cavity wall construction.
- B. Face brick units for cavity wall construction.
- C. Mortar for masonry units.
- D. Reinforcement, anchorage and accessories.
- E. Masonry flashings.
- F. Masonry sealer coating.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 05500 - Metal Fabrications: Placement of loose steel lintels.

1.03 RELATED SECTIONS

- A. Section 01020 - Allowances: Cash Allowances.
- B. Section 07100 – Waterproofing and Dampproofing: Application of dampproofing at cavity wall construction.
- C. Section 07900 - Joint Sealers: Rod and sealant at control joints.

1.04 REFERENCES

- A. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- B. ANSI/ASTM C652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- E. ASTM B370 - Copper Sheet and Strip for Building Construction.
- F. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- G. ASTM C145 - Solid Load Bearing Concrete Masonry Units.
- H. ASTM C144 - Aggregate for Masonry Mortar.
- I. ASTM C150 - Portland Cement.
- J. ASTM C207 - Hydrated Lime for Masonry Purposes.

- K. ASTM C270 - Mortar for Unit Masonry.
- L. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
- M. ASTM C404 - Aggregates for Masonry Grout.
- N. ASTM C476 - Grout for Masonry.
- O. ASTM C780 – Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- P. ASTM C1019 - Method of Sampling and Testing Grout.
- Q. ANSI/ASTM C73 - Calcium Silicate Face Brick (Sand-Lime Brick).
- R. ANSI/ASTM C126 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
- S. ANSI/ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- T. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- U. UL - Underwriters' Laboratories.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit samples under provisions of Section 01340.
- C. Submit four samples of face brick units to illustrate color, texture and extremes of color range.
- D. Include mortar design mix; indicate Proportion or Property method used, required environmental conditions and admixture limitations.
- E. Samples: Submit two ribbons of mortar color, illustrating color and color range.
- F. Submit manufacturer's certificate under provisions of Section 01340 that products meet or exceed specified requirements.

1.06 QUALIFICATIONS

- A. Installer: Company specializing in performing the work of this Section with minimum **five** years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements for masonry construction.

1.08 MOCK-UP

- A. Provide mock-up of face brick masonry under provisions of Section 01400.**
 - B. Erect face brick to 4 x 4 feet panel size, include specified mortar and accessories.
 - C. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may not remain as
- BKA Architects, Inc. 04200-2 Project # 209017

part of the Work.

1.09 PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing work of this Section.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Accept face brick units on site. Inspect for damage.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Strictly comply with recommendations of the International Masonry Industry All-Weather Council – Recommended Practices and Guide Specifications for Cold (Hot) Weather Masonry Construction; the Brick Institute of America – Technical Notes on Brick Construction, Parts 1, 2 and 3; The Portland Cement Assoc.

1.12 SEQUENCE AND SCHEDULING

- A. Coordinate work under provisions of Section 01040.
- B. Coordinate the masonry work with brick veneer and installation of window anchors.

PART 2 PRODUCTS

2.01 MANUFACTURERS – CONCRETE MASONRY UNITS

- A. Park Avenue Cement Block Company.
- B. Substitutions: Under provisions of Section 01600.

2.02 CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Block Units: ASTM C90, Grade N, Type I - Moisture Controlled; normal weight.
- B. Veneer Block Units: ASTM C145, Grade N-1; Architectural split face, natural color.
- C. Masonry Units: Nominal modular sizes of 4 x 16 x 8 inches, 6 x 16 x 8 inches, and 8 x 16 x 8 inches. Provide special units for 90 degree corners, bond beams, lintels and control joints.

2.03 MANUFACTURERS – FACE BRICK UNITS

- A. Glen-Gery Brick.
- B. Spaulding Brick Company of Rhode Island.
- C. Belden Brick Company.

- D. Substitutions: Under provisions of Section 01600.

2.04 FACE BRICK UNITS

A. See Section 04233 – Calcium Silicate Building Stone.

2.05 MORTAR MATERIALS – CONCRETE MASONRY UNITS

- A. Portland Cement: ASTM C150, Type I.
- B. Aggregates: ASTM C144, standard masonry type; clean, dry, protected against dampness, freezing and foreign matter.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Water: Clean and free from injurious amounts of oil, alkali, organic matter or other deleterious material.
- E. Use no admixtures unless written approval is obtained from Architect.
- F. Color: As selected by Architect.

2.06 MORTAR MIXES – CONCRETE MASONRY UNITS

- A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S, using the Property Method, 1800 psi compressive strength.
- B. Mortar for Reinforced Masonry; ASTM C270, Type S using the Property Method, 1800 psi compressive strength.

2.07 GROUT MIXES

- A. Grout: ASTM C476; consistency which will completely fill all spaces intended to receive grout.
- B. Bond Beams and Lintels: 3,000 psi strength at 28 days; 7-8 inches slump; premixed type in accordance with ASTM C94 or mixed in accordance with ASTM C476, fine and course grout.
- C. Engineered Masonry: 3,000 psi strength at 28 days; 7- 8 inches slump; premixed type in accordance with ASTM C94 or mixed in accordance with ASTM C476, fine and course grout.

2.08 MORTAR MATERIALS – FACE BRICK UNITS

- A. Portland Cement: ASTM C150, Type I, white color.
- B. Mortar Aggregate: ASTM C144, Standard Masonry Type.
- C. Hydrated Lime: ASTM C207, Type N.
- D. Water: Clean and potable.

2.09 MORTAR MIXES – FACE BRICK UNITS

- A. Mortar for Reinforced Masonry: ASTM C270, Type N, using the Property Method to achieve 750 psi strength.

2.10 MORTAR MIXING – FACE BRICK UNITS

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Add mortar color, if required, in accordance with manufacturer's instructions. Provide uniformity of mix and

coloration.

- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, retemper only within two hours of mixing.
- E. Use mortar within two hours after mixing at temperatures of 80 degrees F, or two-and-one-half hours at temperatures under 50 degrees F.

2.11 MORTAR COLOR – FACE BRICK UNITS

- A. Mortar Color: Mineral oxide pigment; color as selected by Architect.

2.12 ADMIXTURES

- A. The use of air entraining, antifreeze compounds or calcium chloride admixtures or other substances is not allowed.

2.13 REINFORCEMENT AND ANCHORAGE

- A. CMU: Truss type, welded wire units fabricated from 9 gage ASTM A82 cold-drawn galvanized steel wire with deformed side wire and smooth cross wire; Space reinforcing at 16" on center vertically maximum. Provide one side rod for each concrete masonry shell face.
- B. CMU AND BRICK VENEER: Composite wall ties with two legged, galvanized steel adjustable eye and pintle type units with minimum 3/16" wire diameter; Spaced anchors at 16" on center horizontally and at 16" on center vertically.
- C. Joint Stabilizing Anchors: To connect new masonry walls to existing masonry walls at vertical control joints; Cold-drawn steel; hot dip galvanized; spaced at 16" on center vertically; "D/A 2200," manufactured by Dur-O-Wall, Inc."
- D. Reinforcing Steel: ASTM A615, 60 ksi 276, 414, 517 MpA yield grade, deformed billet bars, unprotected finish..
- E. Substitutions: Under provisions of Section 01600.

2.14 MASONRY FLASHINGS

- A. Membrane Flashings: Grace Construction Products, Inc. –"Perm-A-Barrier" self-sealing, self-healing, fully adhered wall flashing; 32 Mil thick, pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8 mil thick, high density 4 ply cross laminated fill; 40 mil overall thickness.
- B. Substitutions: Under provisions of Section 01600.

2.15 ACCESSORIES

- A. Preformed Control Joints: Neoprene material conforming to ASTM D1056, Class RE41; provide with heat fused joints; thickness as required to suit masonry condition; manufactured by "AA Wire Products Company".
- B. Weep Holes: Preformed plastic tubes.
- C. CLEANING SOLUTIONS: ProSoCo, Inc. "SureKlean 600" detergent masonry cleaner; Non-acidic, not harmful to masonry work or adjacent materials.
- D. Substitutions: Under provisions of Section 01600.

2.16 MASONRY SEALER COATING

- A. Sealer Coating: ProSoCo, Inc. "Sure Klean" products.
 - 1. "Sure Klean Weather Seal": For use on brick veneer surfaces.
 - 2. "Sure Klean Blok-Guard"; For use on CMU veneer surfaces.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

- A. Establish lines, levels and coursing indicated; protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.
- D. Lay brick units in running bond. Course three brick units and three mortar joints equal to 8 inches. Form concave mortar joints.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head, bed and collar joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering courses of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as Work progresses.
- E. Interlock intersections and external corners.
- F. Prior to laying, wet brick having an I.R.A. greater than 25 GR/Min/30In.

- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where insulation bitumen dampproofing is applied.

3.05 WEEPS

- A. Install weep holes in brick veneer at 32 inches on center horizontally above through-wall flashing, above shelf angles and at bottom of walls.

3.06 CAVITY WALL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes.

3.07 REINFORCEMENT AND ANCHORAGES – SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches oc.
- B. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.
- E. Reinforce joint corners and intersections with prefabricated corner pieces 16 inches oc.

3.08 REINFORCEMENT AND ANCHORAGES – CAVITY WALL VENEER MASONRY

- A. Install veneer anchors at 16" on center horizontally and 16" on center vertically; at one course above all openings, extending three feet beyond each side of opening; and within 8 inches of corners and abutting masonry veneer.

3.09 MASONRY THROUGH-WALL FLASHINGS

- A. Install through wall flashing on top of masonry base course or at locations shown on the Drawings. Terminate flashing at top by extending up and behind sheathing as shown on the Drawings. Overlap adjacent pieces by 2" and roll all overlaps with a steel hand roller or blunt object..
- B. Trim bottom edge ½" back from exposed face of building. Apply a bead or trowel coat of bituthene mastic along termination's seams, cuts, penetrations and punctures.
- C. Fill cavity to depth of 8" with 3/8" pea stone.

3.10 LINTELS

- A. Install loose steel lintels over window openings and door openings as specified on the drawings.
- B. Install reinforced unit masonry lintels over openings as specified on the drawings.
- C. Openings up to 48 Inches Wide: Place two, No. 5 reinforcing bars 1 inch from bottom web, unless noted otherwise.

- D. Openings Over 48 Inches. Reinforce openings as detailed.
- F. Use single piece reinforcing bars only.
- G. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- H. Place and consolidate grout fill without displacing reinforcing.
- I. Allow masonry lintels to attain specified strength before removing temporary supports.
- J. Maintain minimum 8 inch bearing on each side of opening.

3.11 BITUMINOUS DAMPPROOFING

- A. Apply Bituminous dampproofing to face of concrete masonry backer units at cavity wall construction.

3.12 GROUTED COMPONENTS

- A. Reinforce bond beams as shown on drawings, placed 1 inch from bottom of web.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.
- C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03300.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1 1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

3.14 CONTROL JOINTS

- A. Do not continue horizontal joint reinforcement through control joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07900 for sealant performance.
- D. Provide control joints at 20 feet on center, maximum, unless noted otherwise.

3.15 BUILT-IN WORK

- A. As work progresses, build in metal door frames, window frames, wood nailing strips, anchor bolts, plates, lintels and other items furnished by other Sections.
- B. Build in items plumb and level.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build in organic materials subject to deterioration.

3.16 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- B. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- C. Maximum Variation From Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- F. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.17 CUTTING AND FITTING

- A. Cut and fit for concealed items as required. Coordinate with other Sections of Work to provide correct size, shape and location.
- B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.18 CLEANING

- A. Clean work under provisions of Section 01700.
- B. Remove excess mortar and mortar smears.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.
- F. Do not use strong acids for cleaning.

3.19 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 01500.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

3.20 SCHEDULES

- A. Exterior wall systems; Locations of wall types shown on drawings.

END OF SECTION 04200

SECTION 04800 - MASONRY ASSEMBLIES

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

PRODUCT DATA SHEET 0 - Provide unit masonry construction:

- 0.1 Concrete masonry non-bearing partitions.

SCHEDULE 1 - SUBMITTALS

PRODUCT DATA SHEET 0 - Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

PRODUCT DATA SHEET 1 - Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

- 1.1 Shop drawings shall be prepared and stamped by a qualified engineer licensed in the jurisdiction of the project.

PRODUCT DATA SHEET 2 - Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

SCHEDULE 2 - QUALITY ASSURANCE

PRODUCT DATA SHEET 0 - Fire Performance for Fire-Rated Brick and Concrete Block Assemblies: ASTM E 119.

PRODUCT DATA SHEET 1 - Testing: Independent Testing Laboratory.

PRODUCT DATA SHEET 2 - Mock-Ups: Provide mock-up as required to demonstrate quality of workmanship.

PRODUCT DATA SHEET 3 - Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

SCHEDULE 0 - MATERIALS

PRODUCT DATA SHEET 0 - Concrete Masonry Units: C-3 (3 hour rated CMU)

- 0.1 Concrete Masonry Units: ASTM C 90, 1500 f'm compressive strength:
 - A. Normal weight.
- 0.2 Size: Face dimension of 11-5/8 inches high by 15-5/8 inches long by width required for application.
- 0.3 Special Shapes: As required by building configuration.
- 0.4 Bond Pattern: Running Bond.

PRODUCT DATA SHEET 1 - Mortar and Grout for Brick and Concrete Masonry Unit Assemblies:

- 1.1 Mortar Mix: ASTM C 270, Type S, for reinforced masonry, masonry below grade and masonry in contact with earth and ASTM C 270, Type N, for above-grade loadbearing and nonloadbearing walls and parapet walls and for interior loadbearing and nonloadbearing partitions.
- 1.2 Mortar Materials: Portland cement, ASTM C 150, Type I or II.
- 1.3 Mortar Materials: Masonry cement, ASTM C 91.
- 1.4 Mortar Materials: Ready mixed, ASTM C 207, Type S.
- 1.5 Mortar Aggregate: Natural color, ASTM C 144.
- 1.6 Grout Aggregate: ASTM C 404.
- 1.7 Hydrated Lime: ASTM C 207, Type S.
- 1.8 Color: Natural color.

PRODUCT DATA SHEET 2 - Reinforcing Steel:

- 2.1 Reinforcing Bars: ASTM A 615, Grade 60.
- 2.2 Deformed Reinforcing Wire: ASTM A 496.
- 2.3 Welded Wire Fabric: ASTM A 185, plain.
- 2.4 Welded Wire Fabric: ASTM A 497, deformed.

PRODUCT DATA SHEET 3 - Reinforcing: Welded wire with deformed side rods.

- 3.1 Steel Wire: 9 gauge (.1875 inch) galvanized steel.
- 3.2 Type: Ladder type.

PRODUCT DATA SHEET 4 - Ties and Anchors:

- 4.1 Masonry to Steel Frame: Anchor with crimped wire anchor section for welding to steel.
- 4.2 Anchor Bolts: ASTM A 307, Grade A, galvanized.

PRODUCT DATA SHEET 5 - Masonry Accessories:

- 5.1 Nonmetallic expansion joint strips.
- 5.2 Preformed control joint gaskets.
- 5.3 Bond breaker strips.

PART 3 - EXECUTION**SCHEDULE 0 - INSTALLATION****PRODUCT DATA SHEET 0 - Installation of Masonry Assemblies:**

- 0.1 Comply with PCA Recommended Practices for Laying Concrete Block, Brick Institute of America BIA Tech Notes, and NCMA TEK Bulletins.
- 0.2 Comply with cold weather and warm weather protection procedures as recommended in BIA Tech Notes.
- 0.3 Provide fire-rated assemblies complying with ASTM E 119.
- 0.4 Sawcut units when required. Maintain uniform joint width. Provide full bed, head and collar joints except at weepholes.
- 0.5 Install lintels and accessories in masonry construction.
- 0.6 Coordinate installation of flashings.
- 0.7 Comply with applicable codes and regulations for spacing of ties and horizontal reinforcing.
- 0.8 Provide expansion and control joints in accordance with BIA and NCMA recommendations.
- 0.9 Remove and replace damaged units.
- 0.10 Clean brick using bucket and brush method, BIA Tech Note 20.
- 0.11 Clean concrete masonry by dry brushing, NCMA TEK No. 28.

END OF SECTION 04800

DIVISION 5

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SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes structural steel.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components, including connections, splices, holes, welds, and bolts.
- C. Mill certificates.
- D. Welding certificates.

1.3 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category I, conventional steel structures.
- B. Comply with applicable provisions in AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" and RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.4 STORAGE AND PROTECTION

- A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.
- B. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural-Steel W Shapes: ASTM A 992/A992 M.

- B. Structural-Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M, carbon steel.
- C. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B.
- D. Anchor Rods, Bolts, Nuts: **ASTM F 1554**, headed bolts, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
- E. Non-high-Strength Bolts, Nuts, and Washers: **ASTM F 1554**, carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated.
- F. High-Strength Bolts, Nuts, and Washers: **ASTM A 325**, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.
- G. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer.
- H. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.

2.2 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
 - 1. Comply with fabrication tolerance limits in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel and architectural exposed structural steel.
 - 2. Shop install and tighten non high-strength bolts, except where high-strength bolts are indicated.
 - 3. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - a. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
 - 4. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
- B. Shop Priming: Shop prime steel, except surfaces embedded in concrete or mortar, surfaces to be field welded, surfaces to be high-strength bolted with slip-critical connections, and surfaces to receive sprayed-on fireproofing.
 - 1. Surface Preparation: SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
 - 2. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than **1.5 mils**. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- C. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process according to ASTM A 123 to structural steel indicated to be galvanized.

2.3 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and to prepare test reports. Comply with Part 3 "Field Quality Control" Article.

PART 3 - EXECUTION

3.1 ERECTION

- A. Examination: Verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.
- B. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- C. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.
 - 1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.
- D. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- E. Install and tighten non high-strength bolts, except where high-strength bolts are indicated.
- F. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
- G. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

3.2 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Correct deficiencies in or remove and replace structural steel that test reports and inspections indicate do not comply with specified requirements.
 - 2. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
 - 3. High-strength bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 4. In addition to visual inspection, welded connections will be tested and inspected according to AWS D1.1 procedures.

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Open-web, K-series steel joists.
 - 2. KCS-type, open-web, K-series steel joists.
 - 3. Joist girders.

1.2 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
- C. Welding certificates.
- D. Mill certificates.
- E. Research/Evaluation Reports: Evidence of steel joists' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.
 - 1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
- B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for chord and web members.
- B. High-Strength Bolts and Nuts: **ASTM A 325**, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers; plain, uncoated.

2.2 PRIMERS

- A. Primer: SSPC-Paint 15, Type I, red oxide; FS TT-P-636, red oxide; or manufacturer's standard shop primer complying with performance requirements of either of these red-oxide primers.

2.3 STEEL JOISTS

- A. Manufacture steel joists according to SJI's "Specifications," with steel-angle top- and bottom-chord members, and as follows:
 - 1. Manufacture K-series and KCS-type K-series steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.4 JOIST GIRDERS

- A. Manufacture joist girders according to "Standard Specifications for Joist Girders," in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements indicated.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.5 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
- B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications."
- C. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.6 SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

- B. Apply 1 shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
- C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
- E. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "[**Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts**] [**Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts**]" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Field welds will be visually inspected according to AWS D1.1
- C. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
- D. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.3 REPAIRS AND PROTECTION

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, accessories, and abutting structural steel.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures joist and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05210

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. Non-composite form deck.

1.2 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
- C. Product certificates.
- D. Welding certificates.
- E. Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

PART 2 - PRODUCTS

2.1 NONCOMPOSITE FORM DECK

- A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 29, the minimum section properties indicated, and the following:
1. Galvanizing: ASTM A 525; G60, 0.60 oz./sq. ft.
 2. Profile Depth: 9/16 inch.
 3. Design Uncoated-Steel Thickness: 0.0179 inch.

2.2 ACCESSORIES

- A. Accessories: Steel deck manufacturer's standard accessory materials, including mechanical fasteners, closure strips, pour stops, and closures for deck.
- B. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.
- C. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, requirements in this Section and on Contract drawings.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work per deck manufacturers specifications.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
1. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

- G. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- H. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.
- I. Repairs and Protection:
 - 1. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

3.2 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B. Field welds will be subject to inspection.
- C. Remove and replace work that does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 REPAIRS AND PROTECTION

- A. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on surfaces of prime-painted deck immediately after installation, and apply repair paint.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing, curtain-wall framing.
2. All other light gage framing sizes and gages are as noted on construction documents and are to be installed per the manufacturer's requirements.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads without deflections greater than the following:

1. Exterior Non-Load-Bearing, Curtain-Wall Framing:

Horizontal deflection of **1/600** of the wall height where wall studs back up masonry veneers.

Horizontal deflection of **1/360** of the wall height where studs back up EIFS or wood siding veneers.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
- C. Mill certificates or test reports.
- D. Welder certificates.
- E. Research/evaluation reports.

1.4 QUALITY ASSURANCE

- A. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
- B. Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency.

- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied American Studco, Inc.
 - 2. Angeles Metal Systems.
 - 3. Clark Steel Framing Industries.
 - 4. Consolidated Fabricators Corp.
 - 5. Consolidated Systems, Inc.
 - 6. Dale Industries, Inc.
 - 7. Design Shapes in Steel.
 - 8. Dietrich Industries, Inc.
 - 9. Knorr Steel Framing Systems.
 - 10. MarinoWare; Div. of Ware Industries, Inc.
 - 11. Scafco Corp.
 - 12. Steel Construction Systems.
 - 13. Steel Developers, LLC.
 - 14. Steeler, Inc.
 - 15. Super Stud Building Products, Inc.
 - 16. Unimast, Inc.
 - 17. United Metal Products, Inc.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 653/A 653M, structural steel, G60 zinc coating, Grade 33 for minimum uncoated steel thickness of 0.0428 inch and less; Grade 50 for minimum uncoated steel thickness of 0.0538 inch and greater.
- B. Wall Framing: Manufacturer's standard steel studs, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:
 - 1. Depth: 6-inches
 - 2. Minimum Uncoated-Steel Thickness: 0.0428 inch. (18 gage)
 - 3. Flange Width: 1-5/8 inches.
 - 4. Section Properties: $S_x = 0.772 \text{ in}^3$ $I_x = 2.316 \text{ in}^4$ $M_x = 16,764 \text{ in-lb.}$

5. Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, complying with ASTM C 955, manufacturer's standard flange width except where noted as deflection track on the contract drawings. Minimum uncoated-steel thickness to match steel studs

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

- A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of **33,000 psi**, of manufacturer's standard thickness and configuration, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked, bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- F. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
- G. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- H. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- I. Thermal Insulation: ASTM C 665, Type I, unfaced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to ASTM C 1007, manufacturer's written recommendations, and requirements in this Section.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 3. Install framing members in one-piece lengths.

4. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed.
 5. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- B. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of **1/8 inch in 10 feet** and as follows:
1. Space individual framing members no more than plus or minus **1/8 inch** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- C. Non-Load-Bearing, Curtain-Wall Installation: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.
1. Isolate non-load-bearing steel framing from building structure with deflection track to prevent transfer of vertical loads while providing lateral support.
 2. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings but not more than **54 inches** apart. Fasten at each stud intersection.
 3. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.
- D. Joist Installation: Install, align, and securely anchor perimeter joist track sized to match joists as indicated on Shop Drawings. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of **1-1/2 inches**. Reinforce ends and bearing points of joists as indicated on Shop Drawings.
 2. Space joists not more than **2 inches** from abutting walls and at spacings indicated.
 3. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
 4. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated. Install web stiffeners to transfer axial loads of walls above.
 5. Install bridging at each end of joists and at intervals indicated. Fasten bridging at each joist intersection as indicated.
 6. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
 7. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

- E. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
 - 1. Field and shop welds will be subject to testing and inspection.
 - 2. Remove and replace Work that does not comply with specified requirements.
 - 3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

END OF SECTION 05400

SECTION 05440- PRE-ENGINEERED, PRE-FABRICATED COLD FORMED STEEL ROOF TRUSSES

PART I GENERAL

I.1 SUMMARY

- A. Section includes pre-engineered, pre-fabricated cold-formed steel framing elements. Work includes:
 - 1. Cold-Formed steel roof trusses.
 - 2. Anchorage, bracing and bridging.
- B. Related Sections
 - 1. Section 05310 – Metal Decking
 - 2. Section 05400 – Cold-Formed Steel Framing

I.2 REFERENCES

- A. Reference standards:
 - 1. ASTM:
 - a. ASTM A653/A653M-94 “Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Glavanealed) by the Hot Dip Process.”
 - b. ASTM A780-93a “Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.”
 - 2. American Welding Society (AWS)
 - a. AWS D1.1 “Structural Welding Code - Steel.”
 - b. AWS D1.3 “Structural Welding Code - Sheet Steel.”
 - 3. Light Gauge Steel Engineers Association Field Installation Guide
 - 4. American Iron and Steel Institute, North American Specification for the Design of Cold-Formed Steel Structural Members, 2001 American Iron and Steel Institute Standard for Cold-Formed Steel Framing – Truss Design, 2001

I.3 PERFORMANCE REQUIREMENTS

- A. AISI “Specifications”: Calculate structural characteristics of cold-formed steel truss members according to American Iron and Steel Institute “North American Specification for the Design of Cold-Formed Steel Structural Members, 2001”
- B. Structural Performance: Design, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.
 - 1. Design Loads: As specified.
 - 2. Deflections: Live load deflection meeting the following (unless otherwise specified):
 - a. Roof Trusses: Vertical deflection less than or equal to Length/240.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).

I.4 SUBMITTALS

- A. Submit manufacturer’s product data and installation instructions for each type of cold-formed steel framing and accessory required.
- B. Submit detailed roof truss layouts indicating placement of trusses.
- C. Submit individual truss drawings, sealed and signed by a qualified registered Professional Engineer, verifying accordance with local building code and design requirements.
Include:
 - 1. Description of design criteria.
 - 2. Engineering analysis depicting member stresses and truss deflection.

3. Truss member sizes and thickness and connections at truss joints.
 4. Truss support reactions.
 5. Top chord, Bottom chord and Web bracing requirements.
- D. Submit final roof and floor plan drawings sealed and signed by a qualified registered Professional Engineer depicting final installed truss assembly.
Include:
1. All truss to truss connections
 2. All truss to structure (bearing) connections
 3. Plan and details for the location of all permanent lateral and diagonal bracing and/or blocking required in the top chord, web, and bottom chord planes. (Diaphragms excluded)

I.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabrication shall be performed in a quality controlled manufacturing environment by a cold-formed steel truss fabricator with experience fabricating Cold-Formed Steel trusses equal in material, design, and scope to the trusses required for this Project.
1. Installation of Cold-Formed Steel truss roof or floor assembly shall be performed by an installer with experience installing Cold-Formed Steel trusses equal in material, design and scope to the trusses required for this Project.
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

I.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.
- B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

I.7 PROJECT CONDITIONS

- A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Ultra-Span® Truss Manufacturer. Contact Aegis Metal Framing, LLC at 1-888-902-3447, or www.aegismetalframing.com for a list of authorized fabricators.

All-Span, Inc.

9347 All-Span Drive
Bridgeville, DE 19933
888-567-5797
FAX 302-349-9461

Website: <http://www.allspaninc.com>

Contacts

Mr. J.J. Carter : jjcarter@allspaninc.com

Service Area

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· New Jersey · New York · North Carolina · Pennsylvania · Rhode Island · Vermont · Virginia · West
Virginia ·

Products

·Cold Formed Trusses · Cold Formed Floor Joists ·

Sanford Contracting, Inc.

1400 Iron Horse Industrial Park
North Billerica, MA 01862
978-663-0200
FAX 978-663-7701

Website: <http://www.sanfordcontracting.com>

Contacts

: sanford@netway.com

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·Cold Formed Trusses · Cold Formed Floor Joists ·

Steele Truss Company

118 Trade Road
Plattsburg, NY 12901
800-562-9565
FAX 518-561-0948

Website: <http://www.steeltrusses.net>

Contacts

Mr. Joel Steele : jsteele@steeltrusses.net

Mr. Pete Wynnuk

Service Area

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Superior Steel Components-Marne

1245 Comstock Street

Marne, MI 49435

800-887-7133

FAX 800-887-0460

Website: <http://www.lgst.com>

Contacts

Mr. Gary Marshall : garym@lgst.com

Mr. Eric Greenfield

Service Area

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Megquier & Jones, Inc.

1156 Broadway

South Portland, ME 04106

207-799-8555

FAX 207-767-2117

Contacts

Mr. John MacGregor : jmacgregor@megjones.com

Mr. John C. Yohe

Service Area

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Products

·Cold Formed Trusses · Cold Formed Floor Joists ·

Butler Manufacturing

1540 Genessee St.

Kansas City, MO 64102

816-968-3618

FAX 816-968-4399

Website: <http://www.ButlerMfg.com>

Contacts

Mr. Michael Mansell : MGMansell@ButlerMfg.com

Mr. Terry Bennington : TBennington@ButlerMfg.com

Service Area

·All 50 States and District of Columbia ·

Products

·Cold Formed Trusses ·

2.2 COMPONENTS

- A. System components: Aegis Metal Framing, LLC ULTRA-SPAN® and POSI-STRUT® light gauge steel roof truss and floor truss components.
- B. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete cold-formed steel truss roof or floor assembly.

2.3 MATERIALS

- A. Materials:
 1. For all chord and web members: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 50,000 psi.
 2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with minimum yield strength of 33,000 psi.
- B. Ultra-Span steel truss components: Provide sizes, shapes and gauges indicated.
 1. Design Uncoated-Steel Thickness: 0.0350 inch (0.89 mm) (nominal 20 ga)
 2. Design Uncoated-Steel Thickness: 0.0460 inch (1.17 mm) (nominal 18 ga)
 3. Design Uncoated-Steel Thickness: 0.0570 inch (1.45 mm) (nominal 16 ga)
 4. Design Uncoated-Steel Thickness: 0.0730 inch (1.85 mm) (nominal 14 ga)
 5. Design Uncoated-Steel Thickness: 0.0970 inch (2.46 mm) (nominal 12 ga)
- C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.
- D. Fastenings:
 1. Manufacturer recommended self-drilling screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
 2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
 3. Other fasteners as accepted by truss engineer.

2.4 FABRICATION

- A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
 1. Fabricate truss assemblies in jig templates.

2. Cut truss members by sawing or shearing or plasma cutting.
 3. Fasten cold-formed steel truss members by screw fastening, or other methods as standard with fabricator.
 - a. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses. Refer to LGSEA "Field Installation Guide".
- C. Fabrication Tolerances: Fabricate trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
1. Spacing: Space individual trusses no more than plus or minus 1/8 inch (3mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch (3mm).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION, GENERAL

- A. General:
 1. Erection of trusses, including proper handling, safety precautions, installation bracing and other safeguards or procedures is the responsibility of the Contractor and Contractor's installer. Refer to LGSEA "Field Installation Guide".
 2. Exercise care and provide installation bracing required to prevent toppling of trusses during erection. Provide Ultra-Span Stabilizer™ from Aegis Metal Framing for lateral bracing.
- B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.
- C. Provide proper lifting equipment, including spreader bar, suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.
- D. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.
- E. Install trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
 1. DO NOT cut truss members without prior approval of truss engineer.
 2. Fasten cold-formed steel trusses by screw fastening, welding or other methods, as standard with fabricator.
 - a. Comply with AWS requirements and procedures for welding, appearance and

- quality of welds, and methods used in correcting welding work.
- b. Locate mechanical fasteners and install according to cold-formed truss manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- 3. Install trusses in one-piece lengths, unless splice connections are indicated.
- 4. Provide installation bracing and leave in place until trusses are permanently stabilized.
- F. Erection Tolerances: Install trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Limit out-of-plane bow and plumb per LGSEA "Field Installation Guide".

3.3 ROOF TRUSS INSTALLATION

- A. Install trusses per installation documents provided for in Section 1.4 (D).
- B. Space trusses per sealed truss drawings.
- C. Do not alter, cut, or remove truss members or connections of truss members.
- D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.
- E. Erect trusses without damaging truss members or connections.
- F. Anchor trusses securely at all points of support, per installation documents provided for in Section 1.4 (D).
- G. Install all continuous bridging and permanent truss bracing per installation documents provided for in Section 1.4 (D).
- H. Perform all truss-to-truss connections per installation documents provided for in Section 1.4 (D).

3.4 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.

END OF SECTION

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel ladders.
 - 2. Loose bearing and leveling plates.
 - 3. Loose steel lintels.
 - 4. Shelf angles.
 - 5. Steel framing and supports for overhead doors.
 - 6. Steel framing and supports for mechanical and electrical equipment.
 - 7. Metal edgings.
 - 8. Miscellaneous metal trim.
 - 9. Pipe bollards.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications 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.

- B. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
 2. AWS D1.2, "Structural Welding Code--Aluminum."
 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. 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.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

- D. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- E. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- F. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 ALUMINUM

- A. Aluminum Extrusions: ASTM B 221, alloy 6063-T6.

2.4 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.5 FASTENERS

- A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- B. Anchor Bolts: ASTM F 1554, Grade 36.
- C. Machine Screws: ASME B18.6.3.
- D. Lag Bolts: ASME B18.2.1.
- E. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- F. Plain Washers: Round, carbon steel, ASME B18.22.1.

- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.6 CONCRETE FILL

- A. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.7 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.8 STEEL LADDERS

- A. General: Fabricate ladders for locations shown, with dimensions, spacings, details, and anchorages as indicated.
 - 1. Comply with ANSI A14.3, unless otherwise indicated.
- B. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges, spaced 16 inches apart.
- C. Bar Rungs: 5/8-inch- diameter steel bars, spaced 12 inches o.c.
- D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
- F. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

2.9 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.

2.10 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Galvanize loose steel lintels located in exterior walls.

2.11 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated. Provide horizontally slotted holes to receive $\frac{3}{4}$ -inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
- B. Galvanize shelf angles to be installed in exterior walls.

2.12 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Fabricate supports for operable partitions as follows:
 - 1. Beams: Continuous steel shapes of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
 - 2. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches o.c.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness, unless otherwise indicated.
 - 1. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.
- E. Galvanize miscellaneous framing and supports where indicated.

2.13 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.
- C. Galvanize miscellaneous steel trim in the following locations:
 - 1. Exterior.

2.14 STRUCTURAL-STEEL DOOR FRAMES

- A. Fabricate steel door frames from structural shapes and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.
- B. Provide steel strap anchors, 1/8 by 2 inches, with a minimum 6-inch embedment and 2-inch hook, unless otherwise indicated, for securing door frames into adjoining concrete or masonry. Weld anchors to frame jambs no more than 12 inches from both bottom and head of frame, and space anchors not more than 30 inches apart.
- C. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
- D. Galvanize frames in the following locations:
 - 1. Exterior.

2.15 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 steel pipe.
 - 1. Cap bollards with 1/4-inch- minimum steel plate.

2.16 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 SETTING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 1. Use nonshrink grout, nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on concrete or steel pipe columns. Secure girders with anchor bolts embedded in concrete or with bolts through top plates of pipe columns.
 1. Where grout space under bearing plates is indicated at girders supported on concrete, install as specified above for setting and grouting bearing and leveling plates.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified above for setting and grouting bearing and leveling plates.
 1. Do not grout baseplates of columns supporting steel girders until girders are installed and leveled.

3.4 INSTALLING PIPE BOLLARDS

- A. Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

- B. Fill bollards solidly with concrete, mounding top surface.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

END OF SECTION 05500

SECTION 05511 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Industrial stairs with steel floor plate treads.
 - 2. Handrails attached to walls adjacent to metal stairs.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.
 - 1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress.
 - 2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.
 - 3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- B. Structural Performance of Handrails: Provide handrails complying with requirements in ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935.

1.4 SUBMITTALS

- A. Product Data: For metal stairs and the following:
 - 1. Steel floor plate.
 - 2. Paint products.

- B. Shop Drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm.
- B. Fabricator Qualifications: A firm experienced in producing metal stairs 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. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal stairs. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Preassembled Stairs:
 - a. Alfab, Inc.
 - b. American Metal Works, Inc.
 - c. American Stair Corp., Inc.
 - d. Florida Stairs & Rails, Inc.

- e. National Stair & Rail, Inc.
- f. Sharon Companies, Ltd. (The).

2.2 FERROUS METALS

- A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Plain Washers: Round, carbon steel, ASME B18.22.1.
- C. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.4 PAINT

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."
- B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

2.5 CAST ABRASIVE NOSINGS

- A. Drill for mechanical anchors and countersink. Locate not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
- B. Provide a plain surface texture, unless fluted or cross-hatched surfaces are indicated.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, handrails, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Industrial class, where indicated.
- C. Shop Assembly: Preassemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.
- E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously, unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

- A. Stair Framing: Fabricate stringers of structural-steel channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
- B. Steel Floor Plate Treads, Risers, and Platforms: Form to configurations shown in contract documents. Floor plate surface as shown on drawings with thickness necessary to support indicated loads, but not less than 1/4 inch.
 - 1. Abrasive-Surface Floor Plate: Fabricate from steel plate, with abrasive granules rolled into surface. Provide material with coefficient of friction of 0.6 or higher when tested according to ASTM C 1028.
 - 2. Form treads with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and weld treads to brackets.
 - 3. Fabricate platforms with integral nosings matching treads and weld to platform framing.

2.8 STEEL PIPE HANDRAILS AND RAILINGS

- A. General: Fabricate handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness and anchorage, but not less than that needed to withstand indicated loads.
- B. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
 - 1. At tee and cross intersections, cope ends of intersecting members to fit contour of pipe to which end is joined, and weld all around.
- C. Form changes in direction of handrails and rails as follows:
 - 1. As detailed.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of handrail and railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- I. For nongalvanized handrails, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- F. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 INSTALLING STEEL TUBE HANDRAILS

- 1. Adjust handrails systems before anchoring to ensure matching alignment at abutting joints.

- B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:
1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 2. For hollow masonry anchorage, use toggle bolts.
 3. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05511

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DIVISION 6

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 06402 – INTERIOR ARCHITECTURAL WOODWORK: Cabinets, Countertops, Laboratory Tops, and Chair Rail.

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SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Utility shelving.
 - 4. Wood furring.
 - 5. Wood Sheathing.
 - 6. Plywood backing panels.

- B. Related Sections include the following:
 - 1. Gypsum Board Assemblies: Section 09260

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with

- requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. 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 American Lumber Standards Committee Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Metal framing anchors.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Boise Cascade Corporation.
 2. Georgia-Pacific Corporation.
 3. Louisiana-Pacific Corporation.
 4. Metal Framing Anchors:
 - a. Alpine Engineered Products, Inc.
 - b. Cleveland Steel Specialty Co.
 - c. Harlen Metal Products, Inc.
 - d. KC Metals Products, Inc.

- e. Silver Metal Products, Inc.
- f. Simpson Strong-Tie Company, Inc.
- g. Southeastern Metals Manufacturing Co., Inc.
- h. United Steel Products Company, Inc.

2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Wood Structural Panels:
 - 1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
 - 2. Oriented Strand Board: DOC PS 2.
 - 3. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
 - 4. Factory mark panels according to indicated standard.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
 - a. Chromated copper arsenate (CCA).
 - b. Ammoniacal copper zinc arsenate (ACZA).
 - c. Ammoniacal, or amine, copper quat (ACQ).
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:

1. Nailers, 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 members less than 18 inches above grade.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
 2. Use treatment that does not promote corrosion of metal fasteners.
 3. Use Exterior type for exterior locations and where indicated.
 4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.5 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Furring.
- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
1. Mixed southern pine; SPIB.
 2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
 4. Northern species; NLGA.
 5. Western woods; WCLIB or WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.
4. Northern species, No. 2 Common grade; NLGA.
5. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

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

2.7 WOOD SHEATHING

- A. Plywood Floor Sheathing: Structural 1 sheathing.

1. Span Rating: Not less than 40/20.
2. Thickness: See drawings.

- B. Plywood Roof Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than 48/24
2. Thickness: Not less than 5/8 inch tongue and groove with H-clips.

2.8 PLYWOOD BACKING PANELS

- A. Telephone and Electrical 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 thick.

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, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

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

- C. Power-Driven Fasteners: CABO NER-272.

- D. Wood Screws: ASME B18.6.1.

- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

- F. Lag Bolts: ASME B18.2.1..
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.10 METAL FRAMING ANCHORS

- A. General: Provide framing anchors made from metal indicated, of structural capacity, type, and size indicated, and as follows:
 - 1. Research/Evaluation Reports: Provide products acceptable to authorities having jurisdiction and for which model code research/evaluation reports exist that show compliance of metal framing anchors, for application indicated, with building code in effect for Project.
 - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.11 MISCELLANEOUS MATERIALS

- A. Building Paper: Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.
- B. Building Wrap: Air-retarder sheeting made from polyolefins; cross-laminated films, woven strands, or spun-bonded fibers; coated or uncoated; with or without perforations; and complying with ASTM E 1677, Type I.
 - 1. Thickness: Not less than 3 mils.
 - 2. Permeance: Not less than 10 perms.
 - 3. Flame-Spread Index: 25 or less per ASTM E 84.
 - 4. Allowable Exposure Time: No more than three months.

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, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 GYPSUM SHEATHING

- A. General: Fasten gypsum sheathing to supports with galvanized roofing nails or divergent point galvanized staples; comply with GA-253 and manufacturer's recommended spacing and referenced fastening schedule. Keep perimeter fasteners 3/8 inch from edges and ends of units.
- B. Install 24-by-96-inch sheathing horizontally with long edges at right angles to studs with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent board without forcing. Abut ends of boards over centers of studs and stagger end joints of adjacent boards not less than one stud spacing, two where possible.
- C. Install 48-by-96-inch and longer sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Fit units tightly against each other.

3.4 SHEATHING TAPE APPLICATION

- A. Apply sheathing tape to joints between sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION 06100

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior standing and running trim.
 - 2. Interior standing and running trim for field-painted finish.
 - 3. Interior plywood paneling.
 - 4. Shelving.

1.3 DEFINITIONS

- A. Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NHLA - National Hardwood Lumber Association.
 - 3. NLGA - National Lumber Grades Authority.
 - 4. RIS - Redwood Inspection Service.
 - 5. SCMA - Southern Cypress Manufacturers Association.
 - 6. SPIB - Southern Pine Inspection Bureau.
 - 7. WCLIB - West Coast Lumber Inspection Bureau.
 - 8. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Include construction details, material descriptions, dimensions of individual components and profiles, textures, and colors.
 - 1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
- B. Samples for Initial Selection: Color charts consisting of actual materials in small sections for each type of material indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, 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 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Primed Hardboard Trim:
 - a. ABT Co.; a Louisiana-Pacific Company.
 - b. Georgia-Pacific Corp.
 - c. Temple-Inland Forest Products Corp.
 - 2. Hardwood Veneer Plywood Paneling:
 - a. Champion International Corp.
 - b. Chesapeake Hardwood Products, Inc.
 - c. Georgia-Pacific Corp.
 - d. Ply-Gem Manufacturing.
 - e. Weyerhaeuser Company.

2.2 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by the American Lumber Standards' Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
- B. Softwood Plywood: DOC PS 1.
- C. Hardwood Plywood: HPVA HP-1.
- D. Hardboard: AHA A135.4
- E. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce products with the following fire-test-response characteristics:
 - 1. Flame-spread index of not greater than 25 when tested according to ASTM E 84.
- B. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
- C. Exterior-Type Fire-Retardant Treatment: Organic-resin-based formulation that shows no increase in flame spread of treated material after being weathered according to ASTM D 2898, Method A.
- D. Kiln-dry material after treatment to levels required for untreated material. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

2.4 FIRE-RATED INTERIOR DOOR WINDOW FRAMES

- A. Frames, complete with casings, fabricated from fire-retardant particleboard or fire-retardant, medium-density fiberboard with veneered exposed surfaces, or from solid fire-retardant-treated wood. Frames comply with NFPA 80 and are listed and labeled, and marked for intended use, for use with doors provided, by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing according to NFPA 252.
 - 1. Species: Birch.
 - 2. Fire Rating: 45 minutes.

2.5 SHELVING AND CLOTHES RODS

- A. Shelving: 3/4-inch particleboard shelving with radiused and filled front edge.
 - 1. Shelf Cleats: 3/4-by-3-1/2-inch boards of same species and grade indicated above for interior lumber trim for opaque finish.

2.6 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws of the following materials, in sufficient length to penetrate minimum of 1-1/2 inches into substrate, unless otherwise recommended by manufacturer:
 - 1. Hot-dip galvanized steel.
 - 2. Prefinished aluminum in color to match stain, where face fastening of material to receive stain is unavoidable.
- B. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- C. Flashing: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim" for flashing materials installed in finish carpentry.
- D. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for materials required for sealing siding work.

2.7 FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and with manufacturer's written recommendations for moisture content of finish carpentry at relative humidity conditions existing during time of fabrication and in installation areas.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

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

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate finish carpentry.

3.4 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.5 CLEANING

- A. Clean finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 06200

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SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood cabinets.
 - 2. Plastic-laminate cabinets.
 - 3. Plastic-laminate countertops.
 - 4. Laminated-plastic laboratory tops.
 - 5. Chair rail.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Leggett & Platt Genesis Inc. for furnishing the interior architectural woodwork specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Leggett & Platt Genesis Inc. at (800) 257-9315.

1.4 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Engage a qualified woodworking firm, approved by the Owner, to assume undivided responsibility for installation of interior architectural woodwork.
 - 1. An experienced installer, approved by the Owner, who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 INSTALLATION MATERIALS

- A. Rough Carriages for Stairs: Comply with requirements in Division 6 Section "Rough Carpentry." Kiln-dry to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Handrail Brackets: Cast from malleable iron with wall flange drilled for exposed anchor and with support arm for screwing to underside of rail. Sized to provide 1-1/2-inch clearance between handrail and wall.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

- G. 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 tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 - 3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
- H. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.
- I. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 06402

DIVISION 7

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 07240 – EXTERIOR INSULATION AND FINISH SYSTEM – EIFS
2. Section 07530 – FULLY ADHERED EPDM ROOFING SYSTEM: Roofing System.

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SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concealed building insulation.
 - 2. Foundation wall/under slab insulation

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Knauf Fiber Glass.
 - d. Owens Corning.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
 - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
- B. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.
 - 1. Provide R-value as indicated on drawings.
- C. Extruded – Polystyrene Drainage Panels: ASTM C 578, Type IV, 1.65 lb./cu. ft. and fabricated with one side having a matrix of drainage and edge channels.
 - 1. Provide R-value as indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

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

3.5 PROTECTION

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

END OF SECTION 07210

SECTION 07240 – EXTERIOR INSULATION AND FINISH SYSTEM - EIFS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Materials and installation of StoTherm Premier NExT to frame and block construction.
 - 2. Installation of Sto coating on Trellis Unit.
- B. Related Sections include the following:
 - 1. Direct- Applied Exterior Finish System (DEFS): Section 09540.
 - 2. Gypsum Board Assemblies: Section 09260.
 - 3. Trellis Unit: Section 10340.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Sto Corporation for furnishing the exterior insulation and finish system specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Sto Corp at (888) 786-3437.

1.4 DESIGN REQUIREMENTS

- A. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
- B. Design for wind load in conformance with code requirements.
- C. Prevent the accumulation of water behind the system, either by condensation or leakage through the construction.
- D. Provide EIFS ultra-high impact mesh full height on all columns and on all EIFS build-outs adjacent to pedestrian traffic as indicated on contract drawings.
- E. Provide expansion joints in the system where they exist in the supporting construction, where frame construction adjoins CMU construction, and where DEFS on soffits adjoins EIFS.

- F. Provide minimum $\frac{3}{4}$ inch wide joint where EIFS adjoins sidewalk or finished grade.
- G. Provide minimum $\frac{1}{2}$ inch wide joints at penetrations through the EIFS (windows, doors, etc.).
- H. Provide sealant by Dow Corning for joints in accordance with recommendations of Dow Corning.

1.5 QUALITY ASSURANCE

A. Contractor Requirements:

1. Engaged in application of Sto EIFS for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of Sto materials.
3. Employ skilled mechanics who are experienced and knowledgeable in Class PB EIFS application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with specifications and details.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.
- B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F. Store away from direct sunlight.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.7 PROJECT/SITE CONDITIONS

- A. Maintain ambient and surface temperatures above 40° F during application and drying period, minimum 24 hours after application of materials.
- B. Provide supplementary heat for installation in temperatures less than 40° F.
- C. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.8 COORDINATION/SCHEDULING

- A. Coordinate installation of windows so sill flashing extends over face of finished wall system.

- B. Coordinate waterproofing of framed gutter so it is waterproof prior to installation of wall system materials.
- C. Install coping and sealant immediately after installation of the finish coating when coatings are dry.

1.9 WARRANTY

- A. Provide manufacturer's standard ten (10) year labor and material warranty.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. EIFS over Frame Construction, EIFS on CMU: Sto Premier EIFS as furnished by Sto Corp.
- B. Air and moisture barrier where required by state energy code: StoGuard as furnished by Sto Corp.
- C. Primer and finish on stucco over CMU: Sto Hot Prime and Sto SilcoLit furnished by Sto Corp.
- D. Direct applied finish for soffits: Sto Quik Gold for Soffits furnish by So Corp.
- E. Sheathing for Frame Construction: As specified in Section 09260 "Gypsum Board Assemblies".

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Prequalify under Quality Assurance requirements of this specification (Paragraph 1.5A).

3.2 EXAMINATION

- A. Inspect surfaces for:
 - 1. Contamination -- algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
 - 2. Surface absorption and chalkiness.
 - 3. Cracks -- measure crack width and record location of cracks.
 - 4. Damage and deterioration.

5. Moisture content and moisture damage -- use a moisture meter to determine if the surface is dry enough to receive the EIFS system and record any areas of moisture damage.
6. Compliance with specification tolerances -- record areas that are out of tolerance (greater than 1/4 inch in 8'-0" deviation in plane).

B. Inspect sheathing application for compliance with applicable requirement:

1. Glass mat faced gypsum sheathing – Georgia-Pacific Publication 102250

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the system installation to the General Contractor.

3.3 SURFACE PREPARATION

- A. Remove surface contaminants in accordance with ASTM D 4261
- B. Replace weather-damaged sheathing and repair damaged or cracked surfaces.
- C. Level surfaces to comply with required tolerances.

3.4 INSTALLATION

- A. Install wall system in compliance with manufacturer's published written instructions.

3.5 TRELLIS UNIT – INSTRUCTIONS FOR COATING

- A. Surface Preparation
Wipe fiberglass surface with a mild solvent wipe (common isopropyl alcohol) to remove all dust and surface residue immediately prior to priming.
- B. Priming
Product: 801 Sto Primer

Surface to receive Sto Primer shall be clean and dry.

Apply Sto Primer to all surfaces, which will receive finish.

Apply minimum 3 wet mils of Sto Primer using roller, spray or brush

(Note: Sto Primer contains sand. Consult the spray equipment manufacturer before removing any filters from spraying equipment to facilitate spraying)

Do not apply Sto Primer if ambient temperatures are below 40°F (4°C).

Do not apply Sto Primer if the surface temperature is within 5°F (3°C) of the ambient dew point temperature.

Allow Sto Primer to dry completely before applying finish. Sto Primer typically dries within 4 hours at 70°F (20°C) and 50% RH. Actual drying time will vary with ambient and surface temperatures.

Protect Sto Primer from rain, freezing, and continuous high humidity until completely dry.

Consult Sto Primer product literature or Sto Corp. for additional information.

- C. Finish
Product: 136 StoSilco® Lit 1.0
Application:
Surface to receive StoSilco® Lit shall be clean and dry.
Apply Sto Silco® Lit to primed surface using a steel trowel or appropriate spray equipment.
Use trowel to scrape the material down to a uniform thickness no greater than the largest aggregate size.
Achieve final texture by floating with the appropriate float in a figure-eight motion.
Always work to a wet edge and do not interrupt the finishing operation except where the finish can be terminated at a clean architectural break.
Do not apply Sto Silco® Lit if ambient temperatures are below 40°F (4°C) or above 100°F (38°C).
Do not apply Sto Silco® Lit if the surface temperature is within 5°F (3°C) of the ambient dew point temperature.
Protect Sto Silco® Lit from rain, freezing, and continuous high humidity until completely dry. StoSilco® Lit normally dries in 24 hours at 70°F (20°C) and 50% RH. Actual drying time will vary with ambient and surface temperatures.
Consult Sto Silco® Lit product literature or Sto Corp. for additional information.
- D. Adjacent Areas
The contractor shall protect adjacent areas of construction from spillage or overspray during the installation of Sto products.
- E. Clean-up
Clean tools and equipment with water immediately after use. Dried material can only be removed mechanically.

3.6 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them.
- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until coatings are fully dry.

END OF SECTION 07240

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SECTION 07530 – FULLY ADHERED EPDM ROOFING SYSTEM

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Carlisle/Versico for furnishing the roofing system specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Carlisle/Versico at (800) 479-6832.
- B. CVS/Pharmacy has entered into a national account agreement with Firestone Building Products Co. for furnishing the roofing system specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Firestone Building Products Co. at (317) 816-3206.

0.3 GENERAL NOTES

- A. Preceding job start up, contractor shall decide to his satisfaction that all specifications contained herein are workable.
- B. Contractor will perform all work by competent, trained, and properly equipped personnel in strict accordance with good roofing practices and applicable industry standards.
- C. Contractor will observe all published safety prevention policies and practices relating to application of roofing system and related work. All federal, state, and local codes shall be followed.
- D. Contractor will follow application, safety, etc. information as published in the most current edition of the Firestone RubberGard EPDM Roofing System Technical Specifications.
- E. Questions concerning this specification should be directed to Firestone Technical Services Department or Mark Munley, National Accounts Manager at 1 800.428.4442.

0.4 WORK INCLUDED

- A. Work under this section covers the installation of a new Fully Adhered EPDM roofing system for CVS. In addition, contractor shall include all related items of work as noted herein or indicated on the drawings or otherwise required to complete the specified elements of work and provide the necessary warranties for this work.
- B. Contractor will dispose of all materials properly. Any material removal shall comply with state and local codes and requirements and shall be disposed of in a legal manner.

0.5 SECTION INCLUDES

- A. Substrate preparation.
- B. Wood nailer installation.
- C. Membrane installation.
- D. Membrane flashing installation.
- E. Walkway pads.

0.6 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 for definition of terms related to roofing work not otherwise defined in the section
- B. Firestone: Firestone Building Products Co., Headquarters, 525 Congressional Blvd., Carmel, IN 46032-5607
- C. American Society for Testing and Materials (ASTM): 1916 Race Street, Philadelphia, PA 19103

0.7 SYSTEM DESCRIPTION

- A. Non-Reinforced elastomeric sheet roofing, that is adhered to acceptable substrate with system manufacture's bonding adhesive.

0.8 PERFORMANCE REQUIREMENTS

- A. General: Install sheet membrane roofing and base flashing that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

- C. FM Listing: Provide sheet membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.
 - 1. Roofing system shall comply with the following:
 - a. Fire/Windstorm Classification: Class 1A-90.

0.9 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Company specializing in manufacturing the roofing membrane specified in this Section with ten years of manufacturing experience.
 - 2. System supplier must have ISO 9002 certification.
 - 3. Manufacturer must be able to provide the project with the membrane and Isocyanurate insulation that is produced in their facilities.
- B. Applicator:
 - 1. Shall be a Firestone Red Shield Licensed Contractor.
 - 2. Shall have at least five years experience in installing specified system.
- C. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing materials are a part.
- D. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Meet with the same participants and review the same items listed for the preinstallation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.
- E. Preinstallation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.
 - 1. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
4. Review loading limitations of deck during and after roofing.
5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
6. Review governing regulations and requirements for insurance, certificates, and inspection and testing, if applicable.
7. Review temporary protection requirements for roofing system during and after installation.
8. Review roof observation and repair procedures after roofing installation.
9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

0.10 REGULATORY REQUIREMENTS

- A. Conform to applicable local building code requirements.

0.11 QUALITY INSPECTION/OBSERVATION

- A. Inspection by Manufacturer: Provide a final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer.
 1. Technical Representative shall not perform any sales functions.
 2. Contractor shall complete any necessary repairs required for issuance of warranty.

0.12 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers dry, undamaged, seals and labels intact and legible.
- B. Store all materials clear of ground and moisture with weather protective covering.
- C. Keep all combustible materials away from **ALL** ignition sources.
- D. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- E. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

- F. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

0.13 ENVIRONMENTAL REQUIREMENTS

- A. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice.
- B. Do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application. Consult Firestone Technical Specifications on cold weather application.

0.14 WARRANTY

- A. Type/Term:
 - 1. Provide 15 year Firestone Red Shield Roofing System Limited Warranty. Warranty shall include membrane, roof insulation, and all other products supplied by Firestone Building Products.
 - 2. Provide a separate Firestone ISO 95+ Insulation Warranty. Warranty term shall coincide with Red Shield Warranty.
- B. Coverage:
 - 1. Red Shield Warranty:
 - a. Limit of liability: No Dollar Limitation
 - b. Scope of coverage: Repair any leak in the Firestone EPDM Roofing System caused by the ordinary wear and tear of the elements, manufacturing defect in Firestone brand materials, and the workmanship used to install these materials.
 - 2. Insulation Warranty:
 - a. Limit of liability: No Dollar Limitation
 - b. Scope of coverage:

PART 2 - PRODUCTS

0.1 NAILERS FOR FLANGES AND ROOF ACCESSORIES

- A. Description: Structural Grade No. 2 or better Southern Pine, Douglas Fir, or Exterior Grade plywood. All wood shall be pressure treated for rot resistance.
 - 1. Nailer width: Minimum 3 1/2 in. (nominal) wide or as wide as the nailing flange of each roof accessory.
 - 2. Nailer thickness: Thickness of roof insulation.

B. Reference Standards:

1. Southern Pines: PS 20; SPIB Grading Rules.
2. Western Woods: PS 20; WWPA Grading Rules.
3. Plywood: PS 1; APA Grade Stamps.
4. Pressure preservative treatment: AWPB LP2.

0.2 MANUFACTURERS – MEMBRANE MATERIALS

- A. Firestone Adhered single-ply membrane system: Non-Reinforced elastomeric sheet roofing, that is adhered to acceptable substrate with manufacturers bonding adhesive.
- B. Approved Equals: Carlisle Syntec System: Carlisle Corp.

0.3 ELASTOMERIC SHEET ROOFING AND FLASHING MEMBRANE

- A. Description: Non-reinforced, cured, synthetic single-ply membrane composed of Ethylene Propylene Diene Terpolymer (EPDM) conforming to the following physical properties:
 1. Membrane Type: .060 Standard

Property:	Specification:
Specific Gravity	1.15 +/- 0.05
Tensile Strength, Minimum, psi (MPa)	1305 (9)
Elongation, Minimum, %	300
Tear Resistance, lbf / in (kN / M)	150 (26.3)
Ozone Resistance, 166 hours @ 100 pphm @ 104°F with 50% extension	No Cracks
Heat Aging, 28 days @ 240°F	
Tensile Strength, Minimum psi (MPa)	1205 (8.3)
Elongation, Minimum %	200
Brittleness Point, max., °F, °C	-49 (-45)
Water Absorption, change in weight after immersion in water for 166 hours @ 158°F, %	+8, -2
Tolerance On Nominal Thickness, %	+/- 10
Water Vapor Permeability, Perm-Mils	2.0

B. Reference Standards:

1. ASTM D4637-96: Standard Specification for EPDM Sheet used in single-ply roof membrane
2. ASTM D297: Methods for Rubber Products, Chemical Analysis.
3. ASTM D412, Die C: Test Methods for Rubber Properties in Tension.
4. ASTM D471: Test Methods for Rubber Property, Effect of Liquids.
5. ASTM D573: Test Method for Rubber, Deterioration in an Air Oven.
6. ASTM D624, Die C: Test Method for rubber property-Tear Resistance
7. ASTM D746: Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
8. ASTM D751: (Grab Method) Method of Testing Coated Fabrics.
9. ASTM D816: (Modified) Methods of Testing Rubber Cements.
10. ASTM D1149: Test Method for Rubber Deterioration, Surface Ozone Cracking in a Chamber.
11. ASTM D2240: Test Method for Rubber Property - Durometer Hardness.
12. ASTM E96: Test Methods for Water Vapor Transmission of Materials.

C. Product/Producer:

1. RubberGard EPDM membrane by Firestone.

0.4 ELASTOMERIC SHEET ROOFING SYSTEM COMPONENTS

A. Roof Flashing:

1. Description: Semi-cured 45 mil EPDM membrane laminated to 35 mil EPDM tape adhesive
2. Product/Producer:
 - a. QuickSeam Flashing by Firestone.

B. Elastomeric Uncured Flashing

1. Description: Non-reinforced, self curing, synthetic, single-ply flashing composed of Ethylene Propylene Diene Terpolymer (EPDM) conforming to the following physical properties as indicated by ASTM D4811-90 standard specification for Non-vulcanized rubber sheet used as roof flashing.
 - a. Nominal Thickness: .060 inch

Property:	Specification:
Thickness	0.055
Green Strength Modulus 100% @ 75°F(psi)	25-250
Elongation, (Ultimate), %	400
modulus 100% @ 122°F(psi)	12

Elongation (Ultimate) %	200
Shelf Stability: Modulus 100% at 75°F(psi)	250
Elongation, min, %	400
Vulcanizability: Tensile strength, min, (psi)	406
Elongation, min, %	400
Tensile Set: min, %	80
Dimensional Stability, max, %	+/- 10
Weatherability , no cracks or crazing	pass
Water Vapor Permeability, Perm-Mils	2.0

b. Reference Standards:

- 1) ASTM D412: Test Methods for Rubber Properties in Tension
- 2) ASTM D471: Test Methods for Rubber Property-Effect of liquids
- 3) ASTM D573: Test Methods for Rubber-Deterioration in Air oven
- 4) ASTM D624: Test Methods for Rubber Property-Tear Resistance
- 5) ASTM D1149: Test Method for Rubber Deterioration-Surface Ozone Cracking in a chamber
- 6) ASTM D1204: Test Method for Linear Dimensional Changes on a Non-rigid Thermoplastic Sheeting or Film at Elevated Temperatures
- 7) ASTM D2137: Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics

2. Product/Producer:

- a. EPDM FormFlash flashing membrane by Firestone.

C. Lap Splice Tape:

1. Description: 35 mil EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer.
2. Product/Producer:
 - a. QuickSeam Splice Tape by Firestone.

D. Adhesive Primer:

1. Description: High-solids, butyl based primer formulated for compatibility with EPDM membrane & tape adhesive.
2. Product/Producer:
 - a. QuickPrime by Firestone.

E. Batten Covers:

1. Description: Cured 60 mil EPDM membrane laminated to 35 mil EPDM tape adhesive.
2. Product/Producer:
 - a. QuickSeam Batten Cover by Firestone.

F. Splice Adhesive:

1. Description: Butyl-based, formulated for compatibility with EPDM membrane.
2. Product/Producer:
 - a. RubberGard Splice Adhesive by Firestone.

G. Bonding Adhesive:

1. Description: Neoprene-based, formulated for compatibility with EPDM membrane & a wide variety of substrate materials, including masonry, wood, and insulation facings.
2. Product/Producer:
 - a. RubberGard Bonding Adhesive by Firestone.

H. Pourable Sealer:

1. Description: 2-Part urethane , 2-color for reliable mixing.

I. Seam Plates, Batten Strips and Insulation Plates:

1. Description: Steel with a Galvalume coating.
2. Reference Standard: Corrosion-resistant to meet FM-4470 criteria.

J. Termination Bar:

1. Description: 1.3" X 0.10" thick aluminum bar with integral caulk ledge.
2. Product/Producer:
 - a. RubberGard Bonding Adhesive by Firestone.

K. Roof Walkway Pads:

1. Description: EPDM Walkway Pads, 0.30" X 30" X 30" with EPDM tape adhesive strips laminated to the bottom.
2. Product/Producer:
 - a. QuickSeam Walkway Pads by Firestone.

0.5 INSULATION MATERIALS

- A. General: Provide preformed roof insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated.
 - 1. Provide preformed, tapered insulation boards where indicated for sloping to drain. Fabricate with the following taper:
 - a. 1/4 inch per 12 inches, unless otherwise indicated.
 - 2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- B. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents to comply with ASTM C 1289, classified by facer type as follows:
 - 1. Facer Type: Type II, felt or glass-fiber mat on both major surfaces.
 - 2. Provide minimum R-value of 25, as determined by the long term thermal resistance (LTTR) method.

0.6 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions of FM 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric mat, water permeable and resistant to ultraviolet degradation, type and weight as recommended by roofing system manufacturer for application.

0.7 WALKWAYS

- A. Walkway Pads: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/14 inch thick, and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support roofers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Start work with sealants and adhesives at 60° - 80° F.
- E. Fumes from adhesive solvents may be drawn into the building during installation through rooftop intakes. Appropriate measures must be taken to assure that fumes from adhesive solvents are not drawn into the building through air intakes.
- F. The surface must be clean, dry, smooth, free of sharp edges, fins, loose or foreign materials, oil, grease and other materials which may damage the membrane. All roughened surfaces which could cause damage shall be properly repaired before proceeding.
- G. All surface voids of the immediate substrate greater than 1/4" wide must be properly filled with an acceptable insulation or suitable fill material.

0.2 PROTECTION OF OTHER WORK

- A. Protect metal, glass, plastic, and painted surfaces from adhesives and sealants.
- B. Protect neighboring work, property, cars, and persons from spills and overspray from adhesives, sealants and coatings.
- C. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

0.3 MATERIAL STORAGE AND HANDLING

- A. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.
- B. Consult container labels and Material Safety Data Sheets (MSDS) for specific safety instructions.

0.4 WOOD NAILER LOCATION AND INSTALLATION

- A. Total wood nailer height shall match the total thickness of insulation being used and shall be installed with a 1/8" gap between each length and at each change of direction.
- B. Wood nailers shall be firmly fastened to the deck. Mechanically fasten wood nailers to resist a force of 200 lbs. per lineal foot.

0.5 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated and to Shop Drawings.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install required thickness in 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Attached Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type indicated.
 - 1. Fasten insulation according to the insulation and roofing system manufacturers' written instructions to meet specified wind-uplift requirements, but not less than 1 fastener for each 4 sq. ft. and at least 2 fasteners per board.

0.6 MEMBRANE PLACEMENT AND ATTACHMENT

- A. Beginning at the low point of the roof, place the Firestone RubberGard membrane without stretching over the acceptable substrate and allow to relax a minimum of 30 minutes before attachment or splicing.
- B. After making sure the sheet is placed in its final position, fold it back evenly onto itself so as to expose the underside.
- C. Sweep the mating surface of the membrane with a stiff broom to remove excess dusting agent (if any) or other contaminants from the mating surface.
- D. Apply Bonding Adhesive at about the same time to both the exposed underside of the sheet and the substrate to which it will be adhered so as to allow approximately the same drying time. Apply Bonding Adhesive so to provide an even and uniform film thickness. Do not apply bonding adhesive to areas that will be subsequently spliced.

- E. Allow Bonding Adhesive to flash off until tacky. Touch the Bonding Adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating.
- F. Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and evenly so as to minimize wrinkles.
- G. Compress the bonded half of the sheet to the substrate with a stiff push broom.
- H. Fold the unadhered half of the membrane sheet back onto itself, and repeat the bonding procedure to complete the bonding of the sheet.

0.7 MEMBRANE LAP SPLICING

A. General

1. Position the sheet at the splice area by overlapping membrane 5 inches. Once the membrane is in place, mark the bottom sheet 1/2" to 3/4" from the edge of the top sheet every 4 to 6 feet. Tack the sheet back with Firestone QuickPrime at 5' centers and at factory splices or as necessary to hold back the membrane at the splicing area.
2. Remove excess amounts of dusting agent on the sheet and at factory splices using a stiff push broom. Stir Firestone QuickPrime thoroughly before and during use. Dip the QuickScrubber into the bucket of QuickPrime, keeping the QuickScrubber flat. Apply the QuickPrime using long back and forth type strokes with pressure along the length of the splicing area until surfaces become a dark gray in color. Apply QuickPrime to both surfaces at the same time to allow the same flash off time. Change the scrub pad each 200 feet of 3 inch field splice, or when the pad will no longer hold the proper amount of QuickPrime. Additional scrubbing is required at areas that may have become contaminated or have excess amounts of dusting agent, and at all factory splices.
3. Position the QuickSeam Splice Tape on the bottom sheet, aligning the edge of the release paper with the markings. Immediately roll the splice tape with a 3"-4" wide silicone or silicone sleeved steel hand roller or a short nap 3" paint roller.
4. When the QuickSeam Splice Tape has been installed for the entire splice length allow the top sheet to rest on top of the tape's paper backing. Trim the top sheet as necessary to assure that 1/8"-1/2" of the QuickSeam Splice Tape will be exposed on the finished splice.
5. To remove the paper backing from the tape, first roll back the RubberGard membrane sheet, then peel the paper backing off the QuickSeam Splice Tape by pulling against the weight of the bottom sheet at approximately a 45 degree angle to the tape and parallel with the roof surface. Allow the top sheet to fall freely onto the exposed QuickSeam Splice Tape. Broom the entire length of the splice as the release paper is being removed.
6. Roll the splice using a 1-1/2"-2" wide silicone or silicone sleeved steel hand roller, first across the splice, and then along the entire length of the splice.

0.8 MEMBRANE SECUREMENT

- A. Secure membrane at all locations where the membrane terminates or goes through an angle change greater than 2" in 12" except for round pipe penetrations less than 18" in diameter and square penetrations less than 4" square.
- B. Mechanically fasten Reinforced Perimeter Fastening Strips per Firestone recommendations.

0.9 FLASHING – PENETRATIONS

- A. General:
 - 1. Flash all penetrations passing through the membrane.
 - 2. The flashing seal must be made directly to the penetration.
- B. Pipes, Round Supports, etc.
 - 1. Flash with Firestone Pre-Molded EPDM Pipe Flashings where practical.
 - 2. Flash using FormFlash when Pre-Molded EPDM Pipe Flashing is not practical.
- C. Structural Steel Tubing: Use a field fabricated pipe flashing detail provided that the minimum corner radius is greater than 1/4" and the longest side of the tube does not exceed 12". When the tube exceeds 12" use a standard curb detail.
- D. Roof Drains
 - 1. Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.
 - 2. Taper insulation around the drain to provide a smooth transition from the roof surface to the drain. Use pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope. Slope shall not exceed Firestone recommendations.
 - 3. Position the RubberGard membrane, then cut a hole for the roof drain to allow 1/2" -3/4" of membrane extending inside the clamping ring past the drain bolts.
 - 4. Make round holes in the RubberGard membrane to align with clamping bolts. Do not cut the membrane back to the bolt holes.
 - 5. Place Water Block Seal on top of drain bowl where the clamping ring seats below the membrane
 - 6. Install the roof drain clamping ring and clamping bolts. Tighten the clamping bolts to achieve constant compression.
- E. Pipe Clusters and Unusual Shaped Penetrations
 - 1. Fabricate penetration pockets to allow a minimum clearance of 1" between the penetration and all sides.
 - 2. Secure penetration pockets per Firestone Details
 - 3. Fill penetration pockets with Pourable Sealer, so as to shed water. Pourable Sealer shall be a minimum of 2" deep.

- F. Hot Pipes: Protect the rubber components from direct contact with steam or heat sources when the in-service temperature is in excess of 180° F. In all such cases flash to an intermediate insulated "cool" sleeve per Firestone details.
 - G. Flexible Penetrations
 - 1. Provide a weathertight gooseneck set in Water Block Seal and secured to the deck.
 - 2. Flash in accordance with Firestone Details
 - H. Scuppers
 - 1. Set welded watertight scupper in Water Block Seal and secure to the structure.
 - 2. Flash in accordance with Firestone Details.
 - I. Expansion Joints
 - 1. Install as shown on roof drawings in accordance with Firestone details.
- 0.10 FLASHING - WALLS, PARAPETS, MECHANICAL EQUIPMENT CURBS, SKYLIGHTS, ETC.
- A. General: Using the longest pieces practical, flash all walls, parapets, curbs, etc., a minimum of 8" high per Firestone Details.
 - B. Evaluate Substrate: Evaluate the substrate and overlay per Firestone specifications as necessary.
 - C. Complete the splice between flashing and the main roof sheet with Splice Adhesive before adhering flashing to the vertical surface. Provide lap splices in accordance with Firestone Details.
 - D. Apply Bonding Adhesive at about the same time to both the flashing and the surface to which it is being bonded so as to allow approximately the same flash off time. Apply Bonding Adhesive in a uniform coating.
 - E. Allow Bonding Adhesive to flash off until tacky. Touch the Bonding Adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. While touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.
 - F. Roll the flashing into the adhesive evenly and carefully so as to minimize wrinkles.
 - G. Ensure proper contact of flashing by brooming in place.
 - H. Provide termination directly to the vertical substrate as shown on roof drawings.
 - I. Install T-Joint covers at field and flashing splice intersections as required by Firestone.

- J. Install intermediate flashing attachment as required by Firestone Specifications and Details.

0.11 FLASHING - ROOF EDGE METALS

- A. Apply QuickPrime to the metal edging and membrane as described in Firestone Specifications.
- B. Place the roll of QuickSeam Flashing on the roof a few feet ahead of the application starting point, positioned so that it unrolls from the top of the roll. Remove approximately 2'-3' of release paper and apply to the metal flange and RubberGard membrane. Lap adjacent rolls of QuickSeam Flashing a minimum of one inch.
- C. With a 2"-3" wide silicone or silicone sleeved steel hand roller, roll the QuickSeam Flashing ensure proper adhesion. Additional attention must be given to factory splice intersections and to any change in plane.
- D. Apply 6" length of QuickSeam Flashing, a QuickSeam Joint Cover, or 6"x6" FormFlash to the inside edge of the QuickSeam Flashing at all overlaps.
- E. Apply 6" length of QuickSeam Flashing, a QuickSeam Joint Cover, or 6"x6" FormFlash at all intersections between the QuickSeam Flashing and field fabricated splices.
- F. Where QuickSeam Flashing will not completely cover the metal flange, an additional piece of QuickSeam Flashing must be applied to the metal edge laps . Apply Seam Edge Treatment at the intersections of the flashing sections.
- G. When the roof slope is greater than 1 in 12, apply Seam Edge Treatment along the back edge of the QuickSeam Flashing.

0.12 TEMPORARY CLOSURE

- A. Temporary closures which ensure that moisture does not damage any completed section of the new roofing system are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

0.13 ROOF WALKWAYS

- A. Install walkways at all access points to the roof and around all rooftop equipment that may require maintenance and as shown on roof drawings.
- B. Layout Firestone RubberGard Walkway Pads so that the flat surface is over the completed RubberGard membrane, spacing each pad a minimum of 1" and a maximum of 3" from each other to allow for drainage. Walkway pads may not be used within 10' of any roof edge or perimeter. These areas will require the installation of concrete pavers.

- C. If the installation of Firestone RubberGard Walkway Pads over field fabricated splices or within 6" of a splice edge cannot be avoided, flash in the splice using QuickSeam Flashing prior to installing the walkway pad. The QuickSeam Flashing shall extend beyond the walkway pad a minimum of 6" on either side.
- D. Remove the release paper. Turn the walkpad over and place it in the QuickPrime.
- E. Walk on the pad to press in place assuring proper adhesion.
- F. If loose laid pavers are used for walkways. Adhere a layer of RubberGard membrane beneath them to isolate them from the roofing membrane. Protection layers must extend a minimum of 2" beyond the paving stone.

0.14 SHEET METAL WORK

- A. Install Firestone sheet metal as shown on roof drawings.
- B. Follow current industry guidelines for installation or Firestone requirements, whichever is more stringent.

0.15 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed as required by the manufacturer
- B. Correct identified defects or irregularities.

0.16 CLEAN-UP

- A. Protect sheet membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Clean all contaminants from building and surrounding areas.
- C. Remove trash, debris, equipment from project site and surrounding areas.
- D. Repair or replace damaged building components or surrounding areas to the satisfaction of the building owner.

END OF SECTION 07530

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SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Roof-drainage systems.
 - 2. Exposed trim and fasciae.
 - 3. Copings.
 - 4. Metal flashing.
 - 5. Reglets.
 - 6. Overhead-piping safety pans.
 - 7. Soffit vent.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.
- B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:
 - 1. Wind Zone 1: Wind pressures of 21 to 30 psf.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 METALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:
 - 1. Anodized Aluminum Sheet: ASTM B 209, 5005-H14, with a minimum thickness of 0.030 inch.
- B. Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

2.2 REGLETS

- A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
- B. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- C. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
- D. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
- E. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
 - 1. Material: Galvanized steel, 0.0217 inch thick.
- F. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fry Reglet Corporation.
 - 2. Hickman: W.P. Hickman Co.
 - 3. Keystone Flashing Company.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Solder: ASTM B 32, Grade Sn50, used with rosin flux.

- B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- C. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- D. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."
- E. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, sealants as specified in Division 7 Section "Join Sealants".
- F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- G. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- H. Gutter Screen: 1/4-inch hardware cloth installed in sheet metal frames. Fabricate screen and frame of same basic material as gutters and downspouts.
- I. Coping Joints: Contractor shall have the option of providing one of the following profiles:
 - 1. Joints with overlapping, matching metal cap adhered to base coping with non-staining, one-part, neutral curing, ultra low-modulus silicone sealant complying with ASTM C920 and equal to "890" as manufactured by Pecora Corporation.
 - 2. Joints with overlapping, non-staining, low-modulus, extruded silicone compound in matte texture and matching coping color, equal to "Sil-Span" as manufactured by Pecora Corporation. Width shall be manufacturer's standard sufficient enough for adhesive attachment to base coping with compatible non-staining, one-part, low-modulus, neutral curing, high performance silicone sealant, complying with ASTM C920 and equal to "864" by Pecora.

2.4 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- F. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- G. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- H. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- I. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- J. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 SHEET METAL FABRICATIONS

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Roof-Drain Flashing: Fabricate from the following material:
 - 1. Lead: 4.0 lb/sq. ft., hard tempered.
- C. Scuppers: Fabricate from the following material:
 - 1. Aluminum: 0.0320 inch thick.
- D. Exposed Trim, and Fasciae: Fabricate from the following material:
 - 1. Aluminum: 0.030 inch thick.

- E. Soffit Vent: Where indicated and as profiled on Drawings, provide 3-inch wide perforated soffit vent form the following material:
 - 1. Galvanized Steel: 0.0276-inch thick.
- F. Copings: Fabricate from the following material:
 - 1. Aluminum: 0.030 inch thick.
- G. Base Flashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276 inch thick.
- H. Counterflashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0217 inch thick.
- I. Flashing Receivers: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0217 inch thick.
- J. Drip Edges: Fabricate from the following material:
 - 1. Aluminum: 0.0320 inch thick.
- K. Eave Flashing: Fabricate from the following material:
 - 1. Aluminum: 0.0320 inch thick.
 - 2. Stainless Steel: 0.0156 inch thick.
 - 3. Terne-Coated Stainless Steel: 0.015 inch thick.
 - 4. Galvanized Steel: 0.0217 inch thick.
 - 5. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
 - 6. Coil-Coated Galvanized Steel: 0.0217 inch thick.
- L. Equipment Support Flashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276 inch thick.
- M. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0276 inch thick.
- N. Overhead-Piping Safety Pans: Fabricate from the following material:
 - 1. Galvanized Steel: 0.0396 inch thick.

2.6 ALUMINUM FINISHES

- A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

- B. Class I, Color Anodic Finish: AA-C22A42/A44 (Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
 - 1. Color: To match exterior finish and insulation system (EFIS).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
- D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- E. 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 where pre-tinned surface would show in finished Work.
 - 1. Do not solder the following metals:
 - a. Aluminum.

2. Pretinning is not required for the following metals:
 - a. Lead.
 3. 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.
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
1. Use joint adhesive for nonmoving joints specified not to be soldered.
- G. Sealant and Coping Compound: Install in accordance with manufacturer's written instructions and recommendations for conditions encountered.
- H. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- J. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
 2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- K. Install reglets to receive counterflashing according to the following requirements:
1. Where reglets are shown in concrete, furnish reglets for installation under Division 3 Section "Cast-in-Place Concrete."
 2. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry."
- L. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.
- M. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

- N. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- O. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
- P. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.
- Q. Splash Pans: Install where downspouts discharge on low-sloped roofs, unless otherwise shown. Set in roof cement or sealant compatible with roofing membrane.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 07620

SECTION 07720 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Equipment supports.
 - 2. Roof hatches.

1.3 QUALITY ASSURANCE

- A. Standards: Comply with the following:
 - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
 - 2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Equipment Supports:
 - a. Custom Curb, Inc.
 - b. Loren Cook Company.
 - c. Pate Co.(The).
 - d. Roof Products & Systems Corp.
 - e. ThyCurb, Inc.
 - 2. Roof Hatches:
 - a. Bilco Company.
 - b. Custom Curb, Inc.
 - c. Dur-Red Products, Inc.
 - d. Milcor, Inc.

- e. Nystrom Products Co.
- f. ThyCurb, Inc.
- g. O'Keeffe's Inc.

3. Walk-in Cooler Condenser Equipment Support

- a. Roof Products, Inc. – Jeff Emmett, (800) 262-6669
- b. Burt Manufacturing – Bob Daugherty, (800) 837-2872
- c. Roof Curb Specialists – Danny Polley, (972) 484-6500

2.2 MATERIALS, GENERAL

- A. Aluminum Sheet: ASTM B 209 for alclad alloy 3005H25 or alloy and temper required to suit forming operations, with mill finish, unless otherwise indicated.
- B. Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements, with mill finish, unless otherwise indicated.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M with G90 coating designation; commercial quality, unless otherwise indicated.
 - 1. Structural Quality: Grade 40, where indicated or as required for strength.
- D. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.
- E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- G. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

2.3 EQUIPMENT SUPPORTS

- A. General: Provide equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
- B. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747-inch- thick, structural-quality, hot-dip galvanized or aluminum-zinc alloy-coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.
 - 1. Provide preservative-treated wood nailers at tops of curbs and formed flange at perimeter bottom for mounting to roof.

2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
3. Fabricate units to minimum height of 8 inches, unless otherwise indicated.
4. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate support units with height tapered to match slope to level tops of units.

2.4 ROOF HATCHES

- A. General: Fabricate units to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loading pressure. Frame with minimum 9-inch- high, integral-curb, single-wall construction with 1-inch minimum insulation, formed cants and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction with 1- inch- thick insulation core. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.
- B. Type: Single-leaf personnel access.
 1. For Ladder Access: 30 by 36 inches.
- C. Material: Galvanized steel sheets.

2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.
- B. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated,
- C. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.
- D. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.
- E. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.
- F. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.2 CLEANING AND PROTECTION

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 07720

SECTION 07811 - SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes sprayed fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Compatibility and adhesion test reports.
- C. Product test reports.
- D. Research/evaluation reports.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
- B. Sprayed Fire-Resistive Materials Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
 - 1. Sprayed fire-resistive materials are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Testing is performed on specimens of sprayed fire-resistive materials that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
- C. Compatibility and Adhesion Testing: Engage a qualified testing and inspecting agency to prepare compatibility and adhesion test reports.
 - 1. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.

2. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with sprayed fire-resistive material.
- D. Fire-Test-Response Characteristics: Where indicated, provide products identical to those tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 2. Identify products with appropriate markings of applicable testing and inspecting agency.
- E. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat is provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.
- C. Sequence and coordinate application of sprayed fire-resistive materials with related work.
1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
 6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, tested and corrections have been made to defective applications.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within two years from date of Substantial Completion.
 1. Failures include, but are not limited to, cracking, flaking, spalling, eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.

PART 2 - PRODUCTS

2.1 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A. General: For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated for material composition and physical properties representative of installed products.
- B. Products: Subject to compliance with requirements, provide the following:
 1. Cementitious Sprayed Fire-Resistive Material:
 - a. Grace, W. R. & Co.--Conn., Construction Products Div.; Monokote Type MK-6s.
- C. Material Composition: As follows:
 1. Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
- D. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
 1. Dry Density: 15 lb/cu. ft. for average and individual densities regardless of density indicated in referenced fire-resistance design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."

2. Thickness: Provide minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 0.375 inch, per ASTM E 605:
 - a. Where the referenced fire-resistance design lists a thickness of 1 inch or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch.
 - b. Where the referenced fire-resistance design lists a thickness of less than 1 inch but more than 0.375 inch, the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch or 75 percent of the design thickness.
 - c. No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft..
3. Bond Strength: 200 lbf/sq. ft. minimum per ASTM E 736 under the following conditions:
 - a. Field test sprayed fire-resistive material that is applied to flanges of wide-flange, structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
 - b. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 200 lbf/sq. ft. minimum per ASTM E 736.
 - c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch.
4. Compressive Strength: 5.21 lbf/sq. in. as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch and minimum dry density shall be as specified, but not less than 15 lb/cu. ft..
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, or delamination per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch, maximum dry density is 15 lb/cu. ft., test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
9. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 0.
10. Fungal Resistance: No observed growth on specimens per ASTM G 21.

2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
 - 1. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory," for coating materials based on a series of bond tests per ASTM E 736.
 - 2. Primer is identical to those used in assemblies tested for fire-test-response characteristics of sprayed fire-resistive material per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material and to verify the following:
 - 1. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
 - 2. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
- B. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, loose mill scale, and incompatible primers, paints, and encapsulants.
- C. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.

- F. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by sprayed fire-resistive material manufacturer, install body of fire-resistive covering in a single course.
- G. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- H. Apply concealed sprayed fire-resistive material in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 2 "Concealed Sprayed Fire-Resistive Materials" Article.
- I. Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- J. Repair or replace work that has not been successfully protected.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Testing Services: Testing and inspecting of completed applications of sprayed fire-resistive material shall take place in successive stages, in areas of extent. Do not proceed with application of sprayed fire-resistive material for the next area until test results for previously completed applications of sprayed fire-resistive material show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
- C. Remove and replace applications of sprayed fire-resistive material where test results indicate that it does not comply with specified requirements for cohesion and adhesion, for density, or for both.
- D. Apply additional sprayed fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 07811
CVS 2/00

SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Work required to complete, as indicated by the Contract Documents, and furnish all supplementary items necessary for the proper installation of UL Rated Firestop Systems and Devices.
 - 1. Seal empty holes.
 - 2. Seal penetration at floors, fire rated walls and smoke barrier walls.
 - 3. Seal holes accommodating penetrating items such as cables, cable trays, pipes, ducts and conduits.
 - 4. Systems shall be UL Rated for appropriate required time rating.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
 - 4. Fire-resistance-rated roof assemblies.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti Construction Chemicals, Inc.
 - 2. Specified Technologies Inc.
 - 3. 3M Fire Protection Products.
 - 4. Tremco.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- F. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

- G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- H. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
 - 1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Through-penetration firestop system manufacturer's name.
 6. Installer's name.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

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SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
 - 1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Control and expansion joints in unit masonry.
 - b. Joints in exterior insulation and finish systems.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors and windows.
 - e. Control and expansion joints in ceiling and overhead surfaces.
 - f. Other joints as indicated.
 - 2. Exterior joints in the following horizontal traffic surfaces:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Tile control and expansion joints.
 - c. Joints between different materials listed above.
 - d. Other joints as indicated.
 - 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Other joints as indicated.
 - 4. Interior joints in the following horizontal traffic surfaces:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. **Source Limitations:** Obtain each type of joint sealant through one source from a single manufacturer.
- C. **Preconstruction Field-Adhesion Testing:** Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
 - 1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of nonelastomeric sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 5. **Test Method:** Test joint sealants by hand-pull method described below:
 - a. Install joint sealants in 60-inch- long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
 - 6. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

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

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.
- D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SEALANTS

- A. General:
1. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard color.
- B. Elastomeric Joint Sealants:
1. Standard: Provide manufacturer's standard chemical curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.
 2. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - a. Products:
 - 1) Chem-Calk 550; Bostik Inc.
 - 2) Pourthane; W.R. Meadows, Inc.
 - 3) NR-300 Urexpan, Type M; Pecora Corporation.
 - 4) Sikaflex – 2c SL; Sika Corporation.
 - 5) SL2; Sonneborn Building Products Div., ChemRex Inc.
 - 6) THC-900; Tremco.

- b. Type and Grade: M (multicomponent) and P (pourable).
 - c. Class: 25.
 - d. Applications: Exterior and interior joints in horizontal surfaces of concrete.
3. Low-Modulus Nonacid-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - a. Products:
 - 1) 790; Dow Corning.
 - 2) Silpruf; GE Silicones.
 - 3) 864; Pecora Corporation.
 - 4) Omniseal; Sonneborn Building Products Div., ChemRex Inc.
 - 5) Spectrem 1; Tremco.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 25.
 - d. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement when tested or adhesion and cohesion under maximum cyclic movement in accordance with ASTM C719.
 - e. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
 - f. Applications: Exterior and interior perimeter joints of metal frames in exterior walls.
4. Mildew-Resistant Silicone Sealant: Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes, and that comply with the following:
 - a. Products:
 - 1) 786 Mildew Resistant; Dow Corning.
 - 2) Sanitary 1700; GE Silicones.
 - 3) 898 Silicone Sanitary Sealant; Pecora Corporation.
 - 4) Tremsil 600 White; Tremco.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 25.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Applications: Interior joints in horizontal surfaces of nonporous substrates that are subject to in-service exposures of high humidity.

C. Latex Joint-Sealants:

1. Latex Sealant: Where joint sealants of this type are indicated, provide products in accordance with ASTM C834, complying with the following:
 - a. Products:
 - 1) Chem-Calk 600; Bostik Inc.
 - 2) AC-20; Pecora Corporation.
 - 3) Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
 - 4) Tremflex 834; Tremco.
 - b. Applications: Interior joints in field-painted vertical and overhead surfaces at perimeter of hollow metal door frames; in gypsum drywall and all other interior joints not indicated otherwise.

D. Miscellaneous Joint Sealants:

1. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

2.2 PREFORMED JOINT SEALANTS

- A. Preformed Silicone-Sealant System: For each product, provide manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
- B. Preformed Foam Sealants: For each product, provide manufacturer's standard preformed, precompressed, impregnated, open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following:
 1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
 2. Impregnating Agent: Manufacturer's standard.
 3. Density: Manufacturer's standard.

2.3 JOINT-SEALANT BACKING

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

- B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

- 1. Type C: Closed-cell material with a surface skin.

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean,

sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

- a. Masonry.
3. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
 - C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

- F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses provided for each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
- H. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply a bead of silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's printed schedule and covering a bonded area of not less than a 3/8 inch. Hold edge of sealant bead inside of masking tape by 1/4 inch.
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.
- I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 2. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - b. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field- adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free from voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 5. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- B. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

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

3.6 PROTECTION

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

END OF SECTION 07920

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DIVISION 8

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 08110 – STEEL DOORS AND FRAMES: Steel Doors and Frames
2. Section 08211 – FLUSH WOOD DOORS: Flush Wood Doors
3. Section 08331 – OVERHEAD COILING DOORS: Rolling Service Door.
4. Section 08334 – OVERHEAD COILING GRILLES: Security Grilles and Pharmacy Grille.
5. Section 08381 – TRAFFIC DOORS: Traffic doors.
6. Section 08410 – ALUMINUM ENTRANCES AND STOREFRONTS: Storefront Windows.
7. Section 08461 – SLIDING AUTOMATIC ENTRANCE DOORS: Telescoping Door.
8. Section 08512 – DRIVE-THRU WINDOW: Drive-Thru Window Package
9. Section 08711 – DOOR HARDWARE: Door Hardware.

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SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel doors.
 - 2. Steel door frames.
 - 3. Fire-rated door and frame assemblies.

1.3 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.4 NATIONAL ACCOUNT

A.CVS/Pharmacy has entered into a national account agreement with DH Pace Door Services for furnishing the Hollow Steel Doors and Frames package specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call DH Pace Door Services at (417) 831-5585.

1.5 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: Test at atmospheric pressure.
 - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

3. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Steel Doors and Frames:
 - a. Builders Hardware Corporation.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

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

- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 1 and Physical Performance Level C, (Standard Duty), Model 2 (Seamless).
- C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- D. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

2.4 FRAMES

- A. General: Provide steel frames for doors and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.042-inch- thick steel sheet for:
 - 1. Level 1 steel doors.
 - 2. Wood doors where indicated.
- C. Frames of 0.053-inch- thick steel sheet for:
 - 1. Door openings wider than 48 inches.
 - 2. Level 2 steel doors.
- D. Smoke Seals: Pemko S88D x length of head and jamb perimeter.
- E. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- F. Weatherstripping: Pemko 316AV at head and jambs.
- G. Plaster Guards: Provide 0.016-inch- thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where materials might obstruct hardware operation.
- H. Supports and Anchors: Fabricated from not less than 0.042-inch- thick, electrolytic zinc-coated or metallic-coated steel sheet.
 - 1. Wall Anchors in Masonry Construction: 0.177-inch- diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.

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

2.5 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door Faces: Fabricate exposed faces of doors and panels, including stiles from the following material:
 1. Cold-rolled steel sheet.
- D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Single-Acting, Door-Edge Profile: Square edge.
- H. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- I. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.
- J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- K. Thermal-Rated (Insulating) Assemblies: At exterior locations, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 1. Provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F or better.

- L. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
- M. Frame Construction: Fabricate frames to shape shown.
 - 1. For exterior applications, fabricate frames with mitered or coped and continuously welded corners.
 - 2. For interior applications, fabricate knock-down frames with mitered or coped corners, for field assembly.
- N. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- O. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- P. Glazing Stops: Manufacturer's standard, formed from 0.032-inch- thick steel sheet.
 - 1. Provide nonremovable stops on secure side of interior doors for glass in doors.
- Q. Astragals: As required by NFPA 80 to provide fire ratings indicated. Refer to Section 08711.

2.6 FINISHES

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Place frames before construction of enclosing walls and ceilings.
 - 2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

3. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
 4. For in-place gypsum board partitions, install knock-down, drywall slip-on frames.
 5. Install fire-rated frames according to NFPA 80.
 6. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
1. Fire-Rated Doors: Install within clearances specified in NFPA 80.

3.2 ADJUSTING AND CLEANING

- A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.
- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Coordinate with the following sections:
 - 1. Painting
 - 2. Steel Doors and frames.
 - 3. Door Hardware

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core doors with wood-veneer.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for vision lites and hardware.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with DH Pace Door Services for furnishing the Wood Doors package specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call DH Pace Door Services at (417) 831-5585.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with WIC's "Manual of Millwork."
 - 1. Provide WIC-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
 - 2. Provide WIC-Certified Compliance Certificate for installation.

- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Solid-Core Interior Doors: 5 years from substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flush Wood Doors:
 - a. Builders Hardware Corporation.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Doors for Opaque Finish:
 - 1. Grade: Custom.
 - 2. Faces for Interior Doors: Any closed-grain hardwood of mill option.

2.3 SOLID-CORE DOORS

- A. Particleboard Cores: Comply with the following requirements:
 - 1. Particleboard: ANSI A208.1, Grade LD-2.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, doors indicated to have kick, mop, or armor plates.
- B. Interior Veneer-Faced Doors:
 - 1. Core: Particleboard.
 - 2. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
 - 3. Construction: Seven plies, either bonded or nonbonded construction.
- C. Fire-Rated Doors:
 - 1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
 - 2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
 - a. 4-1/2-by-10-inch lock blocks, 5-inch midrail blocking, in doors indicated to have exit devices.

3. Edge Construction: Provide mill option clear styules and rails primed to receive paint.
4. Pairs: Furnish formed-steel edges and astragals to receive paint seals for pairs of fire-rated doors, unless otherwise indicated.
 - a. Finish steel edges and astragals to receive paint same color as doors.
5. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same species as door faces.
2. Profile: Manufacturer's standard shape.
3. At 45-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.5 FABRICATION

A. Fabricate doors in sizes indicated for Project-site fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

2.6 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Division 9 Section "Painting."
- B. Doors for Transparent Finish: Shop seal faces and edge of doors, including cutouts, with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section "Painting."

2.7 FACTORY FINISHING

- A. General: Comply with WIC's "Manual of Millwork" for factory finishing.
- B. Finish doors at factory.
- C. Transparent Finish:
 - 1. Grade: Custom.
 - 2. Finish: AWI System TR-6 catalyzed polyurethane.
 - 3. Finish: WIC System #1d. polyurethane, #5 catalyzed polyurethane.
 - 4. Staining: As indicated on drawings.
 - 5. Sheen: Satin.
- D. Opaque Finish:
 - 1. Grade: Custom.
 - 2. Finish: Manufacturer's standard finish with performance comparable to WIC System #7b. opaque pigmented lacquer.
 - 3. Color: As indicated on drawings.
 - 4. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."

- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- F. Field-Finished Doors: Refer to the following for finishing requirements:
 - 1. Division 9 Section "Painting."

3.3 ADJUSTING

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

END OF SECTION 08211

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ceiling access doors and frames.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Access Doors:
 - a. Cesco Products (888) 412-3726; Product: Model #LWT (SD)
Size: as indicated on the drawings.

2.2 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

2.3 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
 - 2. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.4 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.5 STEEL FINISHES

- A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.2 INSTALLATION

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

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 08311

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SECTION 08331 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following type of overhead coiling door:
 - 1. Service door.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Overhead Door Corporation for furnishing the rolling service door specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Overhead Door Corporation at (800) 972-1730.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling door through one source from a single manufacturer, including operator and controls.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Subject to compliance with requirements, provide products by the following:
 - 1. Overhead Door Corporation; Product: Stormtite Series 625.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Provide as standard with the manufacturer for the Owner for the door specified.

2.3 HOODS AND ACCESSORIES

- A. Provide as standard with the manufacturer for the Owner for the door specified.
- B. Chain Lock Keeper: Suitable for Owner-furnished padlock.
- C. Slide Bolt: One on each side. Total two (2).

2.4 COUNTERBALANCING MECHANISM

- A. Provide as standard with the manufacturer for the Owner for the door specified.

2.5 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Primer: Manufacturer's standard gray.
- D. Finish:
 - 1. Exterior Door and Frame: Refer to Drawings.
 - 2. Interior Door and Frame: Refer to Drawings.

2.6 MANUAL DOOR OPERATOR

- A. Chain-Hoist Operator: Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum 35-lbf effort for door operation. Provide alloy steel hand chain with chain holder secured to operator guide.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install door and operating equipment complete with necessary hardware, jamb and head angles/mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust door to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.3 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 - 3. Review data in the maintenance manuals. Refer to Division 1.

END OF SECTION 08331

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SECTION 08334 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes overhead coiling security and pharmacy grilles.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with QMI Roll Shutter Supply for furnishing the security grilles and pharmacy grille specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call QMI Roll Shutter Supply at (800) 446-2500.

1.4 DEFINITIONS

- A. Operation Cycle: One complete cycle of a grille begins with the grille in the closed position. The grille is then moved to the open position and back to the closed position.

1.5 PERFORMANCE REQUIREMENTS

- A. Operation-Cycle Requirements: Design overhead coiling grille components and operator to operate for not less than 20,000 cycles.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling grille manufacturer for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling grilles through source specified.

PART 2 - PRODUCTS

2.1 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. Provide as standard with the manufacturer for the Owner for the overhead coiling grilles specified.

2.2 HOODS AND ACCESSORIES

- A. Provide as standard with the manufacturer for the Owner for the overhead coiling grilles specified.

2.3 COUNTERBALANCING MECHANISM

- A. General: Counterbalance each grille by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to the curtain. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of each curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of case-hardened steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate.

2.4 FINISHES, GENERAL

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISH

- A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. Manufacturer's standard mill finish.
- C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.
 - 1. Color: White.

2.6 MANUAL GRILLE OPERATORS

- A. Crank-Hoist Operator: Provide crank-hoist operator consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit. Size gears to require no more than 35-lbf effort to turn crank. Fabricate gearbox to completely enclose operating mechanism and be oil tight. Provide manufacturer's standard crank-locking device.
 - 1. Provide manufacturer's standard removable operating arm for each crank-gear unit.

2.7 ELECTRIC GRILLE OPERATORS

- A. General: Provide electric grille operator assembly of size and capacity recommended and provided by grille manufacturer as standard for the Owner for the overhead coiling grilles specified. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install grilles and operating equipment complete with necessary hardware, according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust grilles to operate easily, free from warp, twist, or distortion and fitting tight for entire perimeter.

3.3 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below.
1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
 3. Review data in the maintenance manuals. Refer to Division 1.
 4. Schedule training with Owner with at least seven (7) days' advance notice.

END OF SECTION 08334

SECTION 08381 –TRAFFIC DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the double action traffic doors.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Eliason Corporation for furnishing the Traffic door specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Eliason Corporation at (800) 828-3655.

1.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.

PART 2 - PRODUCTS

2.1 TRAFFIC DOORS

- A. Easy Swing SCP-8 Double-Acting Door by Eliason Corporation.

2.2 MATERIALS

- A. Door: 3/4-inch exterior grade solid wood core with 18 gauge stainless steel edge cap and back channel; 1 inch total thickness.
 - 1. Traffic Doors to receive plastic laminate finish, (No. D315-60 Platinum by Wilsonart) both faces.

2.3 ACCESSORIES

- A. View windows 9 x 30 inch (270 sq in), clear acrylic window set in black rubber molding.

- B. ABS Scuff plates on both faces 24 inch-black.
- C. Hardware: Manufactures standard as required for installation conditions.
- D. 3 x 9 Jamb Guard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that openings is ready to receive work

3.2 INSTALLATION

- A. Install door unit assembly to manufacturer's installation instructions
- B. Use anchorage devices to securely fasten door assembly to door frame construction without distortion or imposed stresses.

3.3 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Remove labels and visible markings.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Wipe surfaces clean.

END OF SECTION 08381

SECTION 08410 - ALUMINUM STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior storefront systems.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into national account agreements with each of the following two (2) manufacturers for furnishing the storefront windows specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call:
 - 1. YKK AP America, Inc. at (800) 955-9551.
 - 2. Kawneer Company, Inc. at (317) 883-4267.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing storefront system similar to that required for this Project and who is acceptable to manufacturer.
- B. Source Limitations: Obtain each type of storefront system through one source from a single manufacturer.
- C. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of storefront system that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including, but not limited to, excessive deflection.
 - 2. Failure of system to meet performance requirements.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Water leakage through fixed glazing and frame areas.
- C. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. YKK AP America Inc.; Product:
 - a. Yes 45TU System for exterior
 - b. Yes 45F-S System for interior.
 - 2. Kawneer Company, Inc.; Contact Manufacturer for product corresponding to above

2.2 RELATED MATERIALS

- A. Glazing as specified in Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- C. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- D. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- E. Sealants and joint fillers for joints at perimeter of storefront system as specified in Division 7 Section "Joint Sealants."
- F. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 COMPONENTS

- A. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
- B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Reinforce members as required to retain fastener threads.
- C. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
- E. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
 - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

2.4 FABRICATION

- A. General: As standard with the manufacturer, fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners, anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
- G. Storefront: Fabricate framing in profile specified. Provide subframes and reinforcing of types required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.5 ALUMINUM FINISH

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Provide Valspar Ind. Coating with fluopan finish in color specified on drawings.

2.6 STEEL PRIMING

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of storefront system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing storefront system. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install glazing to comply with requirements of Division 8 Section "Glazing,".
- G. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants".
- H. Erection Tolerances: Install storefront system to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 ADJUSTING AND CLEANING

- A. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure storefront system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410

SECTION 08461 - SLIDING AUTOMATIC ENTRANCE DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes automatic entrance door system operating as follows:
 - 1. Bi-Parting sliding operation.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Stanley Access Technologies for furnishing the telescoping door package specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders and further information, call Stanley Access Technologies at (860) 679-6435.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is an authorized representative of the automatic entrance door manufacturer for both installation and maintenance of units required for this Project.
 - 1. Maintenance Proximity: Not more than two (2) hours' normal travel time from Installer's place of business to Project site.
- B. Source Limitations: Obtain automatic entrance doors through manufacturer specified.
- C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."
- D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."
- E. UL Standard: Provide power door operators that comply with UL 325.
- F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify automatic entrance door opening by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating automatic entrance doors without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Manufacturer shall provide product data and shop drawings to CVS for coordinating hardware and security requirements with electrical interface of door systems prior to installation.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the automatic entrance door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Lateral deflection of glass lite edges in excess of 1/175 of their length or 3/4 inch, whichever is less.
 - 2. Excessive air leakage.
 - 3. Faulty operation of operators and hardware.
 - 4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: One (1) year from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance: Beginning at Substantial Completion, provide twelve (12) months' full maintenance by skilled employees of automatic entrance door Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
 - 1. Engage an inspector certified by the American Association of Automatic Door Manufacturers to perform a safety inspection after each adjustment or repair, and at the end of the maintenance period. Submit the completed inspection form to Owner.
 - 2. Perform maintenance, including emergency callback service, during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Subject to compliance with requirements, provide one of the following:
 - 1. For 14'-0" door openings use Stanley Access Technologies; Div. of The Stanley Works; Product: Dura-Glide Series 3000 Bi-Part.
 - 2. For 8'-7 1/2" door openings use Stanley Access Technologies; Div. of The Stanley Works; Product: Dura-Glide Series 5300 Telescopic Automatic Sliding Entrance System.

2.2 RELATED MATERIALS

- A. Glazing: As specified in Division 8 Section "Glazing."
- B. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.
- C. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107; of consistency suitable for application.
- D. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEMS

- A. General: Provide manufacturer's standard automatic entrance door system, complete with doors, framing, operators, controls, activation devices, safety devices, and accessories as indicated.

- B. Provide door operators; activation and safety devices; and hardware, as standard with the manufacturer, for the Owner for the door specified.
 - 1. Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those to be provided by door manufacturer.

2.4 RELATED COMPONENTS

- A. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
- B. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.
 - 1. Reinforcement: Reinforce members as required to retain fastener threads.
 - 2. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- C. Signage: Comply with ANSI/BHMA A156.10.

2.5 FABRICATION

- A. General: Fabricate automatic entrance door system components to designs, sizes, and thicknesses specified and to comply with indicated standards.
- B. Prefabrication: Provide automatic entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
 - 1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
 - 2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
 - 3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - 4. Prepare components to receive concealed fasteners and anchor and connection devices.
 - 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
- C. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- D. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."
- E. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- F. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.
- G. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.
 - 1. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.
- H. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.
 - 1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.6 ALUMINUM FINISH

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish aluminum automatic entrance door system components to match adjacent aluminum storefront.
 - 1. Provide Valspar Ind. coating with fluopan finish in color specified on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

3.3 INSTALLATION

- A. General: Comply with automatic entrance door manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Entrances: Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.
 - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set tracks, header assemblies, operating brackets, and guides level and true to location with anchorage for permanent support.
 - 3. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Activation and Safety Devices: Install control devices and wiring, including connections to door operators, for complete installation of both interior and exterior motion detectors at sliding automatic entrance door.
- E. Glazing: Comply with installation requirements in Division 8 Section "Glazing,".
- F. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for installing sealants, fillers, and gaskets.
 - 1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated.
 - 2. Seal frame perimeter with sealant to provide weathertight construction.

3.4 ADJUSTING

- A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

- B. Readjust door operators and controls after repeated operation of completed installation equivalent to three (3) days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.5 CLEANING AND PROTECTION

- A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
 - 1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.
- B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure automatic entrance doors are without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors as specified below:
 - 1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, complying with safety requirements, and maintaining equipment and schedules.
 - 2. Review data in maintenance manuals. Refer to Division 1 Section.
 - 3. Schedule training with Owner with at least seven days' (7) advance notice.

END OF SECTION 08461

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SECTION 08512 – DRIVE-THRU WINDOW

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes sliding window with deal drawer and audio package.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Diebold, Inc. for furnishing the drive-thru window specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Diebold, Inc. at (603) 537-2325 ext. 2328.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable recommended specifications.
- B. Single Source Responsibility: Provide windows produced by specified manufacturer.

0.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
 - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of window units.

PART 2 - PRODUCTS

0.1 WINDOW UNIT

- A. Manufacturer: Where indicated on Drawings, provide one of the following sliding windows units with Level 1, bullet resistant glazing as manufactured by Diebold, Inc.
 - 1. For a 3'-8" x 8'-0" window unit use Model No. 00-013184-000A.

- B. Provide a complete window assembly, including glazing, with Deal Drawer No. 120-40 and an Audio Package with two (2) Commaster audio consoles, one (1) privacy handset, and one (1) chime interface option.
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

0.2 ACCESSORIES

- A. Provide trim, anchors, clips, fasteners, weatherstripping and hardware, for a complete installation, as standard with the manufacturer for the Owner for the window specified.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect openings before beginning installation. Verify that rough openings are correct and the sill plate is level.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installation of window unit, hardware, operators, and other components of the work.
- B. Set window units plumb, level and true to line, without warp or rack of frames. Provide proper support and anchor securely to surrounding construction with approved fasteners.
 - 1. Separate zinc-coated steel and other corrodible surfaces from sources of corrosion of electrolytic action at points of contact with other materials, by inserting a bituminous coating or plastic sheet materials.
- C. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" Section of Division 7 for compounds, fillers and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.
 - 1. Compounds, joint fillers, and gaskets to be installed after installation of window units are specified as work in another Section in Division 7.
 - 2. Repair abraded areas of factory applied finishes.

0.3 ADJUSTING

- A. Adjust operating hardware to provide a tight fit at contact points and weatherstripping, for smooth operation and a weathertight closure.

0.4 CLEANING

- A. Clean surfaces promptly after installation of windows. Exercise care to avoid damage to the finish. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of preglazed units promptly after installation of windows. Comply with requirements of the "Glass and Glazing" Section for cleaning and maintenance.

0.5 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 08512

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SECTION 08711 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Commercial door hardware:
 - 2. Cylinders for doors specified in other Sections.
- B. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
 - 1. Cylinders for locks on telescoping entrance doors.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with DH Pace Door Services for furnishing the Door Hardware as specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call DH Pace Door Services at (417) 831-5585.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain each type and variety of door hardware from supplier specified.
- C. Regulatory Requirements: Comply with provisions of the following:
 - 1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and NFPA 101, as applicable.

- D. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: Test at atmospheric pressure.
 - 2. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver keys to Owner by registered mail or overnight package service.

1.6 COORDINATION

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

1.7 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of operators and door hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: Three (3) years from date of Substantial Completion.
- D. Warranty Period for Manual Closers: Ten 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide six (6) months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section, and the Door Hardware Schedule at the end of Part 3.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish indicated, and named products.
 - 2. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3.

2.2 HINGES

- A. Size, Base Metal, and Corners: Provide as standard with the manufacturer for the Owner for the hinges scheduled.
- B. Template Requirements: Provide only template-produced units.
- C. Hinge Weight: Unless otherwise indicated, provide the following:
 - 1. Doors with Closers: Antifriction-bearing Standard-weight hinges.
 - 2. Entrance and Interior Doors: Antifriction-bearing Standard-weight hinges.
- D. Hinge Options: Comply with the following:
 - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed.
- E. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors.

3. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors; wood screws for wood doors. Finish screw heads to match surface of hinges.

2.3 LOCKS AND LATCHES

- A. Backset: 2-3/4 inches, unless otherwise indicated.

2.4 CYLINDERS AND KEYING

- A. Provide as standard with the manufacturer for the Owner for the telescoping door specified.
- B. Construction Keying: Comply with the following:
 1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide quantity as directed by Owner.
 - a. Furnish permanent cores to Owner for installation.
- C. Keying System: Provide a factory-registered keying system as directed by Owner:
- D. Keys: Provide nickel-silver keys complying with the following:
 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 2. Quantity: As determined by Owner:

2.5 STRIKES

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

2.6 CLOSERS

- A. Size of Units: Unless otherwise indicated, 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.

2.7 FABRICATION

- A. **Manufacturer's Nameplate:** Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. **Base Metals:** Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. **Fasteners:** Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. 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.

2.8 FINISHES

- A. **Standard:** Comply with BHMA A156.18.
- B. **Protect mechanical finishes** on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. **Appearance of Finished Work:** Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. **BHMA Designations:** Comply with base material and finish requirements indicated by the following:
 - 1. **BHMA 626:** Satin chromium plated over nickel, over brass or bronze base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 series.
 - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.
- B. Wood Doors: Comply with DHI A115-W series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 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.
- C. Thresholds: Set thresholds for exterior doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Door Closers: Adjust sweep period 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.
- B. Six-Month Adjustment: Approximately six (6) months after date of Substantial Completion, Installer shall perform the following:
1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
 2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
 3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.5 CLEANING AND PROTECTION

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

3.6 DOOR HARDWARE SCHEDULE

Hardware Set No. 1; Sliding Automatic Entrance Door:

1	Mortise cylinder w/ Const Core	TO1106
1	Mortise Thumb turn (interior side)	TO1124

Remainder of door hardware by door manufacturer. Refer to Section 08461 – SLIDING AUTOMATIC ENTRANCE DOOR

Hardware Set No. 2; Exit Doors;

1 1/2	pr. Butts NRP	TO-1038
1	Trident 4-Point Lock	KAP T-1
1	Closer	TO1033
1	Closer Stop Arm –CA578	
1	Head & jamb weatherstripping	3340 - 36 x 84
1	Threshold 1/2" x 5" x 36"	TO1022

1	Sweep	TO1024
1	Viewer (Receiving Area only)	TO1029

Hardware Set No. 3; Compactor Door:

1	Pr Butts	TO1131
1	Door Pull	TO1118
1	Perimeter Seal (3) sides	TO0119
1	Bottom Sweep -36"	TO1024
1	Padlock 2" Shackle	TO1109
1	Wall stop	TO1032
1	Slide Action Bolt –CD1271	TO1037

Hardware Set No. 4; Overhead Door

1	Padlock 4" Shackle	TO1110
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Remainder of door hardware by door manufacturer. Refer to Section 08331 – OVERHEAD COILING DOOR

Hardware Set No. 5; Manager's Office and Pharmacy:

1 1/2	pr. Butts NRP	TO1038
1	Lockset Storeroom	TO1017
1	Latch protector (Manager's Office only)	TO1028
1	Closer	TO1033
1	Closer Stop Arm –CA578 (Pharmacy only)	
1	Wall stop	TO1032
1	Viewer (Pharmacy only)	TO1029
1	Head and jamb smoke seals (Pharmacy only)	TO1019
3	Silencers (Manager's Office only)	TO1027

Hardware Set No. 6; Employee:

1 1/2	pr. Butts	TO1131
1	Pushbutton lock- L1021B-26D	TO1128-LH / TO1036-RH
1	Closer	TO1033
1	Wall Stop	TO1032
3	Silencers	TO1027

Hardware Set No. 7; Toilet Rooms:

1 1/2	pr. Butts	TO1131
1	Privacy Lock Set	TO1016
1	Closer	TO1033
2	Wall stop	TO1032
3	Silencers	TO1027

Hardware Set No. 8; Hall:

1 1/2	pr. Butts	TO1131
1	Pushbutton lock- L1021B-26D	TO1128-LH / TO1036-RH
1	Closer	TO1033
1	Wall Stop	TO1-32
3	Silencers	Refer to Section 08110

Hardware Set No. 9; Overhead Grilles, Cooler Door and Traffic Door:

All hardware by door manufacturer.

END OF SECTION 08711

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SECTION 08800 – GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Glazed entrances.
 - 4. Storefront framing.
 - 5. Security Glazing.

1.3 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not

less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For insulating glass.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- wide interspace.
 2. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F.
 3. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
 4. Solar Optical Properties: NFRC 300.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.
- C. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
- D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- E. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- F. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- G. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publication: GANA'S "Glazing Manual".
 - 2. SIGMA Publication: SIGMA TM-3000, "Vertical Glazing Guidelines."
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
 - 1. Insulating Glass Certification Council.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products equal to those manufactured by Pilkington, PPG Industries or Viracon.

2.2 INSULATING GLASS (TYPE G1), (TYPE G6 - where indicated on drawings)

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article.
 - 1. Provide Kind FT (fully tempered) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
- B. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - 1. Manufacturer's standard sealants.
- C. Spacer Specifications: Manufacturer's standard spacer material and construction.
- D. Corner Construction: Manufacturer's standard corner construction.
- E. Overall Unit Thickness of Each Lite: One inch.
- F. Interspace Content: Air.
- G. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - 1. Class 1 (clear).
 - 2. Annealed.
- H. Outdoor Lite: Type I (transparent glass, flat) float glass.
 - 1. Class 1 (clear).
 - 2. Annealed.
- I. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - 1. Class 1 (clear).
 - 2. Kind FT (fully tempered), Condition A (uncoated surfaces).
- J. Outdoor Lite: Type I (transparent glass, flat) float glass.
 - 1. Class 1 (clear).
 - 2. Kind FT (fully tempered), Condition A (uncoated surfaces).

2.3 LAMINATED GLASS UNITS (TYPE G2)

- A. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

- B. Interlayer: Polyvinyl Butyral of thickness with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - 1. For polyvinyl butyral interlayer, laminate lites in autoclave with heat plus pressure.
- C. Laminating process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
- D. Kind LT, consisting of two lites of annealed float glass.
- E. Outer Lite: Class 1 clear float glass.
 - 1. Annealed.
 - 2. Thickness: 1/8 inch.
- F. Inner Lite: Class 1 (clear) float glass.
 - 1. Annealed.
 - 2. Thickness: 1/8 inch
- G. Plastic Inner Layer:
 - 1. Thickness: 0.060 inch, but not less than that required to comply as a Type II safety glass material.
 - 2. Interlayer Color: Clear

2.4 ONE-WAY MIRROR GLASS (TYPE G3)

- A. Where indicated, provide ¼ inch thick annealed float glass Pilkington Mirropane T.M. transparent mirror glass in the sizes noted. Reflective coating shall meet the performance specifications as published by the manufacturer. The quality of the coating shall meet the requirements of ASTM C 1376-03. The transparent mirror shall be installed with the coated surface facing the observed or subject side of the glazing. A light level ratio of a least 8 to 1 from bright (subject) side to dark (observer) side shall be maintained for effective operation.

2.5 BULLET-RESISTANT GLASS (TYPE G4)

- A. Refer to Section 08512.

2.6 FLOAT GLASS (TYPE G5)

- A. Annealed Float Glass: ASTM C1036; Type I (transparent glass, flat); Quality-Q3 of class indicated.
 - 1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.

- B. Heat-Treated Float Glass: ASTM C1048; Type I (transparent glass, flat); Quality q3 (glazing select).
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless other wise indicate.
 - 2. Kind FT (fully tempered) float glass in place of annealed float glass where safety glass is indicated. Condition A (uncoated) Class 1 (clear)

2.7 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
 - 1. Additional Movement Capability: Provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement in ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.
- C. Low-Modulus Nonacid-Curing Silicone Glazing Sealant: Where glazing sealants of this designation are required, provide products complying with the following:
 - 1. Products: Provide one of the following:
 - a. 790; Dow Corning.
 - b. Omniseal; Sonneborn, Div of ChemRex, Inc.
 - c. Spectrem 1; Tremco.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - a. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.

2.8 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. EPDM, ASTM C 864.

2.9 MISCELLANEOUS GLAZING MATERIALS

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

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

- G. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.5 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four (4) days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08800

DIVISION 9

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 09511 – ACOUSTICAL PANEL CEILINGS: Acoustical Ceiling and Ceiling Grid.
2. Section 09651 – RESILIENT FLOORING – Resilient Flooring
3. Section 09681 – CARPET TILE: Carpet Tile.
4. Section 09950 – WALL COVERINGS: Wall Coverings.

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SECTION 09260 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum wallboard.
 - 2. Exterior soffit board.
 - 3. Sheathing.
 - 4. Non-Load – Bearing Steel framing.

1.3 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Framing and Furring:
 - a. Clark Steel Framing Systems.
 - b. Consolidated Systems, Inc.
 - c. Dale Industries, Inc. - Dale/Incor.
 - d. Dietrich Industries, Inc.
 - e. MarinoWare; Division of Ware Ind.
 - f. National Gypsum Company.
 - g. Scafco Corporation.
 - h. Unimast, Inc.
 - i. Western Metal Lath & Steel Framing Systems.
 - 2. Gypsum Board and Related Products:
 - a. American Gypsum Co.
 - b. G-P Gypsum Corp.
 - c. National Gypsum Company.
 - d. United States Gypsum Co.

2.2 STEEL SUSPENDED SOFFIT FRAMING

- A. Components, General: Comply with ASTM C 754 for conditions indicated.
- B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.
- C. Hangers: As follows:
 - 1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum ½-inch wide flange, with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
 - 1. Depth: 2-1/2-inch.

- E. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
 - 1. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum ½-inch wide flange, ¾-inch deep.

2.3 STEEL PARTITION FRAMING

- A. Components, General: As follows:
 - 1. Comply with ASTM C 754 for conditions indicated.
- B. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0312 inch.
 - 2. Depth: As indicated on drawings.
- C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.
- D. Proprietary Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
 - b. Metal-Lite, Inc.; The System.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0179 inch.
 - 2. Depth: 7/8 inch.
- F. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.4 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard: ASTM C 1396.
 - 1. Regular Type: In thickness indicated and long edges tapered.
 - 2. Type X: In thickness indicated and long edges tapered.
 - 3. Water-Resistant: ASTM C 1396, with core type in thickness indicated.
 - 4. Sag-Resistant Gypsum Wallboard: ASTM C 36, manufactured to have more sag resistance than regular type gypsum board. In thickness indicated and long edges tapered. Apply on all ceiling surfaces.

2.5 EXTERIOR SOFFIT BOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Exterior Gypsum Soffit Board: ASTM C 1177
 - 1. Core: 5/8 inch, G-P Gypsum Corp: Dens-Glass Gold.
 - 2. Core: 5/8 inch, United States Gypsum Co.: Fiberock "Aqua Tough".

2.6 SHEATHING

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Sheathing: ASTM C 1177
 - 1. Core: 1/2 inch, G-P Gypsum Corp: Dens-Glass Gold.
 - 2. Core: 1/2 inch, United States Gypsum Co.: Fiberock "Aqua Tough".

2.7 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized, rolled zinc steel sheet.
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners.
 - b. Bullnose Bead: Use at outside corners.
 - c. LC-Bead (J-Bead): Use at exposed panel edges.
 - d. L-Bead: Use where indicated.
 - e. Expansion (Control) Joint: Use where indicated.
- B. Exterior Trim: ASTM C 1047.
 - 1. Material: Hot-dip galvanized steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners.
 - b. LC-Bead (J-Bead): Use at exposed panel edges.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening. Use where indicated.

2.8 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.

- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Glass Mat Gypsum Sheathing Board: 10 x 10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

- D. Joint Compound for Exterior Applications:
 - 1. Glass-Mat Gypsum Sheathing Board: As recommended by manufacturer.

- E. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.

2.9 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Thermal Insulation: As specified in Division 7 Section "Building Insulation."
- D. Adhesive: Type recommended by laminate manufacturer to suit application.
 - 1. Adhesive for adhering plastic laminate wall wainscoting to gypsum board shall be a high strength polystyrene and polyurethane type equal to CP-96 Chil-Rene as manufactured by Childers Products Co.

2.10 TEXTURE FINISHES

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Primer: As recommended by textured finish manufacturer.
 - 2. Texture Finish: Roller apply finish texture coating in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
 - 1. Furnish devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLING NON LOAD-BEARING STEEL FRAMING, GENERAL

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
 - 1. Isolate ceiling assemblies where they abut or are penetrated by building structure.

2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
 - a. Use deep-leg deflection track where indicated.
 - b. Use proprietary firestop track where indicated.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
 4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.
- C. Sway-brace suspended steel framing with hangers used for support.
- D. For exterior soffits, install cross bracing and framing to resist wind uplift.
- E. Wire-tie furring channels to supports, as required to comply with requirements for assemblies indicated.

- F. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Furring Members): 16 inches o.c.

3.5 INSTALLING STEEL PARTITION

- A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.
 - 1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 - 1. Cut studs 1/2 inch short of full height to provide perimeter relief.
 - 2. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.
 - a. Terminate partition framing at suspended ceilings where indicated.
- D. Install steel studs and furring at the following spacings:
 - 1. Single-Layer Construction: 16 inches o.c., unless otherwise indicated.
 - 2. Multilayer Construction: 16 inches o.c., unless otherwise indicated.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - 1. Install two studs at each jamb, unless otherwise indicated.
 - 2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
 - 3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

- G. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect open concrete coffer, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffer, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

- K. TC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
 - 1. Space screws a maximum of 12 inches o.c. for vertical applications.
- M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.7 PANEL APPLICATION METHODS

- A. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
- B. Multilayer Application on Ceilings: Apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
- C. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- D. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- E. Exterior Soffits: Apply exterior gypsum soffit board panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Fasten with corrosion-resistant screws.
- F. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Install where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
2. Areas Not Subject to Wetting: Install standard gypsum wallboard panels to produce a flat surface except at locations indicated to receive water-resistant panels.

3.8 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 1. Level 3: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compound shall be smooth and free of tool marks and ridges. This finish is to be applied in the Walk-In Cooler, Receiving Area, Stairs, Electrical Room, Upper Floor and Mezzanine area only.
 2. Level 5: All joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. A thin skim coat of joint compound, or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges. This finish is to be applied in all area unless noted otherwise.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

3.10 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture finish manufacturer's written recommendations.

3.11 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
 - 1. Notify Architect seven (7) days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
 - 2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
 - a. Installation of 80 percent of lighting fixtures, powered for operation.
 - b. Installation, insulation, and leak and pressure testing of water piping systems.
 - c. Installation of air-duct systems.
 - d. Installation of air devices.
 - e. Installation of mechanical system control-air tubing.
 - f. Installation of ceiling support framing.

END OF SECTION 09260

SECTION 09511 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes ceilings consisting of acoustical panels and exposed suspension systems.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Armstrong World Industries, Inc. for furnishing the acoustical ceiling and grid specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Armstrong at (800) 442-4212.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from source specified.
 - 1. Source Limitations for Suspension System: Obtain each suspension system from source specified.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
 - 2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
 - 3. Fire-resistance-rated assemblies, which are indicated by design designations from UL's "Fire Resistance Directory," from ITS/Warnock Hersey's "Directory of Listed Products," or from the listings of another testing and inspecting agency, are identical in materials and construction to those tested in accordance with ASTM E 119.

4. Products are identified with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 1. Acoustical Ceiling Units: Full-size units equal to 2.0 percent of amount installed.
 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Products: Subject to compliance with requirements, provide products indicated as manufactured by Armstrong World Industries, Inc.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances.
 - 1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface in accordance with ASTM E 795.
- B. Acoustical Panel Colors and Patterns: As Scheduled

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems indicated that comply with applicable ASTM C 635 requirements.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied white finish for type of system indicated: As Scheduled
- C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- E. Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from same material and finish as that used for exposed flanges of suspension system runners.
 - 1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- F. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For interior ceilings consisting of acoustical panels weighing less than 1 lb/sq. ft., provide hold-down clips spaced 24 inches o.c. on all cross tees as specified below:
 - 1. Regardless of panel weight, place hold-down clips within twenty (20) feet of exterior doors.
 - 2. Provide hold down clips at all exterior ceiling panel applications.

2.4 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
 - 1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - b. SHEETROCK Acoustical Sealant; United States Gypsum Co.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for clips and other ceiling anchors whose installation is specified in other Sections.
 - 1. Furnish anchorage devices to other trades for installation well in advance of time needed for coordinating other work.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below in accordance with manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
 2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Do not attach hangers to steel deck tabs.
 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

- E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels with pattern running in one direction parallel to long axis of space.
 - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 - 3. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated or required.
 - 4. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09511

SECTION 09540 – DIRECT–APPLIED EXTERIOR FINISH SYSTEM (DEFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1) Materials and installation of DEFS on the underside of canopy soffits.

- B. Related Sections

- 1) Exterior Insulation And Finish System - EIFS: Section 07240
 - 2. Gypsum Board Assemblies: Section 09260

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Sto Corporation for furnishing the exterior coating specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Sto Corp. at (888) 786-3437.

1.4 DESIGN REQUIREMENTS

- A. Design for a maximum allowable coating deflection, normal to the plane of the wall, of L/360.
- B. Design for wind load in conformance with code requirements.
- C. Prevent the accumulation of water behind the coating either by condensation within the wall assembly or leakage through construction in the design and detailing of the wall assembly and construction.

1.5 QUALITY ASSURANCE

- A. Contractor Requirements

- 1) Engaged in application of special coatings for a minimum of three (3) years.
 - 2. Employ skilled applicators to execute work with minimum three (3) years of experience with the materials, methods and requirements of the specified work.
 - 3. Successful completion of a minimum of three (3) projects of similar size and complexity to the specified work.

4. Provide the equipment, manpower and supervision on the job site to install coatings in compliance with Sto's published specifications and details and the project plans and specifications.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in their original sealed containers bearing manufacturer's name and identification of product.
- B. Protect acrylic based materials (pail products) from freezing and temperatures in excess of 90° F . Store away from direct sunlight.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.7 PROJECT/SITE CONDITIONS

- A. Maintain ambient and surface temperatures above 40° F during application and drying period, minimum 24 hours after application of coating.
- B. Provide supplementary heat for installation in temperatures less than 40° F .
- C. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.8 SEQUENCING

- A. Install flashings, copings and sealants immediately after installation of coatings when they are dry.

1.9 WARRANTY

- A. Provide manufacturer's standard materials warranty.

PART 2 - PRODUCTS

2.1 SHEATHING FOR SOFFIT FRAME CONSTRUCTION:

- A. As Specified in Section 09260 "Gypsum Board Assemblies".

2.2 DEFS ACCESSORIES:

- A. DEFS Accessories as furnished by Plastics Components, Inc.

2.3 MATERIALS SURFACE PREPARATION

A. Surface Conditioner

- 1) Sto Plex W - acrylic based surface sealer and hardener (for chalking surfaces or highly absorptive surfaces).

B. Fabric Reinforcement

- 1) Sto Mesh - nominal 4.5 oz/sq yd symmetrical, interlaced open weave glass fiber reinforcing fabric made with minimum 20% by weight alkaline resistant coating for compatibility with Sto materials.

C. Base Coat

- 1) Sto BTS-Plus - one-component, polymer-modified, cement-based skim coat material with fiber reinforcement (for applications up to 1/16 inch [1.6 mm] thick).

2.4 PRIMERS

- ### A. Sto Primer – acrylic-based primer.

2.5 FINISH COATINGS

- ### A. Sto Silco Lit 1.5 – silicone enhanced acrylic textured wall coating with graded marble aggregate.

2.6 MATERIALS (NON-PROPRIETARY)

- ### A. Portland Cement: ASTM C 150, Type 1.
- ### B. Water: Clean and potable.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS

- #### A. Pre-qualify under Quality Assurance requirements of this specification (Section 1.5 A).

3.2 EXAMINATION

A. Inspect surfaces for:

- 1) Contamination - algae, curing compounds, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew, mold or other foreign matter.
2. Delamination, damage, defects and deterioration - record location
3. Cracks - measure crack width and record location.
4. Surface absorption and chalkiness.

5. Moisture content and moisture damage - use a moisture meter to determine if the surface is dry enough to receive the coating and record areas of moisture damage.
6. Plumbness - record areas that are not within required tolerances.

B. Inspect sheathing application for compliance with applicable requirements:

- 1) Glass faced Gypsum sheathing – Georgia – Pacific publication 102250.

C. Report results of inspection and deviation from the requirements of this specification and other conditions that might adversely affect the coatings work to the General Contractor.

3.3 INSTALLATION

A. Install DEFS in compliance with manufacturers published written instructions.

3.4 PROTECTION

A. Provide protection of installed coatings from dust and dirt, precipitation, freezing, continuous high humidity and damage from other trades or building components.

END OF SECTION 09540

SECTION 09651 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Vinyl composition floor tile.
 - 2. Vinyl base

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Interface Services for furnishing and installing the vinyl products manufactured by "Centiva" as specified on the "Interior Finish Schedules." For pricing quotations, placing orders, and further information, please call Interface Services at (770) 975-4821.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
 - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Store tiles on flat surfaces.
- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

- A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.
 - 2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Refer to interior finish schedule on drawings.

2.2 RESILIENT TILE

- A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements specified in the Resilient Tile Flooring Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

- A. General: Comply with tile manufacturer's written installation instructions.
- B. Lay out 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 of a tile at perimeter.
 - 1. Lay tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in basket-weave pattern with grain direction alternating in adjacent tiles.
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. 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 chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Hand roll tiles according to tile manufacturer's written instructions.
- J. Apply rubber stair treads and accessories to stairs as indicated and according to manufacturer's written installation instruction.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing resilient products:
1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 2. Sweep or vacuum floor thoroughly.
 3. Do not wash floor until after time period recommended by flooring manufacturer.
 4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to flooring manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
 3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
 2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.5 RESILIENT TILE FLOORING SCHEDULE

- A. Vinyl Composition Tile: Where this product is indicated, provide vinyl composition floor tile complying with the following:
1. Manufacturers Product and Color: Refer to interior finish schedule on drawings.
 2. Thickness: 1/8 inch.
 3. Size: 12 by 12 inches.

- B. Vinyl Base: Where this product is indicated, provide vinyl base complying with the following:
1. Manufacturers Product and Color: Refer to interior finish schedule on drawings.
 2. Thickness: 1/8 inch

END OF SECTION 09651

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Resilient wall base.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
 - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

- A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.
- D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each different type, color, pattern, and size of resilient product installed.
 - 2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Refer to interior finish schedule on drawings.

2.2 RESILIENT WALL BASE

- A. Vinyl Wall Base: Products complying with FS SS-W-40, Type II and with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.3 RESILIENT ACCESSORIES

- A. Vinyl Accessories: Products complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.4 INSTALLATION ACCESSORIES

- A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Install resilient products according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 3. Do not stretch base during installation.
 - 4. Install premolded outside and inside corners before installing straight pieces.
- C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum horizontal surfaces thoroughly.
3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
4. Damp-mop or sponge resilient products to remove marks and soil.

B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.

1. Apply protective floor polish to vinyl resilient products installed on floors and stairs that are free from soil, visible adhesive, and surface blemishes, if recommended by manufacturer.
 - a. Use commercially available product acceptable to resilient product manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
2. Cover resilient products installed on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors and stairs after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
2. After cleaning, reapply polish on vinyl products on floors and stairs to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.5 RESILIENT WALL BASE AND ACCESSORY SCHEDULE

A. Vinyl Wall Base VWB-V2: Where this designation is indicated, provide vinyl wall base complying with the following:

1. Products: Refer to Interior Finish Schedule in drawings.
2. Style: Cove with top-set toe.
3. Minimum Thickness: 1/8 inch.
4. Height: 4 inches.
5. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet.
6. Outside Corners: Premolded.
7. Inside Corners: Premolded.

8. Surface: Smooth.

END OF SECTION 09653

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SECTION 09681 - CARPET TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes carpet tile and installation.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Interface Services for furnishing and installing the carpet tile specified in this section. For pricing quotations, placing orders, and further information, please call Interface Services at (770) 975-4821.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet tile until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tile over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

- D. Where items are indicated for installation on top of carpet tile, install carpet tile before installing these items.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Carpet Tile Warranty: Written warranty, signed by carpet tile manufacturer agreeing to replace carpet tile that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Products: Refer to Interior Finish Schedule in drawings.
- B. Refer to Section 09680 carpet section for additional information.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and that is recommended by carpet tile manufacturer.
- C. At Interface carpet installations, Adhesive: Quantum Optima, pressure sensitive adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 - 2. Trowelled subfloor finishes shall comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 13, "Carpet Modules (Tiles)."
- B. Installation Method: Glue-down; install every tile with releasable adhesive.

- C. Cut and fit carpet tile 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 tile manufacturer.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- E. 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.
- F. Install carpet tile grains perpendicular to each other.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 15, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.5 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.6 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
 - 1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:

- A. Benjamin Moore
- B. ACTEL Coatings
- C. ICI Dulux

2.2 PAINT MATERIALS, GENERAL

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood.
 - c. When transparent finish is required, backprime with spar varnish.
 - d. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, covers, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
 10. Sand lightly between each succeeding enamel or varnish coat.

- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- I. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

- A. Refer to drawings.

END OF SECTION 09900

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SECTION 09950 - WALL COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Vinyl wall covering.

1.3 NATIONAL ACCOUNTS

- A. CVS/Pharmacy has entered into an agreement with Wolf Gordon for furnishing the wall covering in the Pharmacy Area as specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Wolf Gordon at (800) 347-0550.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed five (5) projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

- A. Space Enclosure and Environmental Limitations: Do not install wall covering until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.
- B. Lighting: Do not install wall covering until a lighting level of not less than 15 foot-candles is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Rolls of Wall Covering Material: Full-size units equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 ADHESIVES

- A. General: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application, as recommended by wall covering manufacturer.

2.2 ACCESSORIES

- A. As recommended by wall covering manufacturer.

2.3 FINISHES

- A. Refer to Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance of Work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt.
- C. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Prime new gypsum board with "08400/Clear" as manufactured by Nu-Brite/Muralo.

- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.
- E. Acclimatize wall covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION, GENERAL

- A. General: Comply with wall coverings manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Cut wall covering panels in roll number sequence. Change run numbers at partition breaks and corners only.
- C. Install wall covering with no gaps or overlaps.
- D. As applicable, match pattern 72 inches above finish floor.
- E. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners. No horizontal seams.
- F. Remove air bubbles, wrinkles, blisters, and other defects.
- G. Trim edges for color uniformity, pattern match, and tight closure at seams and edges. Butt seams.

3.4 CLEANING

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended by wall covering manufacturer.
- C. Replace strips that cannot be cleaned.

END OF SECTION 09950

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SECTION 09971 – WATERPROOF WALL PANELS

PART 1 - GENERAL

0.1 SCOPE

- A. Provide waterproof wall panels where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

0.2 REFERENCE

- A. ASTM D570 – Test Method for Water Absorption of Plastics.
- B. ASTM D2240 – Test Method for Rubber Property – Durometer Hardness.
- C. ASTM E84 – Surface Burning Characteristics of Building Materials.

0.3 QUALITY ASSURANCE

- A. Standards:
 - 1. Comply with USDA Criteria for incidental food contact and ASTM E84, Class C, for surface burning characteristics of flame spread less than 200 and smoke density less than 450.
 - 2. Comply with ASTM D570 and ASTM D2240.
- B. Use of adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for performance of the Work of this Section.

0.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with the recommendations and instructions of the Manufacturer.

PART 2 - PRODUCTS

0.1 MANUFACTURER

- A. Marlite: 202 Harger Street, Dover, OH. 44622, ASD Tel: (330) 343-6621, Fax: (330) 343-7296

0.2 WALL PANELS

A. Marlite FRP (Fiber Reinforced Panels) Panels:

1. Size: 4' – 0" x 8' – 0".
2. Sheet Thickness: 3/32 (2.4mm) nominal.
3. Color: P100 White.
4. Finish Texture: Pebble Surface.

0.3 OTHER MATERIALS

- A. Trim: Matching Marlite® molding trim as supplied by panel manufacturer for outside/inside corners, vertical joints, openings, outside angles, end caps, and ceiling intersections.
- B. Fasteners: Manufacturer's standard rivets.
- C. Adhesive: Non-flammable adhesive as recommended by the manufacturer for substrate encountered.
- D. Sealant: As recommended by panel manufacturer.
- E. Provide other materials, not specifically described, but required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Architect.

PART 3 - EXECUTION

0.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

0.2 INSTALLATION

- A. Installation of panels shall be in strict accordance with the manufacturer's recommendations.
- B. Promptly, upon completion of installation, clean all exposed surfaces with methods and materials recommended by the manufacturer of the panels.

END OF SECTION 09971

DIVISION 10

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 10100 – VISUAL DISPLAY BOARDS: Bulletin Boards.
2. Section 10200 – VISUAL DISPLAY WALLS: Steel Pharmacy Bays.
3. Section 10340 – TRELIS UNIT: Trellis Unit.
4. Section 10425 – INTERIOR SIGNAGE: Graphics, Aisle Signs and Toilet Signs.
5. Section 10426 – EXTERIOR SIGNAGE: Pylon, Monument, Drive-Thru, and Building Signs.
6. Section 10450 – CART CORRAL: Cart Storage Enclosure.
7. Section 10801 – TOILET ACCESSORIES

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SECTION 10100 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Bulletin board.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Newton Distributing Company for furnishing all the bulletin boards as specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders and further information call Newton Distributing Company at (877) 837-7745 or (617) 969-4002.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the manufacturer for both installation and maintenance of the type of units required for this Project.
- B. Fire-Test-Response Characteristics: Provide bulletin boards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify tackboards with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 10 or less.

1.5 WARRANTY

- A. General Warranty: Made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCESSORIES

- A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch-thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim from manufacturer's standard structural support accessories to suit conditions indicated.

2.2 FABRICATION

- A. Assembly: Provide factory-assembled tackboard units, unless field-assembled units are required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.
 - 1. Surfaces to receive bulletin board shall be dry and free of substances that would impair the bond between tackboards and substrate.
 - 2. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Deliver factory-built boards completely assembled in one piece without joints, where possible.
- B. Install units in locations as indicated on drawings and in according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.3 ADJUSTING AND CLEANING

- A. Verify that accessories required for each unit have been properly installed and that operating units function properly.
- B. Clean units according to manufacturer's written instructions.

END OF SECTION 10100

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SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes toilet compartments and screens as follows:
 - 1. Type: Steel, color-coated finish.
 - 2. Compartment Style: Overhead braced and floor anchored.
 - 3. Screen Style: Floor anchored.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details of installation, and attachments to other Work.
- C. Samples: For each exposed finish and for each color and pattern required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mills Company (The).

2.2 MATERIALS

- A. Panel, Pilaster, and Door Material:
 - 1. Steel Sheets with Color-Coated Finish: Mill-phosphatized, corrosion-resistant steel sheet; stretcher-leveled flatness, ASTM A 591/A 591M, Class C, or ASTM A 653/A 653M; with manufacturer's standard baked finish.
 - a. Color: As selected from manufacturer's full range.
- B. Core Material for Metal-Faced Units: Sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch** minimum for doors, panels, and screens and **1-1/4 inches** minimum for pilasters.
- C. Pilaster Shoes and Sleeves (Caps): Stainless steel, not less than **3 inches** high.

- D. Stirrup Brackets: Manufacturer's standard.
- E. Continuous Brackets: Manufacturer's standard.

2.3 FABRICATION

- A. Toilet Compartments: Overhead braced and floor anchored.
- B. Urinal Screens: Floor anchored.
- C. Metal Units: Internally reinforce metal panels for hardware, accessories, and grab bars.
- D. Doors: Unless otherwise indicated, **24-inch-** wide in-swinging doors for standard toilet compartments and **36-inch-** wide out-swinging doors with a minimum **32-inch-** wide clear opening for compartments indicated to be accessible to people with disabilities.
- E. Door Hardware: Clear anodic aluminum or cast-zinc alloy (zamac). Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
 - 1. Hinges: Self-closing type, adjustable to hold door open at any angle up to 90 deg rees.
 - 2. Latches and Keepers: Surface-mounted unit designed for emergency access and with combination rubber-faced door strike and keeper.
 - 3. Door Bumper: Rubber-tipped bumpers at out-swinging doors or entrance screen doors.
 - 4. Door Pull: Provide at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units rigid, straight, level, and plumb, with not more than **1/2 inch** between pilasters and panels and not more than **1 inch** between panels and walls. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed fasteners finished to match hardware. Use sex-type bolts for through-bolt applications.
 - 1. Stirrup Brackets: Align brackets at pilasters with brackets at walls. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - 2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

END OF SECTION 10155
CVS 11/99

SECTION 10200 – VISUAL DISPLAY WALLS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes visual display walls (steel pharmacy bays).

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Uniweb, Inc. for furnishing the visual display wall (steel pharmacy bays) specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Uniweb, Inc., at (951) 279-7999.

0.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the manufacturer for installation of the type of visual display walls required for this Project.

0.5 DELIVERY, STORAGE, AND HANDLING

- A. Protected materials against weather and contact with damp or wet surfaces in accordance with manufacturer's instructions and recommendations.

0.6 PROJECT CONDITIONS

- A. Field Measurements: Verify field measurements before fabrication to ensure proper fittings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Coordinate wall construction to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

0.1 MATERIALS, GENERAL

- A. Provide panels, retainers, channel and tube style legs, metal deck, sway bars, spacers and hardware as standard with the manufacturer for the Owner for a complete installation.

PART 3 - EXECUTION

0.1 EXAMINATION

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

0.2 PREPARATION

- A. Clean substrates of projections and substrates detrimental to application.

0.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, or too small to fabricate with proper joining arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install visual display walls in accordance with manufacturer's instructions, level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Install to tolerances as required by the manufacturer.
 - 3. Coordinate visual display wall with materials and systems in or adjacent to it. Provide cutouts for electrical items that penetrate wall system.

0.4 ADJUSTING

- A. Replace visual display wall that is damaged or does not comply with requirements. Wall system may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

0.5 CLEANING

- A. Clean visual display walls on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 10200

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SECTION 10290 – ELECTRIC BIRD ABATEMENT SYSTEM

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes electric bird abatement system.

0.3 PREFERRED SUPPLIER

- A. CVS/Pharmacy has entered into an agreement with Bird-B-Gone for furnishing the electric bird abatement system as specified in this section. Complete installation shall be by the Contractor. For pricing quotation, placing orders and further information call Bird-B-Gone at (800) 392-6915.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, Shock Track System for Birds as manufactured by Bird-B-Gone.

0.2 COMPONENTS

- A. Shock Track System shall have the following features:
 - 1. Shock track direct charge transformer.
 - 2. Equipment kit, which includes the following:
 - a. 100'-0" track – beige colored
 - b. mounting clips
 - c. power terminal connectors
 - d. insulated lead-in wire
 - e. connectors

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install complete shock track system on building trellis unit as indicated on drawings in strict accordance with manufacturer's instructions.

0.2 CLEANING

- A. Clean all surfaces of shock track system. Exercise care to avoid damage.

0.3 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, shock track system will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 10290

SECTION 10340 – TRELLIS UNIT

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes a prefabricated trellis above the main entrance.
- B. Related Section includes the following:
 - 1. Exterior Insulation and Finish System – EIFS – Section 07240.

0.3 PREFERRED SUPPLIER

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers listed below for furnishing the trellis unit specified in this section. Complete installation shall be by the contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.
 - 1. Schmidt Progressive at (800) 272-3706.
Area: CT, DC, DE, IL, IN, KY, MA, ME, MD, MI, MO, NH, NJ, NY, OH, PA, RI, TN, VA, VT, WV.
 - 2. Fibergrate Composite Structures at (508) 981-3547.
Areas: AL, GA, KS, LA, MS, MN, NC, OK, SC.

PART 2 - PRODUCTS

0.1 MANUFACTURER

- A. Subject to compliance with requirements, Provide prefabricated trellis as manufactured by Schmidt Progressive, LLC.

0.2 MATERIALS

- A. Provide trellis in profile and location as indicated on Drawings including, but not necessarily limited to, properly sized threaded tie rods and manufacturer's standard finish. Finish shall be ready for specified EIFS coat.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install prefabricated trellis at building entrance, complete, in strict accordance with manufacturer's instructions and recommendations.

0.2 CLEANING

- A. Clean all exposed surfaces, exercising care to avoid damage to final structure and finish.

0.3 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, trellis will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 10340

SECTION 10425 – INTERIOR SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes, but is not necessarily limited to, the following types of signs:
 - 1. Graphics.
 - 2. Aisle markers.
 - 3. Toilet signs.
 - 4. Employee hand wash signs.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers below for furnishing the interior graphics and aisle markers specified in this section. Complete installation shall be by the contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.
 - 1. King Retail Solutions at (800) 533-2796, ask for the CVS Account Manager
Areas: AL, GA, IA, IL, IN, KS, KY, LA, MI, MN, MO, MS, MT, NC, ND, NE, OH, OK, SC, TN, WI, WV
 - 2. LSI Retail Graphics at (401) 766-7446, ask for the CVS Account Manager
Areas: CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT
- B. CVS/Pharmacy has entered into a national account agreement with Newton Distributing Company for furnishing the Toilet Signs and Employee Hand Wash Signs as specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders and further information call Newton Distributing Company at (877) 837-7745 or (617) 969-4002.

1.4 QUALITY ASSURANCE

- A. Toilet Signs:
 - 1. Signs shall comply with State and Local Codes. Refer to drawings for additional signage notes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Toilet Signs:

1. Plastic for ADA compliant raised copy and braille core plies in contrasting colors, in finishes and color combinations, as selected from the manufacturer's standards.
 - a. Signs to have 5/8-inch high letters raised 1/32-inch, accompanied by Grade 2 braille, 8" x 8" signs to have a 6-inch area for pictograms.
 - b. Famed: Plastic frame in contrasting color.
 - c. Mounting with double face tape.

B. Employee Hand Wash Signs

1. Sign is provided by owner and installed contractor

PART 3 - EXECUTION

3.1 INSTALLATION

A. Graphics and Aisle Signs:

1. Locate sign units and accessories where indicated, using mounting methods in compliance with the manufacturer's instructions and the drawings.
 - a. Install signs level, plumb, and at the height indicated or required, with sign surfaces free from distortion or other defects in appearance.
2. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods as recommended by the manufacturer for the substrate encountered.

B. Toilet Signs:

1. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 - a. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
2. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
 - a. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

C. Employee Hand Wash Signs:

1. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 - a. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
2. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
 - a. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10425

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SECTION 10426 – EXTERIOR SIGNS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following:
 - 1. Pylon sign.
 - 2. Monument sign.
 - 3. Drive-thru signs.
 - 4. Building signs.
 - 5. Address signs.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers below for furnishing the pylon sign, monument sign, drive-thru signs, and building signs as specified in this section. Complete installation shall be by the contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.
 - 1. Anchor Sign at (843) 576-3202, contact Josh Muckelvaney
Areas: AL, GA, KY, NC, SC, TN
 - 2. Chandler at (214) 902-2000, contact Doug Hallan
Areas: AR, KS, LA, MS, OK
 - 3. Coast Signs at (714) 999-1976, contact Theresa Heitkamp
Areas: MT
 - 4. Icon Identity Solutions at (847) 631-3148, contact Dan Parkin
Areas: IA, MN, ND, NE, NJ, NY (all NY except upstate), PA, SD, WI
 - 5. Poyant Signs at (800) 544-0961, contact Gary McCoy at ext. 128
Areas: CT, MA, ME, NH, NY (upstate only), RI, VT
 - 6. Service Neon at (703) 354-3000, contact Rick Pepper at ext. 313
Areas: DC, DE, MD, VA, WV
 - 7. Sign Art at (800) 422-3030
Areas: IN, MI, OH
 - 8. Southwest Signs at (210) 757-9112
Areas: CO, NM
 - 9. Sure Light Signs at (708)343-7446, contact Jerry Shaw
Areas: IL, MO

0.4 PERFORMANCE REQUIREMENTS.

- A. Design Criteria: Design, fabricate, and install exterior post and panel signs to withstand a wind velocity of 100 mph on the total sign area, in all directions.

0.5 QUALITY ASSURANCE

- A. Installer Qualifications: Contractor shall enter into a contract with the sign company chosen by the Owner for installation of pylon sign, monument sign, drive-thru signs, and building signs.
- B. For dimensional address signs, engage an experienced installer who is an authorized representative of the manufacturer and who has completed installation of signs similar in material, design, and extent to that indicated for this Project and with a record of successful in service performance.

0.6 DELIVERY AND HANDLING

- A. Dimensional Address Signs:
 - 1. Delivery: Provide protective covering or crating as recommended by the manufacturer to protect sign components and surfaces against damage during transportation and delivery.
 - a. Coordinate delivery time so signs can be installed within 24 hours of receipt at Project site.
 - 2. Handle signs carefully to prevent breakage, surface abrasion, denting, soiling, and other defects. Comply with the manufacturer's written handling instructions for unloading components subject to damage.
 - a. Inspect sign components for damage on delivery.
 - b. Do not install damaged sign components.
 - c. Repair minor damage to signs, provided the finish repair is equal in all respects to the original work and is approved by Architect; otherwise, remove and replace damaged sign components.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide dimensional address signs by the following:
 - 1. H.B. Ives.
- B. Manufacturer of remaining exterior signage to be determined by Owner.

0.2 PYLON, MONUMENT, DRIVE-THRU AND BUILDING SIGNS

- A. Materials, components, fabrication, and finishes to be determined by the National Account manufacturer above.

0.3 DIMENSIONAL ADDRESS SIGN

- A. Metal Address Numbers: Form individual numbers. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Comply with requirements indicated for finish, style, and size.
 - 1. Metal: Aluminum.
 - 2. Size: 5 inches tall.
 - 3. Color: Black.
 - 4. Style: "The Ives Artisan Collection".

PART 3 - EXECUTION

0.1 PREPARATION

- A. Furnish templates, anchor bolts, internal reinforcement, and other items required to be set in concrete post foundations at proper for setting.

0.2 INSTALLATION

- A. General: Locate sign units and accessories where indicated or required, using mounting methods complying with manufacturer's written instructions.
- B. Pylon and Monument Signs:
 - 1. Excavation: In firm, undisturbed or compacted soil, drill or (using a post-hole digger) hand-excavate holes for each post to the minimum diameter required, but at least 4 times the largest post cross-section.
 - 2. Setting Posts: In accordance with sign manufacturer's instructions.
 - 3. Set anchor bolts and other embedded items required for installation.
 - 4. Install signs level, plumb, and at height indicated, with surfaces free from distortion or other defects in appearance.

0.3 CLEANING AND PROTECTING

- A. At completion of installation, clean soil surfaces of sign units according to manufacturer's written instructions.
- B. Protect installed sign units from damage until acceptance by Owner.

END OF SECTION 10426

SECTION 10450 – CART CORRAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes double cart storage enclosure.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Leggett & Platt Store Fixtures Group for furnishing the cart storage enclosure in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in:

1. Leggett & Platt Charleston
4500 Goer Drive, Charleston, SC 29406
Tel: 1(843) 308-5205
Areas: AR,AL,GA,IL,IN,KY,LA,MS,NC, OH, SC, TN, VA, WV.
2. Leggett & Platt Genesis Inc.
3842 Redman Drive, Fort Collins, CO 80524
Tel: 1(800) 257-9315
Areas:CO,CT,DC,DE,IA,ID,KS,MA,ME,MD,MI,MO,MN,MT,ND,NE,NH,NJ,NM,
NY,OK,OR,PA,PR,RI,SD,UT,VT,WA,WI,WY.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.

PART 2 - PRODUCTS

0.1 MANUFACTURER

- A. Manufacturers: Subject to compliance with requirements, provide cart storage enclosure by Leggett & Platt Store Fixtures Group for configuration as shown on the drawings.

0.2 COMPONENTS

- A. Provide accessories as required and as standard with the manufacturer for the Owner for the unit required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect final location area for a clean and level floor; floor area shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
 - 1. Attach each vertical rail to the concrete floor with four (4) - 3" DynaBolt screws
- B. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory-applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, double cart storage enclosure will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 10450

SECTION 10520 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection accessories.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide extinguishers listed and labeled by FM.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Portable Fire Extinguishers:
 - a. Ansul Incorporated.
 - b. Badger; Div. of Figgie Fire Protection Systems.
 - c. J.L. Industries, Inc.
 - d. Larsen's Manufacturing Company.

2.2 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity for each location indicated.
- B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb nominal capacity, in enameled-steel container.

2.3 ACCESSORIES

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.
 - 1. Provide brackets for extinguishers not located in cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing blocking where extinguishers are to be installed.
- B. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - 1. Fasten mounting brackets to structure, square and plumb.

END OF SECTION 10520

SECTION 10801 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Toilet accessories.

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Newton Distributing Company for furnishing all the Toilet Accessories as specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders and further information call Newton Distributing Company at (877) 837-7745 or (617) 969-4002.

1.4 QUALITY ASSURANCE

- A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices as required to prevent delaying the Work.

1.6

1.7

1.8 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
 - 1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide accessories as scheduled.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Galvanized Steel Sheet: ASTM A 653/A 653M, G60.
- C. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- D. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

- A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Provide concealed anchorage where possible.
- C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

- A. Paper Towel Dispenser: Centerpull paper towel dispenser Model #DP-QTS-180E/URO/1 IFBGF. Purchase from DelVecchio at (401) 821-2700.
- B. Toilet Tissue Dispenser: Where this designation is indicated, provide toilet tissue dispenser Model 0710 as manufactured by American Specialties, Inc.

- C. Grab Bars: Where this designation is indicated, provide stainless-steel grab bar B-6806 as manufactured by Bobrick. Size and location as shown on Drawings.
- D. Mirror Unit: Where this designation is indicated, provide mirror B-293 1836 as manufactured by Bobrick.
- E. Baby Changing Station: Where this designation is indicated, provide horizontal baby changing station Model KB 100-00 as manufactured by Koala Corporation. Purchase from Carriage Trade at (781) 933-3216.
- F. Hand Dryer: Where this designation is indicated, provide hand dryer Model XL-W as manufactured by Excel Dryer Inc. To purchase contact Lance LaFave with Newton Distributing Company at (877) 837-7745.
- G. Toilet Seat Cover Dispenser: Where this designation is indicated, provide toilet seat cover dispenser Model B-5221 as manufactured by Bobrick.
- H. Single Coat Hook: Where this designation is indicated, provide single coat hook Model 0740-Z as manufactured by American Specialties, Inc.

END OF SECTION 10801

SECTION 10860 – CONVEX MIRROR

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes convex mirror.

PART 2 - PRODUCTS

0.1 MANUFACTURER

- A. Lester L. Brossard Co.

0.2 COMPONENTS

- A. Convex Mirror, Model P-260MR with the following features:
 1. 26" diameter convex acrylic mirror
 2. 20 gauge steel back with baked enamel finish
 3. Rubber gasket seal
 4. Adjustable swivel and mounting bracket

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install complete convex mirror in location as indicated on drawings in strict accordance with manufacturer's instructions.

0.2 CLEANING

- A. Clean all surfaces of convex mirror. Exercise care to avoid damage.

0.3 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, convex mirror will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 10860

DIVISION 11

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 11020 – SECURITY SAFES: Free-Standing Front Store and Pharmacy Security Safes.
2. Section 11172 – WASTE COMPACTOR.
3. Section 11200 – WALK IN COOLER: Walk In Beverage Display Cooler.
4. Section 11400 – COOLER AND FREEZERS: Cooling and Refrigeration Units.

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SECTION 11010 – OWNER FURNISHED ITEMS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section provides for handling items specified in this section that shall be furnished by the Owner.
- B. Where scheduled, items specified shall be stored and installed by the Contractor; otherwise items shall be stored by the Contractor and installed by the Owner.

0.3 PROJECT CONDITIONS

- A. Owner will furnish items as scheduled at end of this Section. The Work includes providing support systems to receive Owner's equipment and plumbing, mechanical, and electrical connections.
- B. Owner Responsibilities:
 - 1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
 - 3. After Delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
 - 4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
 - 5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
 - 6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
- C. Contractor Responsibilities:
 - 1. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
 - 2. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.

3. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
4. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
5. The Contractor shall determine the specific requirements of each Owner furnished item in order to verify field measurements for an accurate fit.
6. Coordination with applicable trades before installation shall be by the Contractor.

0.4 SEQUENCE AND SCHEDULING

- A. Sequence of Owner furnished of equipment installation with other work is required to minimize possibility of damage and soiling during the construction period.

PART 2 - PRODUCTS

0.1 OWNER FURNISHED/CONTRACTOR INSTALLED ITEMS

- A. Cash drop boxes and Change Drawers.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Installation of Owner furnished items shall be in strict accordance with respective manufacturer's recommendations, applicable industry standards, and Owner's instructions.

END OF SECTION 11010

SECTION 11020 – SECURITY SAFES

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes free-standing front store and pharmacy security safes.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Corporate Safes Specialists for furnishing the security safe specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Corporate Safes Specialists at (708) 371-4200.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.

PART 2 - PRODUCTS

0.1 SECURITY SAFE

- A. To be determined by Owner.

0.2 ACCESSORIES

- A. Provide accessories as required and as standard with the manufacturer for the Owner for the unit required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect final location area for a clean and level floor; floor area shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, security safe will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 11020

SECTION 11172 – WASTE COMPACTOR

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes waste compactor.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Marathon Equipment Company for furnishing the waste compactor specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Marathon Equipment at 800-633-8974.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.

0.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual location for waste compactor by accurate field measurement. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.

PART 2 - PRODUCTS

0.1 WASTE COMPACTOR

- A. Provide one of the compactors below as specified on drawings.
 1. Model No. RJ-225NA with 40 yard compaction container, chute, magnetic switch and start/stop station.
 2. Model No. VIP vertical compactor with platform and compaction container.
 3. Model No. VIP vertical compactor with compaction container.

0.2 ACCESSORIES

- A. Provide accessories and features as required and as standard with the manufacturer for the Owner for the unit required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation area for a clean and level floor space; and materials for electrical wiring and connections. Compactor area shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, compactor will be free of damage or deterioration at the time of Substantial Completion.

0.5 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventative maintenance.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".

4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 11172

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SECTION 11174 - WASTE BALERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general-purpose, commercial, waste balers.

1.2 QUALITY ASSURANCE

- A. 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.
- B. Waste Baler Standards: Comply with ANSI Z245.5, "Safety Requirements for Baling".

1.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers below for furnishing the waste baler as specified in this section. Complete installation shall be by the contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.
 - 1. PTR Baler & Compactor Co. at (800) 523-3654 ext 2311
Areas: Michigan only
 - 2. Ver-Teck Inc at (800) 328-3398 ext 216
Areas: All areas except Michigan

PART 2 - PRODUCTS

2.1 Waste Baler

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Ver-Tech Inc.; Model M-42
 - 2. PTR Baler & Compactor Co – Model1800

2.2 WASTE BALER FABRICATION

- A. Fabricate baler with smooth, eased exposed edges. Fabricate bins, baler chambers, unit bodies, and similar components of steel plate with welded joints. Reinforce with structural-steel members sized and spaced to withstand impacts and pressures of normal operations and to prevent excessive long-term development of waves and valleys. Fabricate equipment with replaceable parts at points of normal wear.
- B. Provide electrical devices, controls, and materials of type and quality recommended by manufacturer for applications indicated. See Division 16 Sections for power characteristics and service to equipment, including disconnect switches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set waste balers level, plumb, properly aligned, and securely and accurately in place. Anchor as required for secure operation.
- B. Complete field assembly with joining methods recommended in writing by manufacturer. Grind welds smooth and restore finishes.

3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain waste balers.

END OF SECTION 11174
CVS CUSTOM

SECTION 11200 – WALK-IN COOLER

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes walk-in beverage display cooler.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with MASTER-BUILT for furnishing the walk-in cooler specified in this section. System shall be supplied by the General Contractor and complete installation shall be by the manufacturer under contract with the General Contractor. For pricing quotations, placing orders, and further information, call MASTER-BUILT at (800) 647-1284.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Single Source Responsibility: Provide system produced by specified manufacturer.

0.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations for cooler by accurate field measurement. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
 - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

0.1 WALK-IN COOLER

- A. Provide prefabricated, sectional walk-in cooler as manufactured by Master-Bilt of size, profile and capacity as standard for the Owner. Standard components shall include, but not necessarily be limited to, foamed-in-place urethane insulation; cam-lock tongue and groove connector construction and vinyl floor screeds; exterior/interior finish system; display doors and door hardware; shelves; electrical and refrigeration features; and condensate drainage

0.2 ACCESSORIES

- A. Provide accessories as required and as standard with the manufacturer for the Owner for the unit required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation area for a clean and level floor space; materials for electrical wiring and connections, and condensate drain piping shall be in place. Cooler area shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support and anchor securely to surrounding construction with approved fasteners.
 - 1. Separate zinc-coated steel and other corrodible surfaces from sources of corrosion of electrolytic action at points of contact with other materials by manufacturer's standard means.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.
- B. Comply with requirements of the "Glass and Glazing" Section for cleaning and maintenance of glazing.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, cooler will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 11200

SECTION 11400 – COOLER AND FREEZERS

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes:
 - 1. Free-standing freezer.
 - 2. Pharmacy refrigerators.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with MASTER -BILT for furnishing the cooler and freezers specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call MASTER-BILT at (800) 647-1284.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.

0.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations for cooler and freezers by accurate field measurement. Coordinate fabrication schedule with construction progress to avoid delay of the work.
 - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

0.1 COOLERS AND FREEZERS

- A. Provide prefabricated, coolers and freezers of size, profile and capacity as standard for the Owner. Standard components shall include, but not necessarily be limited to, insulation; exterior/interior finish system; doors and door hardware; shelves; electrical and refrigeration features; and condensate drainage.

0.2 ACCESSORIES

- A. Provide accessories as required and as standard with the manufacturer for the Owner for the units required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for a clean and level floor space; materials for electrical wiring and connections, and condensate drain piping shall be in place. Areas shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation of each unit.
- B. Provide proper support for each unit as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. All penetrations through insulated panels should be sealed with both an expanding foam sealant and silicone sealant per manufacturer's requirements.
- D. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, cooler and freezers are free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 11400

DIVISION 12

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 12300 – STEEL GONDOLA: Merchandise and storage fixtures.

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SECTION 12300 – STEEL GONDOLA

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes steel gondolas.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Lozier Store Fixtures for furnishing the steel gondolas in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Lozier Store Fixture at (800) 228-9882.

0.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the manufacturer for installation of the type of steel gondolas walls required for this Project.

0.5 DELIVERY, STORAGE, AND HANDLING

- A. Protected materials against weather and contact with damp or wet surfaces in accordance with manufacturer's instructions and recommendations.

0.6 PROJECT CONDITIONS

- A. Field Measurements: Verify field measurements before fabrication to ensure proper fittings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements. Coordinate wall construction to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

0.1 MATERIALS, GENERAL

- A. Provide panels, retainers, channel and tube style legs, metal deck, sway bars, spacers and hardware as standard with the manufacturer for the Owner for a complete installation.

PART 3 - EXECUTION

0.1 EXAMINATION

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

0.2 PREPARATION

- A. Clean substrates of projections and substrates detrimental to application.

0.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, or too small to fabricate with proper joining arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install steel gondolas in accordance with manufacturer's instructions, level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Install steel gondolas per final merchandise plan.
 - 2. Install to tolerances as required by the manufacturer.
 - 3. Coordinate steel gondolas with materials and systems in or adjacent to it. Provide cutouts for electrical items that penetrate wall system.

0.4 ADJUSTING

- A. Replace visual display wall that is damaged or does not comply with requirements. Wall system may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

0.5 CLEANING

- A. Clean steel gondolas on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 12300

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DIVISION 13

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 13851 – FIRE ALARM: Fire Alarm System.

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SECTION 13851 - FIRE ALARM

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes fire alarm systems with manual stations, detectors, signal equipment, controls, and devices.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers listed below for furnishing the fire alarm system specified in this section. Complete installation shall be by the contractor. For pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.
 1. Guardian Alarm Co. at (248) 423-1021
Area: Michigan Only.
 2. AFA Protective System at (671) 312-5598
Areas: AL, CT, DC, DE, GA, MA, ME, MD, NC, NH, NJ, NY, PA, RI, SC, VA, VT, WV
 3. BCI Technologies at (817) 649-0686
Areas: IN, IL, KS, KY, LA, MO, MS, OH, OK, TN
 4. MRJ Security at (978) 372-3489
Areas: MN

0.4 DEFINITIONS

- A. FACP: Fire alarm control panel.
- B. LED: Light-emitting diode.
- C. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

0.5 SYSTEM DESCRIPTION

- A. General: Noncoded, zoned system with manual and automatic alarm initiation; and hard-wired for signal transmission, using separate individual circuits for each zone of alarm initiation and notification appliances.

0.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is an authorized representative of the FACP manufacturer for both installation and maintenance of units required for this Project.

- B. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
- C. Compliance with Local Requirements: Comply with applicable building code, local ordinances and regulations, and requirements of authorities having jurisdiction.
- D. Comply with NFPA 72.

0.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Smoke Detectors, Fire Detectors, and Flame Detectors: Quantity equal to 10 percent of amount of each type installed, but not less than one unit of each type.
 - 2. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than one unit of each type.
 - 3. Keys and Tools: One extra set for access to locked and tamperproofed components.

PART 2 - PRODUCTS

0.1 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. Control of System: By the FACP.
- B. System Supervision: Automatically detect and report open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
- C. Priority of Signals: Automatic alarm response functions resulting from an alarm signal from one zone or device are not altered by subsequent alarm, supervisory, or trouble signals. An alarm signal is the highest priority. Supervisory and trouble signals have second- and third-level priority. Higher-priority signals take precedence over signals of lower priority, even when the lower-priority condition occurs first. Annunciate and display all alarm, supervisory, and trouble signals regardless of priority or order received.
- D. Noninterference: A signal on one zone shall not prevent the receipt of signals from other zones.
- E. System Reset: All zones are manually resettable from the FACP after initiating devices are restored to normal.
- F. Transmission to Remote Alarm Receiving Station: Automatically route alarm, supervisory, and trouble signals to a remote alarm station by means of a digital alarm communicator transmitter and telephone lines.
- G. System Alarm Capability during Circuit Fault Conditions: System wiring and circuit arrangement prevent alarm capability reduction when a single ground or open circuit occurs in an initiating device circuit, signal line circuit, or notification-appliance circuit.
- H. Basic Alarm Performance Requirements: Unless otherwise indicated, operation of a manual station, automatic alarm operation of a smoke or flame or heat detector, or operation of a sprinkler flow device initiates the following:

1. Notification-appliance operation.
2. Identification at the FACP and the remote annunciator of the zone originating the alarm.
3. Transmission of an alarm signal to the remote alarm receiving station.
4. Shutdown of fans and other air-handling equipment serving zone when alarm was initiated.
5. Recording of the event in the system memory.

I. Alarm Silencing, System Reset and Indication: Controlled by switches in the FACP.

1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.

J. Water-flow alarm switch operation initiates the following:

1. Notification-appliance operation.

K. Sprinkler valve-tamper switch operation initiates the following:

1. A supervisory, audible, and visible "valve-tamper" signal indication at the FACP and the annunciator.
2. Transmission of supervisory signal to remote alarm receiving station.

L. Removal of an alarm-initiating device or a notification appliance initiates the following:

1. A "trouble" signal indication at the FACP and the annunciator for the device or zone involved.
2. Transmission of trouble signal to remote alarm receiving station.

M. FACP Alphanumeric Display: Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating the report. Display monitoring actions, system and component status, system commands, programming information, and data from the system's historical memory.

0.2 MANUAL PULL STATIONS

A. Description: Fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color.

1. Double-action mechanism requires two actions, such as a push and a pull, to initiate an alarm.
2. Station Reset: Key or wrench operated; double pole, double throw; switch rated for the voltage and current at which it operates.

0.3 SMOKE DETECTORS

A. General: Include the following features:

1. Operating Voltage: 24-V dc, nominal.
2. Plug-in Arrangement: Detector and associated electronic components are mounted in a module that connects in a tamper-resistant manner to a fixed base with a twist-locking plug connection. Terminals in the fixed base accept building wiring.

3. Integral Visual-Indicating Light: LED type. Indicates detector has operated.
4. Sensitivity: Can be tested and adjusted in-place after installation.

B. Photoelectric Smoke Detectors: Include the following features:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

C. Duct Smoke Detector: Ionization type.

1. Sampling Tube: Design and dimensions as recommended by the manufacturer for the specific duct size, air velocity, and installation conditions where applied.
2. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

0.4 OTHER DETECTORS

A. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or rate of rise of temperature that exceeds 15 deg F per minute, unless otherwise indicated.

1. Mounting: Adapter plate for outlet box mounting.
2. Mounting: Plug-in base, interchangeable with smoke detector bases.

0.5 NOTIFICATION APPLIANCES

A. Description: Equip for mounting as indicated and have screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. When operating, bells provide a sound-pressure level of 94 dB, measured 10 feet from the bell. 10-inch size, unless otherwise indicated. Bells are weatherproof where indicated.

C. Horns: 24-V dc; with provision for housing the operating mechanism behind a grille. Horns produce a sound-pressure level of 90 dB, measured 10 feet from the horn.

D. Visible Alarm Devices: Xenon strobe lights listed under UL 1971 with clear or nominal white polycarbonate lens. Mount lens on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output: 110 candela.
2. Strobe Leads: Factory connected to screw terminals.

0.6 CENTRAL FACP

A. Cabinet: Lockable steel enclosure. Arrange interior components so operations required for testing or for normal maintenance of the system are performed from the front of the enclosure. If more than one unit is required to form a complete control panel, fabricate with matching modular unit enclosure to accommodate components and to allow ample gutter space for field wiring and interconnecting panels.

1. Mounting: Surface.
- B. Alarm and Supervisory Systems: Separate and independent in the FACP. Alarm-initiating zone boards consist of plug-in cards. Construction requiring removal of field wiring for module replacement is unacceptable.
- C. Control Modules: Include types and capacities required to perform all functions of fire alarm systems.
- D. Indications: Local, visible, and audible signals announce alarm, supervisory, and trouble conditions. Each type of audible alarm has a different sound.
- E. Indicating Lights and System Controls: Individual LED devices identify zones transmitting signals. Zone lights distinguish between alarm and trouble signals, and indicate the type of device originating the signal. Manual switches and push-to-test buttons do not require a key to operate. Controls include the following:
 1. Alarm acknowledge switch.
 2. Alarm silence switch.
 3. System reset switch.
 4. LED test switch.
- F. Resetting Controls: Prevent the resetting of alarm, supervisory, or trouble signals while the alarm or trouble condition still exists.
- G. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and system components, including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 1. Display: Liquid-crystal type, 40 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- H. Instructions: Printed or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

0.7 REMOTE ANNUNCIATOR

- A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, reset, and test.
 1. Mounting: Flush cabinet, NEMA 250, Class 1.
- B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

0.8 EMERGENCY POWER SUPPLY

- A. General: Components include valve-regulated, recombinant lead acid battery; charger; and an automatic transfer switch.
- B. Battery Capacity: Comply with NFPA 72.
- C. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide capacity for 150 percent of the connected system load while maintaining batteries at full charge. If batteries are fully discharged, the charger recharges them completely within four hours. Charger output is supervised as part of system power supply supervision.
- D. Integral Automatic Transfer Switch: Transfers the load to the battery without loss of signals or status indications when normal power fails.

0.9 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Listed and labeled under UL 864 and NFPA 72.
- B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP panel, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising two lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.
- C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.
- D. Self Test: Conducted automatically every 24 hours with report transmitted to central station.

0.10 RADIO ALARM TRANSMITTER

- A. Listed and labeled under NFPA 72 and NFPA 1221. Comply with 47 CFR 90.

0.11 WIRE

- A. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
- B. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.

PART 3 - EXECUTION

0.1 EQUIPMENT INSTALLATION

- A. Connect the FACP with a circuit breaker with lockable handle or cover.
- B. Manual Pull Stations: Mount semiflush in recessed back boxes.
- C. Water-Flow Detectors and Valve Supervisory Switches: Connect for each sprinkler valve station required to be supervised. Supplied and installed by sprinkler contractor.
- D. Ceiling-Mounted Smoke Detectors: Not less than 4 inches from a side wall to the near edge. For exposed solid-joist construction, mount detectors on the bottom of joists. On smooth ceilings, install not more than 30 feet apart in any direction.
- E. Wall-Mounted Smoke Detectors: At least 4 inches, but not more than 12 inches, below the ceiling.
- F. Smoke Detectors near Air Registers: Install no closer than 60 inches.
- G. Duct Smoke Detectors: Comply with manufacturer's written instructions.
 - 1. Verify that each unit is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 2. Install sampling tubes so they extend the full width of the duct.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Combine audible and visible alarms at the same location into a single unit.
- I. Visible Alarm-Indicating Devices: Install at 80" AFF or 6 inches below the ceiling, whichever is lower.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- K. FACP: Surface mount with tops of cabinets not more than 72 inches above the finished floor.
- L. Annunciator: Install with the top of the panel not more than 72 inches above the finished floor.

0.2 WIRING INSTALLATION

- A. Wiring Method: Install wiring as required by NFPA 70, Article 760. Conceal raceway except in unfinished spaces and as indicated.
- B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

- C. Cable Taps: Use numbered terminal strips in junction, pull and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- D. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

0.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Basic Electrical Materials and Methods."
- B. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."
- C. Install instructions frame in a location visible from the FACP.
- D. Paint power-supply circuit breaker red and label "FIRE ALARM."

0.4 GROUNDING

- A. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

0.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and connections and to supervise pretesting, testing, and adjustment of the system. Report results in writing.
- B. Pretesting: After installation, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the compliance of the system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
- C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of witnesses to preliminary tests.
- D. Final Test Notice: Provide a minimum of 10 days' notice in writing when the system is ready for final acceptance testing.
- E. Minimum System Tests: Test the system according to procedures outlined in NFPA 72. Minimum required tests are as follows:
 - 1. Verify the absence of unwanted voltages between circuit conductors and ground.
 - 2. Test all conductors for short circuits using an insulation-testing device.

3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on record drawings.
4. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
5. Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
6. Test each initiating and indicating device for alarm operation and proper response at the control unit. Test smoke detectors with actual products of combustion.
7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications.
8. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log on the satisfactory completion of tests.

0.6 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

0.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide a minimum of 8 hours' training.
2. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

0.8 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and sensitivities to suit actual occupied conditions. Provide up to three requested visits to Project site for this purpose.

END OF SECTION 13851

SECTION 13915 - FIRE-SUPPRESSION PIPING AND SPRINKLERS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes fire-suppression piping and equipment for the following building systems:
 - 1. Wet-pipe, fire-suppression sprinklers, including piping, valves, specialties, and automatic sprinklers.

0.3 DEFINITIONS

- A. CPVC: Chlorinated polyvinyl chloride plastic.
- B. Hose Connection: Valve with threaded outlet matching fire hose coupling thread for attaching fire hose.
- C. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

0.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design sprinklers and obtain approval from authorities having jurisdiction.
- B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:
 - 1. Include 10 psi margin of safety for available water flow and pressure.
 - 2. Include losses through water-service piping, valves, and backflow preventers.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
 - a. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500- sq. ft. area.
 - 4. Maximum Protection Area per Sprinkler: 130 square feet.
- C. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

0.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
- B. **Engineering Responsibility:** Preparation of working plans, calculations, and field test reports by a qualified professional engineer and NICET Level 3 sprinkler designer, as indicated above. Base calculations on results of fire-hydrant flow test.
- C. **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 fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
- D. **Manufacturer Qualifications:** Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. **Sprinkler Components:** Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
- F. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. **NFPA Standards:** Equipment, specialties, accessories, installation, and testing complying with NFPA 13, "Installation of Sprinkler Systems."

0.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. **Sprinkler Cabinets:** Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Refer to Fire Protection Drawings and specifications.

0.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

0.3 PIPES AND TUBES

- A. Ductile-Iron Pipe: AWWA C151, mechanical-joint type; with cement-mortar lining and seal coat according to AWWA C104. Include gland, rubber gasket, and bolts and nuts according to AWWA C111.
- B. Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller.
- C. Thinwall, Threadable Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10.
- D. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller and NFPA 13 specified wall thickness in NPS 6 to NPS 10.
- E. Thinwall Steel Pipe: ASTM A 135 or ASTM A 795, threadable, with nonstandard OD and wall thickness less than Schedule 10.

0.4 PIPE AND TUBE FITTINGS

- A. Ductile-Iron Fittings: ASTM A 47, malleable-iron or ASTM A 536, ductile-iron casting complying with AWWA pipe size; with ends factory grooved according to AWWA C606.
- B. Cast-Iron Threaded Flanges: ASME B16.1.
- C. Cast-Iron Threaded Fittings: ASME B16.4.
- D. Malleable-Iron Threaded Fittings: ASME B16.3.
- E. Steel, Threaded Couplings: ASTM A 865.
- F. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
- G. Steel Flanges and Flanged Fittings: ASME B16.5.
- H. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

0.5 JOINING MATERIALS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for pipe-flange gasket materials and welding filler metals.
- B. Ductile-Iron, Keyed Couplings: UL 213 and AWWA C606, for ductile-iron pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts.
- C. Ductile-Iron, Flanged Joints: AWWA C115, ductile-iron or gray-iron pipe flanges, rubber gaskets, and steel bolts and nuts.
- D. Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for couplings for dry piping.

0.6 POLYETHYLENE ENCASUREMENT

- A. Polyethylene Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105, film, 0.008-inch minimum thickness, tube or sheet.

0.7 FIRE-PROTECTION-SERVICE VALVES

- A. General: UL listed and FM approved, with minimum 175-psig nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.
- B. Gate Valves, NPS 2 and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.
- C. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
- D. Gate Valves, NPS 2-1/2 and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
- E. Indicator-Post, Gate Valves: UL 262, iron body, bronze mounted, solid-wedge disc, and nonrising stem with operating nut and flanged ends.
- F. Indicator Posts: UL 789, horizontal, wall type, cast-iron body, with windows for target plates that indicate valve position, extension rod and coupling, locking device, and red enamel finish.
- G. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
- H. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.

0.8 SPECIALTY VALVES

- A. Wet main alarm check valve shall be approved type for a wet-pipe sprinkler system main drain valve, pressure gauges and other required trimming. Valve shall be equal to Reliable, Model No. E for variable pressure vertical installation, with water motor and gong. Electric water gong shall be located on outside of building, where directed by Architect, with head and identification tag.
- B. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.
- C. Dry alarm valve shall be UL listed and FM approved for a dry pipe sprinkler system, complete with drain valve, priming water valve, ball drip valve, alarm test valve, priming chamber, fill line attachment, pressure gauges and air control valve assembly. Reliable Model D. or approved equal.
- D. To maintain air pressure in the dry pipe system, furnish and install a listed air compressor with pressure switch and starter to operate compressor automatically. Compressor to be sized as required for system in accordance with NFPA #13

- E. If required, and to accelerate operation of the dry valve, furnish and install Reliable Model B or approved equal accelerator with integral anti-flooding device.
- F. Valve trim is to include pressure activated electric alarm switch and low air pressure alarm switch.
- G. The Fire Protection Subcontractor shall provide any devices required to interface with the building fire alarm system and should include the details of interface between the fire protection and the other contractors (HVAC, ATC, Electrical, etc.)

0.9 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element complying with UL 199, for applications except residential.
- B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
- C. Refer to Drawing FP-0.1 for Sprinkler Types, Manufacturer and Model Numbers.

0.10 FIRE DEPARTMENT CONNECTIONS

- A. Wall, Fire Department Connections: UL 405; cast-brass body with brass, wall, escutcheon plate; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking "AUTO SPKR & STANDPIPE" or as required by Local Authority Having Jurisdiction.
- B. Refer to Drawing FP-0.1 to Fire Department Connection Detail.

0.11 ALARM DEVICES

- A. General: Types matching piping and equipment connections.
- B. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig pressure rating; and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- D. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.
- E. Low Pressure Alarm Switch: Potter Electric PS40-A with 3-way Bleeder Valve (BVL) for testing.

0.12 PRESSURE GAGES

- A. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with dial range of 0 to 250 psig.

PART 3 - EXECUTION

0.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.
- B. Report test results promptly and in writing, including static and residual pressure, flow, number and size of outlets, elevation above sea level, conductor of test, exact location of test, and date and time of test.

0.2 EARTHWORK

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

0.3 PIPING APPLICATIONS

- A. Do not use welded joints with galvanized steel pipe.
- B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- C. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
- D. Underground Service-Entrance Piping: Use ductile-iron, mechanical-joint pipe and fittings and restrained joints.
- E. Sprinklers System Piping: Use the following:
 1. NPS 2" and Smaller for Wet Sprinkler System: Schedule 40 black steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
 2. NPS 2-1/2 and Larger for Wet Sprinkler System: Schedule 10 black steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
 3. NPS 2" and Smaller for Dry Sprinkler System: Schedule 40 galvanized steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
 4. NPS 2-1/2 and Larger for Dry Sprinkler System: Schedule 10 galvanized steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.

0.4 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13.

- a. Shutoff Duty: Use gate valves.

0.5 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
- C. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- D. Brazed Joints: Use AWS A5.8, BCuP-3 or BCuP-4 filler metals.
- E. Locking-Lug-Fitting, Twist-Locked Joints: Follow fitting manufacturer's written instructions.
- F. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.
- G. Handling of Cleaners, Primers, and Solvent Cements for CPVC Pipe: Comply with procedures in ASTM F 402 for safe handling when joining CPVC piping with solvent cements.

0.6 SERVICE-ENTRANCE PIPING

- A. Connect standpipe and sprinkler piping to water-service piping of size and in location indicated for service entrance to building. Refer to Division 2 Section "Water Distribution" for exterior piping.
- B. Install shutoff valve, backflow preventer, low pressure alarm switch, pressure gage, drain, and other accessories indicated at connection to water-service piping. Refer to Division 2 Section "Water Distribution" for backflow preventers.

0.7 WATER-SUPPLY CONNECTION

- A. Connect sprinkler piping to building interior water distribution piping. Refer to Division 15 Section "Water Distribution Piping" for interior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water distribution piping. Refer to Division 15 Section "Plumbing Specialties" for backflow preventers.

0.8 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - C. Install underground service-entrance piping according to NFPA 24 and with restrained joints.
 - D. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 - E. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
 - F. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
 - G. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
 - H. Install sprinkler piping with drains for complete system drainage.
 - I. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
 - J. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
 - K. Install alarm devices in piping systems.
 - L. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping.
 - M. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage, if required by local building and fire codes.
 - N. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
 - O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- 0.9 SPECIALTY SPRINKLER FITTING INSTALLATION
- A. Install specialty sprinkler fittings according to manufacturer's written instructions.

0.10 VALVE INSTALLATION

- A. Refer to Division 15 Section "Valves" for installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13 and NFPA 14, manufacturer's written instructions, and authorities having jurisdiction.
- B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
- C. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

0.11 SPRINKLER APPLICATIONS

- A. General: Use sprinklers according to the following applications:
 - 1. Rooms without Ceilings: Upright and pendent sprinklers, as indicated.
 - 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers, as indicated.

0.12 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

0.13 CONNECTIONS

- A. Electrical Connections: Power wiring is specified in Division 16.
- B. Connect alarm devices to fire alarm.

0.14 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 15 Section "Basic Mechanical Materials and Methods."

0.15 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
- B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- C. Report test results promptly and in writing to Owner and authorities having jurisdiction.

0.16 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers having paint other than factory finish.

0.17 PROTECTION

- A. Protect sprinklers from damage until Substantial Completion.

0.18 COMMISSIONING

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that specified tests of piping are complete.
- C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
- D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- E. Verify that potable-water supplies have correct types of backflow preventers.
- F. Verify that fire department connections have threads compatible with local fire department equipment.
- G. Fill wet-pipe sprinkler piping with water.
- H. Energize circuits to electrical equipment and devices. Coordinate with electrical contractor and Owner.
- I. Coordinate with fire alarm tests. Operate as required.

0.19 DEMONSTRATION

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with Owner with at least seven days' advance notice.

END OF SECTION 13915

DIVISION 14

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 14566 – VERTICAL RECIPROCATING CONVEYOR: Vertical Reciprocating Conveyor
2. Section 14570 – PNEUMATIC TRANSPORT SYSTEM: Tube Delivery System.

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SECTION 14566 – VERTICAL RECIPROCATING CONVEYOR

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes vertical reciprocating conveyor.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with A - Prime Handling for furnishing the vertical reciprocating conveyor specified in this section. System shall be supplied by the General Contractor and complete installation shall be by the manufacturer under contract with the General Contractor. For pricing quotations, placing orders, and further information, call A-Prime Handling at (508) 587-6975.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide vertical reciprocating conveyor, Model No. FLT-30 as supplied by A-Prime Handling.

0.2 COMPONENTS

- A. Vertical reciprocating conveyor shall have the following salient features:
 1. Height: Standard 11'-8" floor-to-floor.
 2. Electric Hydraulic Power Unit – 3000 psi max. pressure
 3. 5 HP/208V/3PH/60HZ
 4. Size: As specified on drawings.
 5. (2) 3-button pushbutton stations.
 6. Interlock Gate System.
 7. 6'w x 8'h Bi-part swing gate.
 8. Full height enclosure panels on (2) sides on both levels.
 9. Support bracing.
 10. Expanded metal enclosure for power unit.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. General: Comply with manufacturer's written instructions. Assemble components with tight joints. Anchor securely to supporting structure to withstand impact and stresses.

0.2 TESTING

- A. Test vertical reciprocating conveyor components after installation. Operate to demonstrate that adjustments and connections are done correctly.

0.3 CLEANING

- A. Clean exposed surfaces of vertical reciprocating conveyor system's components. Do not remove labels of independent testing and inspecting agencies.

0.4 DEMONSTRATION

- A. Demonstrate use of vertical reciprocating conveyor and equipment to Owner's personnel.

END OF SECTION 14566

SECTION 14570 – PNEUMATIC TRANSPORT SYSTEM

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes a pneumatic tube delivery system.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Diebold, Inc. for furnishing the pneumatic transport system specified in this section. System shall be supplied by the General Contractor and complete installation shall be by the manufacturer under contract with the General Contractor. For pricing quotations, placing orders, and further information, call Diebold, Inc. at (603) 537-2325 ext. 2328.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Single Source Responsibility: Provide system produced by specified manufacturer.
- C. Transport system shall be FCC Class A rated, and listed with UL 345R electrical business equipment.

0.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual openings by accurate field measurement. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
 - 1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

0.1 PNEUMATIC TUBE DELIVERY SYSTEM

- A. Where indicated on Drawings, provide Easy-aire 10 Pneumatic Transport System as manufactured by Diebold, Inc.
- B. System shall be complete, including manufacturer's standard overhead 10-inch diameter, galvanized steel tubing with 32-inch radius bends and four 94) remote vacuum pressure blower assemblies (2 customer and 2 operator).
- C. Power Requirements: 115 VAC, 60 Hz; two (2) 30 amp circuits at blowers and one (1) 15 amp circuit at controls. Provide control cables for easy routing through a single conduit.
- D. In addition, provide the following salient features:
 - 1. CommMaster audio capability for two-way communication.
 - 2. High capacity captive carrier system.
 - 3. Remote blower packages for load volume and distances required.
 - 4. Full system monitoring and control from the operator unit.
 - 5. Call/Send operation at customer unit.
 - 6. Eight (8) optical sensors and built-in diagnostics with LED indicators.
 - 7. Privacy handset.
- E. Color: As selected by Owner.

0.2 ACCESSORIES

- A. Provide accessories as required and as standard with the manufacturer for the owner for the unit specified.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect openings before beginning installation. Verify that rough openings are correct.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.

- B. Provide proper support and anchor securely to surrounding construction with approved fasteners.
 - 1. Separate zinc-coated steel and other corrodible surfaces from sources of corrosion of electrolytic action at points of contact with other materials by manufacturer's standard means.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 ADJUSTING

- A. Provide a tight fit at contact points for smooth operation and a weathertight closure at building penetrations.

0.4 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess compounds, dirt, and other substances. Lubricate as recommended by manufacturer.
- B. Comply with requirements of the "Glass and Glazing" Section for cleaning and maintenance of glazing.

0.5 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, pneumatic transport system will be free of damage or deterioration at the time of Substantial Completion.

END OF SECTION 14570

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DIVISION 15

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 15430 – PLUMBING SPECIALTIES: Pharmacy Water Purification Systems.
2. Section 15782 – ROOFTOP UNITS: HVAC Rooftop Units.

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SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Escutcheons.
3. Dielectric fittings.
4. Flexible connectors.
5. Mechanical sleeve seals.
6. Equipment nameplate data requirements.
7. Nonshrink grout for equipment installations.
8. Field-fabricated metal and wood equipment supports.
9. Installation requirements common to equipment specification sections.
10. Cutting and patching.
11. Touchup painting and finishing.
12. Excavation.

- B. Pipe and pipe fitting materials are specified in Division 15 piping system Sections.

0.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

0.4 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

0.5 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.

0.6 EXCAVATION

- A. Trenching:
 - 1. Perform all excavating of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching and shoring. Pile excavated material suitable for backfilling on one side only of trenches in such a manner as to permit ready access to and use of existing fire hydrants, valves, manholes and other utilities system apparatus and a sufficient distance from banks of trenches to prevent slides or cave-ins. Keep surface drainage of adjoining areas unobstructed. Waste all excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, and discharge at a safe distance from the excavation.

2. Provide trenches of necessary width for proper laying of pipe and comply with latest publication of OSHA 2226 Excavating and Trenching Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade bottoms of trenches to provide uniform bearing, and support for each section of pipe on undisturbed soil or the required thickness of bedding material at every point along its entire length.
 3. Provide at least 12 inches in the clear between their outer surfaces and the embankment or shoring which may be used when excavating for manholes and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
 4. Material to be excavated is "unclassified." No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry or other materials.
 5. Protect existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavating and trenching and that are to be retained, as well as utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; and if damaged, repair the lines at no additional compensation. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
 6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 1 Foot Minimum Cover: Sanitary sewer, storm drainage, industrial waste.
 - b. 2 Foot Minimum Cover: Domestic water, fire line.
- B. Backfilling:
1. Backfill all trenches after piping, fittings and joints have been tested and approved.
 2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1 ½ inch in size, and deposit in 9 inch maximum layers, loose depth as indicated or specified. Take care not to damage utility lines. Deposit the remainder of backfill materials in the trench in 1 foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to the depth required to obtain the specified compaction, then refill and compact with the surface restored to the required grade and compaction.
 3. Backfill trench utility line with sand backfill material in 6 inch layers where trenches cross streets, driveways, building slabs, or other pavements. Moisten each layer and compact to 95 percent modified proctor of the maximum soil density as determined by ASTM D1557. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Dielectric Unions:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Eclipse, Inc.; Rockford-Eclipse Div.
 - d. Epco Sales Inc.
 - e. Hart Industries International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
 2. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
 3. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

0.2 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
 2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.
 3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.
 4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.
 5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.
- F. Brazing Filler Metals: AWS A5.8.
1. BCuP Series: Copper-phosphorus alloys.
 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
1. ABS Piping: ASTM D 2235.
 2. CPVC Piping: ASTM F 493.
 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
1. Sleeve: ASTM A 126, Class B, gray iron.
 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
 3. Gaskets: Rubber.
 4. Bolts and Nuts: AWWA C111.
 5. Finish: Enamel paint.
- 0.3 DIELECTRIC FITTINGS
- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.

- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

0.4 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
 - 1. 2-Inch NPS and Smaller: Threaded.
 - 2. 2-1/2-Inch NPS and Larger: Flanged.
 - 3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

0.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

0.6 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
 - 5. PVC: Manufactured, permanent, with nailing flange for attaching to wooden forms.
 - 6. PVC Pipe: ASTM D 1785, Schedule 40.
 - 7. PE: Manufactured, reusable, tapered, cup shaped, smooth outer surface, with nailing flange for attaching to wooden forms.

- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
 - 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 - 2. OD: Completely cover opening.
 - 3. Stamped Steel: One piece, with set screw and chrome-plated finish.
 - 4. Cast-Iron Floor Plate: One-piece casting.

0.7 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
 - 2. Location: Accessible and visible location.
- C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch- high letters for ductwork and not less than 3/4-inch- high letters for access door signs and similar operational instructions.
 - 1. Material: Brass.
 - 2. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
 - 3. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.
- E. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:
 - 1. Green: Cold air.
 - 2. Yellow: Hot air.
 - 3. Yellow/Green or Green: Supply air.
 - 4. Blue: Exhaust, outside, return, and mixed air.
 - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 - 6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.

- d. Duct destination.
 - e. Design cubic feet per minute.
- F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
- 1. Fabricate in sizes required for message.
 - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 - 3. Punch for mechanical fastening.
 - 4. Thickness: 1/16 inch, unless otherwise indicated.
 - 5. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
- G. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
- 1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."
- H. Metal Tags: Brass with stamped letters; Tag size minimum 1-1/2 inch diameter with smooth edges.

0.8 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
- 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

0.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 15 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump

sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

- C. Install piping at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Uninsulated Piping Wall Escutcheons: Stamped steel, with set screw.
 - 2. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 3. Insulated Piping: Stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 4. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Build sleeves into new walls and slabs as work progresses.
 - 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

- a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- O. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- P. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.
- R. Verify final equipment locations for roughing-in.
- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."

4. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
 5. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
 6. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 8. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 9. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
- U. Piping Connections: Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

0.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

0.3 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
 - 2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
 - c. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
 - g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.
 - 1. Lettering Size: Minimum 1/4-inch- high lettering for name of unit if viewing distance is less than 24 inches, 1/2-inch- high lettering for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
 - 1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.

- D. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.
- E. Valves: Identify valves in main and branch piping with metal tags. Install metal tags with corrosive – resistant chain and “J-Hook”.

0.4 PAINTING AND FINISHING

- A. Do not paint piping specialties with factory-applied finish.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

0.5 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

0.6 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

END OF SECTION 15050

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes hangers and supports for mechanical system piping and equipment.

0.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

0.4 PERFORMANCE REQUIREMENTS

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design and obtain approval from authorities having jurisdiction for seismic restraint hangers and supports for piping and equipment.

PART 2 - PRODUCTS

0.1 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
 - 1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
 - 2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

0.2 MISCELLANEOUS MATERIALS

- A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- D. Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
 1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
 2. Properties: Nonstaining, noncorrosive, and nongaseous.
 3. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

0.1 HANGER AND SUPPORT APPLICATIONS

- A. Comply with MSS SP-69 for pipe hanger selections and applications.
- B. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 3. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 4. U-Bolts (MSS Type 24): For support of heavy pipe, NPS 1/2 to NPS 30.
 5. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
- C. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- D. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
- E. Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- F. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi minimum compressive-strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

0.2 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
1. Field assemble and install according to manufacturer's written instructions.
- C. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install

additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

- D. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
- E. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- J. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.9.
 - 2. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span arc of 180 degrees.

0.3 METAL FABRICATION

- A. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

0.4 PAINTING

- A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

SECTION 15081 - DUCT INSULATION

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

0.3 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

0.4 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

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

- a. CertainTeed Manson.
- b. Knauf FiberGlass GmbH.
- c. Owens-Corning Fiberglas Corp.
- d. Schuller International, Inc.

0.2 INSULATION MATERIALS

- A. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- B. Mineral-Fiber Duct Liner Thermal Insulation. Bonded flexible glass fibers. Comply with ASTM C553 and ASTM C1071. Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard." Surface exposed to air stream is a coated surface to withstand maximum 4000 ft/min air velocity. 'K' value at 0.26 at 75 degrees F.
- C. Lining materials installed inside ducts and plenums shall meet UL 181. When air velocity exceeds 2000 fpm, liners must be attached both mechanically and with adhesives. Treated exposed edges must withstand operating velocities.

0.3 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
 1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
 2. Galvanized Steel: 0.005 inch thick.
 3. Aluminum: 0.007 inch thick.
 4. Brass: 0.010 inch thick.
 5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
- D. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
 1. Welded Pin Holding Capacity: 100 lb for direct pull perpendicular to the attached surface.

0.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

0.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

0.2 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Apply multiple layers of insulation with longitudinal and end seams staggered.
- D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- E. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- F. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- G. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- H. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
 - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- I. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
 - 1. Seal penetrations with vapor-retarder mastic.

2. Apply insulation for exterior applications tightly joined to interior insulation ends.
3. Seal insulation to roof flashing with vapor-retarder mastic.

J. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

K. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

0.3 MINERAL-FIBER INSULATION APPLICATION

A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
4. Impale insulation over anchors and attach speed washers.
5. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.
6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch-wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.
8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

B. Type C: Liner Applications. Secure liner insulation with adhesive and mechanical fasteners.

1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct surface.
2. Secure insulation with mechanical fasteners on 15-inch centers maximum on top and side of ductwork with dimension exceeding 20 inches. Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesives.
 - a. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without causing leakage in duct.
 - 1) Tensile Strength: Indefinitely sustain a 50 lb (23 kg) tensile, dead-load test perpendicular to duct wall.
 - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8-inch (3 mm) into air stream.
 - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

0.4 DUCT SYSTEM APPLICATIONS

- A. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 1. Metal ducts with duct liner.
 2. Factory-insulated flexible ducts.
 3. Flexible connectors.
 4. Vibration-control devices.
 5. Testing agency labels and stamps.
 6. Nameplates and data plates.
 7. Access panels and doors in air-distribution systems.

0.5 INDOOR DUCT APPLICATION SCHEDULE

- A. Service: Round, and rectangular supply-air ducts, and return-air ducts, located inconcealed / unconditioned space.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inch.
- B. Service: round and rectangular supply-air ducts, exposed.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 1-inch (minimum).
- C. Service: Round and rectangular exhaust-air ducts, concealed and exposed, within 10-feet of roof or wall penetration.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 1-inch (minimum).

- D. Service: Round and rectangular supply-air duct, and return-air duct, within 10-feet of roof top units.
 - 1. Material: Mineral-Fiber Duct Liner Thermal Installation.
 - 2. Thickness: 1 ½ -inch (minimum).

END OF SECTION 15081

SECTION 15083 - PIPE INSULATION

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

0.3 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

0.4 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 15 Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for insulation application.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Knauf FiberGlass GmbH.
 - c. Owens-Corning Fiberglas Corp.
 - d. Schuller International, Inc.
 2. Cellular-Glass Insulation:
 - a. Pittsburgh-Corning Corp.
 3. Flexible Elastomeric Thermal Insulation:
 - a. Armstrong World Industries, Inc.
 - b. Rubatex Corp.

0.2 INSULATION MATERIALS

- A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
 2. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.
 3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
 6. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
 7. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- B. Cellular-Glass Insulation: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.

1. Preformed Pipe Insulation, without Jacket: Comply with ASTM C 552, Type II, Class 1.
 2. Preformed Pipe Insulation, with Jacket: Comply with ASTM C 552, Type II, Class 2.
- C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Adhesive: As recommended by insulation material manufacturer.
 2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

0.3 FIELD-APPLIED JACKETS

- A. General: ASTM C 921, Type 1, unless otherwise indicated.
- B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
- C. Aluminum Jacket: Factory cut and rolled to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.

0.4 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
 2. Galvanized Steel: 0.005 inch thick.
 3. Aluminum: 0.007 inch thick.
 4. Brass: 0.010 inch thick.
 5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.

PART 3 - EXECUTION

0.1 PREPARATION

- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

0.2 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- G. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- H. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- I. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 - 3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- J. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- K. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- L. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
 2. Circumferential Joints: Cover with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches o.c.
 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- M. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
1. Seal penetrations with vapor-retarder mastic.
 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 3. Extend metal jacket of exterior insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal metal jacket to roof flashing with vapor-retarder mastic.
- N. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor-retarder mastic.
- O. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- P. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.
1. Firestopping and fire-resistive joint sealers are specified in Division 7 Section "Firestopping."

0.3 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet to form a vapor retarder between pipe insulation segments.
 3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
3. Cover fittings with standard PVC fitting covers.

C. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.
4. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

0.4 CELLULAR-GLASS INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Secure each layer of insulation to pipe with wire, tape, or bands without deforming insulation materials.
2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic.
3. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When premolded sections of insulation are not available, apply mitered sections of cellular-glass insulation. Secure insulation materials with wire, tape, or bands.

3. Cover fittings with standard PVC fitting covers.

C. Apply insulation to valves and specialties as follows:

1. Apply premolded segments of cellular-glass insulation or glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
2. Apply insulation to flanges as specified for flange insulation application.
3. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

0.5 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer's written instructions for applying insulation.
2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

C. Apply insulation to valves and specialties as follows:

1. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.
2. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to stainer basket.
3. Apply insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

0.6 FIELD-APPLIED JACKET APPLICATION

A. Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

1. Apply jacket smooth and tight to surface with 2-inch overlap at seams and joints.

2. Embed glass cloth between two 0.062-inch- thick coats of jacket manufacturer's recommended adhesive.
 3. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.
- B. Foil and Paper Jackets: Apply foil and paper jackets where indicated.
1. Draw jacket material smooth and tight.
 2. Apply lap or joint strips with the same material as jacket.
 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 4. Apply jackets with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-retarder mastic.
- C. Apply metal jacket where indicated, with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

0.7 FINISHES

- A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of the insulation manufacturer's recommended protective coating.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

0.8 PIPING SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
1. Flexible connectors.
 2. Vibration-control devices.
 3. Fire-suppression piping.
 4. Below-grade piping, unless otherwise indicated.
 5. Chrome-plated pipes and fittings, unless potential for personnel injury.
 6. Unions, strainers, check valves, plug valves, and flow regulators.

0.9 INSULATION APPLICATION SCHEDULE

- A. Service: Domestic hot and cold water.
1. Operating Temperature: 60 to 140 deg F.
 2. Insulation Material: Mineral fiber.
 3. Insulation Thickness: Apply the following insulation thicknesses:

- a. Copper Pipe: 1 ½" and smaller, 1" insulation thickness.
 - b. Copper Pipe: 2" to 4", 1 ½" insulation thickness.
4. Finish: None.
- B. Service: Condensate drain piping.
1. Operating Temperature: 35 to 75 deg F.
 2. Insulation Material: Flexible elastomeric.
 3. Insulation Thickness: 1" thickness.
 4. Field-Applied Jacket: None.
 5. Vapor Retarder Required: Yes.
 6. Finish: None.
- C. Service: Exposed tailpiece, P-trap, and domestic hot and cold water supplies and stops for fixtures for the disabled.
1. Operating Temperature: 35 to 120 deg F.
 2. Insulation Material: Flexible elastomeric.
 3. Insulation Thickness: 1 ½" thickness.
 4. Field-Applied Jacket: PVC P-trap and supply covers.
 5. Vapor Retarder Required: No.
 6. Finish: None.
- D. Service: Refrigerant Piping
1. Operating Temperature: 35 to 120 deg F.
 2. Insulation Material: Flexible elastomeric.
 3. Insulation Thickness: 1 ½" thickness.
 4. Field-Applied Jacket: PVC P-trap and supply covers.
 5. Vapor Retarder Required: No.
 6. Finish: 2 coats of protective coating.

END OF SECTION 15083

SECTION 15110 - VALVES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes valves for building services piping.

0.3 REFERENCES

- A. AGA Z21.22 – Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.3 – Malleable Iron Threaded Fittings.
- C. AWS – Welding and Brazing Qualifications.
- D. MSS SP - 67 – Butterfly Valves.
- E. MSS SP - 71 – Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- F. MSS SP – 78 – Cast Iron Plug Valves, Flanged and Threaded Ends.
- G. MSS SP – 80 – Bronze Gate, Globe, Angle and Check Valves.
- H. MSS SP – 85 – Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
- I. MSS SP – 110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

0.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain valves of same type through one source from a single manufacturer.
- B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

0.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

0.6 WARRANTY

- A. Provide five year manufacturer warranty for valves excluding packing.

0.7 EXTRA MATERIALS

- A. Supply two packing kits for each size valve.

PART 2 - PRODUCTS

0.1 GATE VALVES

- A. Up to and Including 3 inches: MSS SP – 80, bronze body, bronze trim, rising stem, hand-wheel, inside screw, solid wedge disc, threaded ends.
- B. 2 inches and Larger: MSS SP – 70, iron body, bronze trim, outside screw and yoke, hand-wheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

0.2 GLOBE VALVES

- A. Up to and Including 3 inches: MSS SP – 80, bronze body, bronze trim, hand-wheel, bronze disc, threaded ends.
- B. 2 inches and Larger: MSS SP – 85, iron body, bronze trim, outside screw and yoke, hand-wheel, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

0.3 BALL VALVES

- A. Construction, 4 inches and Smaller: MSS SP – 110, bronze, two piece body, chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded ends with union.

0.4 PLUG VALVES

- A. Construction 2 ½ inches and Larger: MSS SP – 78, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged ends. Provide lever operator with setscrew.

0.5 BUTTERFLY VALVES

- A. Construction 1 ½ inches and Larger: MSS SP – 67, cast or ductile iron body. Aluminum bronze disc, resilient replaceable Buna N seat, grooved ends, extended neck, 10 position lever handle. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

0.6 SWING CHECK VALVES

- A. Up To and Including 3 inches.
 - 1. MSS SP-80 bronze body and cap, bronze swing disc with rubber seat, threaded ends.
- B. 2 inches and Larger:
 - 1. MSS SP – 71, iron body, bronze swing disc, renewable disc seal and seat ends.

0.7 SPRING LOADED CHECK VALVES

- A. Construction: Class 125 or Class 150, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

0.8 WATER PRESSURE REDUCING VALVES

- A. Up to 2 inches:
 - 1. Construction: MSS SP – 80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded ends.
- B. Over 2 inches:
 - 1. Construction: MSS SP – 85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

0.9 RELIEF VALVES

- A. Pressure Relief:
 - 1. Construction: AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- B. Temperature and Pressure Relief:
 - 1. Construction: AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME SEC IV certified and labeled.

0.10 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe 2 inches and Under:
 - 1. Ferrous Piping: 150 psig malleable iron, threaded.
 - 2. Copper Piping: Bronze.

- B. Flanges for Pipe Over 2 inches:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.
 - 2. Copper Piping: Bronze.
- C. Gaskets: 1/16 inch thick preformed neoprene.
- D. Grooved and Shouldered Pipe End Couplings:
 - 1. Housing Clamps: Malleable iron to engage and lock designed to permit some angular deflection, contraction, and expansion.
 - 2. Sealing Gasket: C-shape elastomer composition for operating temperature range from minus 30 degrees F to 230 degrees F.
- E. Accessories: Steel bolts, nuts, and washers.
- F. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Verify Piping System is ready for installation.

0.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Install valves with stems upright or horizontal, not inverted.
- C. Use grooved mechanical couplings and fasteners only in accessible locations.
- D. Install unions downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- E. Install gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- F. Install globe, ball or butterfly valves for throttling, bypass, or manual flow control services.
- G. Provide plug valves in natural, **[propane]** gas systems for shut-off service.
- H. Use lug end butterfly valves to isolate equipment.
- I. Use $\frac{3}{4}$ inch gate, ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

0.3 INTERFACE WITH OTHER PRODUCTS

- A. Conform to applicable piping specification for hangers and insulation.

END OF SECTION 15110

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.
- B. Related Sections include the following:
 - 1. Division 15 Section "Plumbing Specialties" for water distribution piping specialties.

0.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Service Piping: 160 psig.
 - 2. Domestic Water Distribution Piping: 125 psig.

0.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

0.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

- C. Transition Couplings for Underground Pressure Piping: AWWA C219, metal, sleeve-type coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

0.2 COPPER TUBING

- A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
- B. Hard Copper Tube: ASTM B 88, Types K and L, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 - 4. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.
 - a. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

0.3 VALVES

- A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.
- B. Refer to Division 15 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

0.1 EXCAVATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for excavating, trenching, and backfilling.

0.2 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on above ground piping, unless otherwise indicated.
- C. Grooved joints may be used on above ground grooved-end piping.
- D. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on above ground copper tubing.
- E. Underground Domestic Water Service Piping: Use any of the following piping materials for each size range:
 - 1. NPS 2 and Smaller: Soft copper tube, Type K, copper pressure fittings; and soldered joints.
 - 2. NPS 2-1/2 to NPS 3-1/2: Use NPS 3 or NPS 4 ductile-iron pipe; mechanical push-on -joint, ductile-iron fittings; and restrained, gasketed joints.
 - 3. NPS 2-1/2 to NPS 3-1/2: Soft copper tube, Type K, copper pressure fittings; and soldered joints.
 - 4. NPS 4 to NPS 8: Mechanical Push-on-joint, ductile-iron pipe; mechanical push-on -joint, ductile-iron fittings; and restrained, gasketed joints.
- F. Aboveground Domestic Water Piping: Use any of the following piping materials for each size range:
 - 1. NPS 1-1/2 and Smaller: Hard copper tube, Type L, copper pressure fittings; and soldered joints.
 - 2. NPS 2: Hard copper tube, Type L, copper pressure fittings; and soldered joints.
 - 3. NPS 2: Hard copper tube, Type L, with grooved ends; copper grooved-end fittings; copper-tubing, keyed couplings; and grooved joints.
 - 4. NPS 2-1/2 to NPS 3-1/2: Hard copper tube, Type L, copper pressure fittings; and soldered joints.
 - 5. NPS 2-1/2 to NPS 3-1/2: Use NPS 2-1/2 to NPS 4 hard copper tube, Type L, with grooved ends; copper grooved-end fittings; copper-tubing, keyed couplings; and grooved joints.
- G. Underground Domestic Water Piping
 - 1. NPS 2 and Smaller: Soft copper tube, Type K; No joints below floor.
 - 2. NPS 2 1/2 " and larger: Hard copper tube, Type K copper pressure fittings; and soldered joints.

0.3 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.

2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
3. Drain Duty: Hose-end drain valves.

0.4 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.
- C. Install underground ductile-iron piping according to AWWA C600 and AWWA M41. Install buried piping inside building between wall and floor penetrations and connection to water service piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 1. Encase piping with polyethylene film according to ASTM A 674 or AWWA C105.
- D. Install underground copper tubing according to CDA's "Copper Tube Handbook."
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.
- F. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for wall penetration systems.
- G. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service. Refer to Division 15 Section "Plumbing Specialties" for drain valves and strainers.
- H. Install water-pressure regulator downstream from main shutoff valve. Refer to Division 15 Section "Plumbing Specialties" for water-pressure regulators.
- I. Install aboveground domestic water piping level and plumb.
- J. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- K. Perform the following steps before operation:
 1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
- L. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

- M. Check plumbing specialties and verify proper settings, adjustments, and operation.
 - 1. Water-Pressure Regulator: Set outlet pressure at 80 psig maximum, unless otherwise indicated.

0.5 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- C. Grooved Joints: Assemble joints with keyed-coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- D. Mechanically Formed Outlets: Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

0.6 ROUGHING-IN FOR WATER METERS

- A. Rough-in domestic water piping and install water meters according to utility company's requirements. Refer to Division 15 Section "Meters and Gages" for water meters.

0.7 VALVE INSTALLATION

- A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
- B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
- C. Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.

0.8 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 15 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 3. NPS 2: 10 feet with 3/8-inch rod.
 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
- F. Install supports for vertical steel piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.
- 0.9 CONNECTIONS
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Install piping adjacent to equipment and machines to allow service and maintenance.
 - C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

- D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:

0.10 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

- B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

0.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

- a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE, VENT, STORM DRAIN, CONDENSATE DRAIN, AND REFRIGERANT PIPING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes soil and waste, sanitary drainage, vent, and storm drain piping inside the building and to locations indicated.

0.3 DEFINITIONS

- A. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride plastic.

0.4 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Soil, Waste, Vent, and Storm Drain Piping: 10-foot head of water.

0.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, vent, and storm drain piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

0.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

- B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.
- C. Transition Couplings for Underground Pressure Piping: AWWA C219 metal, sleeve-type coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

0.2 CAST-IRON SOIL PIPING

- A. Hub-and-Spigot Pipe and Fittings: ASTM A 74, Service classes.
 - 1. Gaskets: ASTM C 564, rubber.
- B. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.
 - 1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.

0.3 COPPER TUBING

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

0.4 PVC PIPING

- A. PVC Pipe: Schedule 40, ASTM D 2665, solid-wall drain, waste, vent, and above roof condensate piping.
 - 1. PVC Socket Fittings: Schedule 40, ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

0.5 CONDENSATE DRAINAGE PIPING WITHIN BUILDING

- A. Copper Tubing: ASTM B 88, Type M, hard drawn.
 - 1. Fittings: ASME B 16.18, cast bronze, or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B 32, grade 50B solder joints.

0.6 REFRIGERANT PIPING

- A. Shall be Type "ACR" hard drawn copper tubing with silver solder wrought copper fittings. Piping shall be cleaned and capped for use with refrigerants. Piping shall be

sized as per the recommendation of the manufacturer. Provide all loops, traps, sight glass, filter driers, expansion valves, and charging valves required for the systems.

PART 3 - EXECUTION

0.1 EXCAVATION

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

0.2 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.
- C. Aboveground, Soil, Waste, Vent, and Storm Drain Piping: Use the following piping materials for each size range:
 - 1. NPS 1-1/4 and NPS 1-1/2: Copper DWV tube, copper drainage fittings, and soldered joints.
 - 2. NPS 1-1/4 and NPS 1-1/2: PVC pipe, PVC socket fittings, and solvent-cemented joints. (Only use PVC where permitted by the local jurisdiction.)
 - 3. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 - 4. NPS 2 to NPS 4: Hubless, cast-iron soil piping and one of the following:
 - 5. NPS 2 to NPS 4: cast-iron, threaded drainage fittings; and threaded joints.
 - 6. NPS 2 to NPS 4: PVC pipe, PVC socket fittings, and solvent-cemented joints.
- D. Underground, Soil, Waste, Vent, and Storm Drain Piping: Use the following piping materials for each size range:
 - 1. NPS 1-1/2: PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 2. NPS 2 to NPS 4: Service class, cast-iron soil piping; gaskets; and gasketed joints.
 - 3. NPS 2 to NPS 4: PVC pipe, PVC socket fittings, and solvent-cemented joints.

0.3 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links

required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

- D. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - E. Make changes in direction for soil and waste drainage, vent, and storm drain piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
 - F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
 - G. Install soil and waste drainage, vent, and storm drain piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary and Storm Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
 - H. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
 - I. Install PVC soil and waste drainage, vent and storm drain piping according to ASTM D 2665.
 - J. Install underground PVC soil and waste drainage and storm drain piping according to ASTM D 2321.
 - K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- 0.4 JOINT CONSTRUCTION
- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
 - B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- D. Grooved Joints: Assemble joint with keyed coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- E. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

0.5 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 15 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 3. NPS 2: 10 feet with 3/8-inch rod.
 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 5. NPS 3: 12 feet with 1/2-inch rod.

- 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
- H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
- I. Install supports for vertical copper tubing every 10 feet.
- J. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- K. Install supports for vertical PVC piping every 48 inches.
- L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

0.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste and storm drain piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 2. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Specialties."

0.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage, vent and storm drain piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.

0.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

SECTION 15194 - FUEL GAS PIPING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes fuel gas piping, specialties, and accessories within the building.

0.3 PROJECT CONDITIONS

- A. Design values of fuel gas supplied for these systems are as follows:
 - 1. Nominal Heating Value: 1000 Btu/cu. ft..
 - 2. Nominal Specific Gravity: 0.6.

0.4 QUALITY ASSURANCE

- A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ANSI Standard: Comply with ANSI Z223.1, "National Fuel Gas Code."
- C. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Gas Valves, NPS 2 and Smaller:
 - a. BMI Canada, Inc.
 - b. Crane Valves.
 - c. Dungs: Karl Dungs, Inc.

- d. Flow Control Equipment, Inc.
 - e. Grinnell Corp.
 - f. Honeywell, Inc.
 - g. Jomar International, Ltd.
 - h. Kitz Corp. of America.
 - i. Legend Valve and Fitting, Inc.
 - j. Lyall: R. W. Lyall & Co., Inc.
 - k. McDonald: A. Y. McDonald Mfg. Co.
 - l. Milwaukee Valve Co., Inc.
 - m. Mueller Co.; Mueller Gas Products Div.
 - n. Nibco, Inc.
 - o. Red-White Valve Corp.
 - p. Velan Valve Corp.
 - q. Watts Industries, Inc.; Water Products Div.
2. Plug Valves, NPS 2-1/2 and Larger:
- a. Flow Control Equipment, Inc.
 - b. Milliken Valve Co., Inc.
 - c. Nordstrom Valves, Inc.
 - d. Olson Technologies, Inc.; Homestead Valve Div.
 - e. Walworth Co.
3. [UL-Listed Earthquake Valves:
- a. Energy Pacific.
 - b. Safe T Quake Corp.
 - c. Seismic Safety Products, Inc.
 - d. Seismic Valve Co., Inc.
 - e. Trembler-Tech, Inc.
 - f. Westcoast Seismic Protection Co., Ltd.]
4. Service Pressure Regulators:
- a. American Meter Co.
 - b. Equimeter, Inc.
 - c. Fisher Controls International, Inc.
 - d. National Meter.
 - e. Richards Industries, Inc.; Jordan Valve Div.
 - f. Schlumberger Industries; Gas Div.
5. Line Pressure Regulators:
- a. American Meter Co.
 - b. Donkin: Bryan Donkin RMG Canada, Ltd.
 - c. Eclipse Combustion, Inc.
 - d. Equimeter, Inc.
 - e. Fisher Controls International, Inc.
 - f. Maxitrol Co.
 - g. National Meter.
 - h. Richards Industries, Inc.; Jordan Valve Div.

- i. Schlumberger Industries; Gas Div.

0.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

0.3 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

- A. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
 - 2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
 - 3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
 - 4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
 - 5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
 - 6. Joint Compound and Tape: Suitable for natural gas.
 - 7. Steel Flanges and Flanged Fittings: ASME B16.5.
 - 8. Gasket Material: Thickness, material, and type suitable for natural gas.

0.4 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

0.5 SPECIALTY VALVES

- A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
- B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- C. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.
- D. Gas Valves, NPS 2 and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.
 - 1. Tamperproof Feature: Include design for locking.

- E. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.
 - 1. Tamperproof Feature: Include design for locking.
- F. **[Earthquake Valves: FM approved or listed in IAS Directory as complying with ANSI Z21.70 and UL listed. Include mechanical operator.]**

0.6 SERVICE METERS

- A. Service Meters: Positive-displacement type suitable for fuel gas service. Include metal case, temperature compensation, corrosion-resistant internal components, and flow registered in cubic feet per hour.
 - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3. Type: ANSI B109.3, rotary.

0.7 PRESSURE REGULATORS

- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 - EXECUTION

0.1 SERVICE ENTRANCE PIPING

- A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.
 - 1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
- B. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting.

0.2 PIPING APPLICATIONS

- A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.
- B. Fuel Gas Piping, 0.5 psig or Less: Use the following:
 - 1. NPS 1/2 and Smaller: NPS 3/4 steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 2. NPS 3/4 and NPS 1: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 3. NPS 1-1/4 to NPS 2: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 - 4. NPS 2-1/2 to NPS 4: Steel pipe, steel welding fittings, and welded joints.
 - 5. Larger Than NPS 4: Steel pipe, steel welding fittings, and welded joints.
- C. Fuel Gas Piping 2 to 5 psig: Use the following:
 - 1. NPS 2 and Smaller: Steel pipe, steel welding fittings, and welded joints.
 - 2. NPS 2-1/2 to NPS 4: Steel pipe, steel welding fittings, and welded joints.
 - 3. Larger Than NPS 4: Steel pipe, steel welding fittings, and welded joints.
- D. Underground Fuel Gas Piping: Steel pipe, steel welding fittings, and welded joints. Encase in containment conduit.
- E. Gas Service Piping at Meters and Regulators, Above 5 psig: Steel pipe, steel welding fittings, and welded joints.

0.3 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.
- B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.
- C. Appliance Shutoff Valves for Pressure 2 to 5 psig: Gas valve.
- D. Piping Line Valves, NPS 2 and Smaller: Gas valve.
- E. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.

0.4 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: All welded gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
 2. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.
 3. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - a. Exception: Accessible above-ceiling space specified above.
- C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.
- E. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- G. Connect branch piping from top or side of horizontal piping.
- H. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- I. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.
- J. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.
- K. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.
- 0.5 HANGER AND SUPPORT INSTALLATION
- A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices.

- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 - 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

0.6 CONNECTIONS

- A. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
- B. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
- C. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
 - 2. Do not use gas pipe as grounding electrode.

0.7 FIELD QUALITY CONTROL

- A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction.

END OF SECTION 15194

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes plumbing fixtures and related components.

0.3 DEFINITIONS

- A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

0.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Hand Sinks: NSF 2 construction.
 - 2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - 3. Stainless-Steel Fixtures Other Than Service Sinks: ASME A112.19.3M.
 - 4. Vitreous-China Fixtures: ASME A112.19.2M.
 - 5. Water-Closet, Flushometer Tank Trim: ASSE 1037.
- H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 2. Hose-Coupling Threads: ASME B1.20.7.
 - 3. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - 4. Pipe Threads: ASME B1.20.1.
 - 5. Supply and Drain Fittings: ASME A112.18.1M.

0.5 COORDINATION

- A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

0.1 FIXTURES AND TRIM

- A. Refer to plumbing drawing P-1.2 for plumbing fixture schedule.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
- B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 FIXTURE INSTALLATION

- A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-hanging fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Refer to Division 15 Section "Valves" for general-duty valves.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.
- M. Install traps on fixture outlets.
- N. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for escutcheons.

- O. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

0.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water supplies from water distribution piping to fixtures.
- C. Connect drain piping from fixtures to drainage piping.
- D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.
- E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.
- F. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.4 FIELD QUALITY CONTROL

- A. Verify that installed fixtures are categories and types specified for locations where installed.
- B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

0.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow and stream.

- C. Replace washers and seals of leaking and dripping faucets and stops.

0.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.

0.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following plumbing specialties:
 - 1. Backflow preventers.
 - 2. Cleanouts.
 - 3. Floor drains.
 - 4. Pharmacy water purification system.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Innovative Medical Services for furnishing the Pharmacy water purification system specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, please call Innovative Medical Services at (619) 596-9900 x102.

0.4 DEFINITIONS

- A. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride plastic.

0.5 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Domestic Water Piping: 125 psig.
 - 2. Sanitary Waste and Vent Piping: 10-foot head of water.

0.6 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.
- C. 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.
- D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.
- E. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.
 - 2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

0.2 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Ames Co., Inc.
 - 2. B & K Industries, Inc.
 - 3. Cla-Val Co.
 - 4. CMB Industries, Inc.; Febco Backflow Preventers.
 - 5. Conbraco Industries, Inc.
 - 6. FLOMATIC Corp.
 - 7. IMI Cash Valve.
 - 8. Mueller Co.; Hersey Meters Div.
 - 9. Sparco, Inc.
 - 10. Watts Industries, Inc.; Water Products Div.
 - 11. Zurn Industries, Inc.; Wilkins Div.

- B. General: ASSE standard, backflow preventers.
 - 1. NPS 2 and Smaller: Bronze body with threaded ends.
 - 2. NPS 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
 - a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.
 - 3. Interior Components: Corrosion-resistant materials.
 - 4. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
 - 5. Strainer: On inlet, if indicated.
- C. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- D. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7, garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
- E. Intermediate Atmospheric-Vent Backflow Preventers: ASSE 1012, suitable for continuous pressure application. Include inlet screen and two independent check valves with intermediate atmospheric vent.
- F. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between two positive-seating check valves.
 - 1. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
- G. Double-Check Backflow Prevention Assemblies: ASSE 1015, suitable for continuous pressure application. Include shutoff valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves.
 - 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- H. Antisiphon-Pressure-Type Vacuum Breakers: ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.
 - 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- I. Dual-Check-Valve-Type Backflow Preventers: ASSE 1024, suitable for continuous pressure application. Include union inlet and two independent check valves.
- J. Dual-Check-Valve-Type Backflow Preventers: ASSE 1032, suitable for continuous pressure application for carbonated beverage dispensers. Include stainless-steel body; primary and secondary checks; ball check; intermediate atmospheric-vent port for relieving carbon dioxide; and threaded ends, NPS 3/8.

- K. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3-gpm flow and applications with up to 10-foot head of water back pressure. Include two check valves; intermediate atmospheric vent; and nonremovable, ASME B1.20.7, garden-hose threads on outlet.

0.3 MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
 - 1. Manufacturers:
 - a. Amtrol, Inc.
 - b. Josam Co.
 - c. Precision Plumbing Products, Inc.
 - d. Sioux Chief Manufacturing Co., Inc.
 - e. Watts Industries, Inc.; Drainage Products Div.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- B. Hose Bibbs: Refer to plumbing drawing P-1.2 – Plumbing Fixture Schedule.
- C. Deep-Seal Traps: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap seal primer valve connection.
 - 1. NPS 2: 4-inch- minimum water seal.
 - 2. NPS 2-1/2 and Larger: 5-inch- minimum water seal.
- D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.
- E. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.
- F. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
- G. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.
- H. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

- I. Expansion Joints: ASME A112.21.2M, assembly with cast-iron body with bronze sleeve, packing gland, and packing; of size and end types corresponding to connected piping.

0.4 CLEANOUTS

- A. Refer to plumbing drawing P-1.2 – Plumbing Fixture Schedule.

0.5 FLOOR DRAINS

- A. Refer to plumbing drawing P-1.2 – Plumbing Fixture Schedule.

0.6 PHARMACY WATER PURIFICATION SYSTEM

- A. Manufacturer: Innovative Medical Services (IMS), El Cajon, California (no substitutes).
- B. Description: “Fillmaster Pharmapure” water purification system including the “Scanmaster 1000e” fully programmed digital dispenser, filtration system, water storage tank, air-gap faucet, drain adapter, tubing, installation cabinet and all necessary hardware.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 1. Locate backflow preventers in same room as connected equipment or system.
 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 3. Do not install bypass piping around backflow preventers.
- C. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.
- D. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.
- E. Install expansion joints on vertical risers, stacks, and conductors if indicated.

- F. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- G. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.
- H. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- I. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- J. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- K. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- L. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- M. Install pharmacy water purification system as shown on the Drawings and in accordance with manufacturer's instructions.

0.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect plumbing specialties to piping specified in other Division 15 Sections.
- D. Ground equipment.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Connect plumbing specialties and devices that require power according to Division 16 Sections.

0.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 7 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

0.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled and their installation, including piping and electrical connections. Report results in writing.
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

0.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 15430

SECTION 15485 - ELECTRIC, DOMESTIC WATER HEATERS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following for domestic water systems:
 - 1. Tankless, electric water heaters.
 - 2. Commercial, electric water heaters.
 - 3. Compression tanks.
 - 4. Accessories.

0.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on specific units indicated. Other manufacturers' products complying with requirements may be considered. Refer to Division 1 Section "Substitutions."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Fabricate and label water heater, hot-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
- E. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:
 - 1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.

0.4 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.
1. Failures include heating elements and storage tanks.
 2. Warranty Period: From date of Substantial Completion:
 - a. Heating Elements: 1 year.
 - b. Storage Tanks: 6 years.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Point-of-Use, Tankless, Electric Water Heaters:
 - a. Chronomite Laboratories, Inc.
 - b. Eemax, Inc.
 - c. PVI Industries, Inc.
 2. Commercial, Point-of-Use, Small-Capacity, Electric Water Heaters:
 - a. Lochinvar Corp.
 - b. Rheem Manufacturing Co.; Ruud Water Heater Div.
 - c. Smith: A. O. Smith Water Products Co.
 - d. State Industries.
 3. Water Heater Stand and Drain Pan Units:
 - a. Safety: W. H. Safety Products, Inc.
 4. Compression Tanks:
 - a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Myers: F. E. Myers.
 - d. Smith: A. O. Smith; Aqua-Air Div.
 - e. State Industries.
 - f. Taco, Inc.
 - g. Wessels Co.
 - h. Zurn Industries, Inc.; Wilkins Div.

0.2 POINT-OF-USE, STORAGE, ELECTRIC WATER HEATERS

- A. Description: Automatic, electric vertical storage type with capacity, recovery rates, and electrical characteristics as scheduled with 100 degrees F temperature rise, 150 psig maximum working pressure.
- B. Storage Tank Construction: non-ASME code steel with 150-psig (1035-kPa) working-pressure rating.
 - 1. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
 - 2. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
 - 3. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.
 - 4. Jacket: Steel, with enameled finish.
- C. Heating Elements: Two, unless otherwise indicated; electric, screw-in, immersion type.
 - 1. Temperature Control: Adjustable thermostat.
- D. Anode Rod: Factory installed, magnesium.
- E. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.
- F. Special Requirement: NSF 5 construction.

0.3 POINT-OF-USE, INSTANTANEOUS, ELECTRICAL WATER HEATERS

- A. Tankless point of use water heater for instantaneous/unlimited hot water demand with electrical characteristics as scheduled, and 150 psig maximum working pressure.
- B. Cast aluminum alloy casing, plastic element assembly with stainless steel heating coils.
- C. Differential pressure flow activated switch and integral high temperature cut-off at 190 degrees F.

0.4 COMPRESSION TANKS

- A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
- B. Construction: 150-psig (1035-kpa) working-pressure rating.
- C. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
- D. Tank Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
- E. Tank Exterior Finish: Manufacturer's standard, unless finish is indicated.
- F. Air-Charging Valve: Factory installed.

0.5 WATER HEATER ACCESSORIES

- A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.
 - 1. Option: Separate temperature and pressure relief valves are acceptable instead of combination relief valve.
 - 2. Exception: Omit combination temperature and pressure relief valve for tankless water heater, and furnish pressure relief valve for installation in piping.
- B. Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.
 - 1. Exception: Omit if water heater has integral vacuum-relieving device.
- C. Water Heater Stand and Drain Pan Units: High-density-polyethylene-plastic, 18-inch- (457-mm-) high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and NPS 1 (DN25) drain outlet with ASME B1.20.1, pipe thread.
- D. Water Heater Stands: Water heater manufacturer's factory-fabricated, steel stand for floor mounting and capable of supporting water heater and water. Include dimension that will support bottom of water heater a minimum of 18 inches (457 mm) above the floor.
- E. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated, steel bracket for wall mounting and capable of supporting water heater and water.
- F. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4 (DN20).

PART 3 - EXECUTION

0.1 WATER HEATER INSTALLATION

- A. Install water heaters on concrete bases.
 - 1. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.
- B. Install water heaters, level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Anchor water heaters to substrate.
- D. **[Install seismic restraints for water heaters when specified by local codes.] [Anchor to substrate.]**
- E. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain.

- F. Install vacuum relief valves in cold-water-inlet piping.
- G. Install water heater drain piping as indirect waste to spill into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 15 Section "Plumbing Specialties" for drain valves.
- H. Install thermometers on water heater inlet and outlet piping.
- I. Fill water heaters with water.
- J. Charge compression tanks with air.
- K. Install instantaneous water heaters in accordance with manufacturer's instructions.

0.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Make connections with dielectric fittings where piping is made of dissimilar metal.
- D. Electrical Connections: Power wiring and disconnect switches are specified in Division 16 Sections. Arrange wiring to allow unit service.
- E. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.3 FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative to perform startup service.
- B. In addition to manufacturer's written installation and startup checks, perform the following:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Verify that piping system tests are complete.
 - 3. Check for piping connection leaks.
 - 4. Check for clear relief valve inlets, outlets, and drain piping.
 - 5. Test operation of safety controls, relief valves, and devices.
 - 6. Energize electric circuits.
 - 7. Adjust operating controls.
 - 8. Adjust hot-water-outlet temperature settings. Do not set above 140 deg F (60 deg C) unless piping system application requires higher temperature.

END OF SECTION 15485

SECTION 15543 - FUEL-FIRED UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gas-fired unit heaters.

1.2 QUALITY ASSURANCE

- A. 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.

1.3 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of fuel-fired unit heater that fail in materials and workmanship within five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 GAS-FIRED UNIT HEATERS

- A. Manufacturers:
 - 1. Modine Manufacturing Company, provided by York International Corporation.
 - a. Model Number: HD 75AS011.
- B. Description: Factory assembled, piped, and wired, and complying with AGA Z83.8, "Gas Unit Heaters."
 - 1. AGA Approval: Designed and certified by and bearing label of American Gas Association.

2. Type of Gas: Designed and built to burn natural gas with characteristics same as those of gas available at Project site.
- C. Venting: Gravity.
- D. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.
- E. Heat Exchanger: Aluminized.
- F. Burners: Stainless steel.
- G. Unit Fan: Propeller fan with aluminum blades dynamically balanced and resiliently mounted.
 1. Steel fan-blade guard.
 2. Motors: Totally enclosed with internal thermal-overload protection and complying with Division 15 Section "Motors."
- H. Controls: Regulated redundant 24-V ac gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 1. Gas Control Valve: Single stage.
 2. Ignition: Electronically controlled electric spark with flame sensor.
 3. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
 4. Vent Flow Verification: Differential pressure switch to verify open vent.
 5. Control Transformer: 24 V ac.
 6. High Limit: Thermal switch or fuse to stop burner.
 7. Sensors, components, and wiring are specified in Division 15 Section "HVAC Instrumentation and Controls."
 8. Thermostat: Single-stage, 24-V ac, wall-mounting type with 50 to 90 deg F operating range and fan on switch.
- I. Discharge Louvers: Independently adjustable horizontal blades.
 1. Unit-mounted thermostat bracket.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested, fuel-fired unit heater before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install unit heaters level and plumb.

- B. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
- C. Substrate-Mounted Units: Provide supports connected to substrate. Secure units to supports.
- D. Spring hangers are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

3.2 CONNECTIONS

- A. Install piping adjacent to machine to allow service and maintenance.
- B. Gas Piping: Comply with applicable requirements in Division 15 Section "Fuel Gas Piping." Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service. Provide AGA-approved flexible units.
- C. Connect vents according to Division 15 Section "Breechings, Chimneys, and Stacks."
- D. Electrical: Comply with applicable requirements in Division 16 Sections.
 - 1. Install electrical devices furnished with heaters but not specified to be factory mounted.
- E. Ground equipment according to Division 16 Section "Grounding and Bonding."

3.3 FIELD QUALITY CONTROL

- A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fuel-fired unit heaters. Refer to Division 1 Section "Demonstration and Training".

END OF SECTION 15543

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SECTION 15782 - ROOFTOP UNITS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes rooftop heating and cooling units.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with York for furnishing the HVAC roof top units specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call York at (800) 775-9675 ext. 6084.

0.4 QUALITY ASSURANCE

- A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- C. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- E. Comply with AGA Z223.1 for gas-fired furnace section.
- F. Comply with NFPA 70.

0.5 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations with roof construction.

0.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.
 - 1. Warranty Period, Compressors: Manufacturers standard, but not less than 5 years after date of Substantial Completion.
 - 2. Warranty Period, Heat Exchangers: Manufacturers standard, but not less than 10 years after date of Substantial Completion.

0.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Fan Belts: One set for each belt-drive fan.
 - 2. Filters: One set of filters for each unit.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide rooftop A/C units manufactured by York.

0.2 ROOFTOP UNITS

- A. Description: Factory assembled and tested; single package air to air DX cooling and heating system; down-flow configuration; designed for roof installation; and consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers.
- B. Casing: Manufacturer's standard construction with enamel paint exterior finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch- thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

- C. Evaporator Fans: Forward curved, centrifugal, belt driven with adjustable sheaves or direct-drive fans; and with permanently lubricated motor bearings.
- D. Power Exhaust Fans (only where indicated): Forward-curved, centrifugal or propeller type, directly driven with permanently lubricated motor bearings.
- E. Condenser Fans: Propeller type, directly driven with permanently lubricated motor bearings.
- F. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in galvanized steel casing with equalizing-type vertical distributor.
- G. Compressors: Serviceable, semihermetic, or fully hermetic compressors with integral vibration isolators and crankcase heaters.
 - 1. Safety Controls: Manual-reset type for low pressure, high pressure, and compressor motor overload protection.
 - 2. Timed-Off Control: Automatic-reset control shuts compressor off after 5 minutes.
- H. Heat Exchangers: Manufacturer's standard construction for induced draft gas-fired heat exchangers and burners with the following controls:
 - 1. Redundant, dual gas valves (3-6 tons: single stage; 7 ½ ton and larger 2-stage).
 - 2. Electronic-spark ignition system.
 - 3. High-limit cutout.
 - 4. Forced-draft proving switch.
- I. Economizer: Factory installed, return- and outside-air low leakage dampers, outside-air hood with filter, fully modulating electronic-control system with adjustable mixed-air thermostat (55°F set point) and automatic changeover through adjustable differential enthalpy-control device, and adjustable outdoor air minimum positioner; designed for 100% outside-air.
- J. Low Ambient Control: Head-pressure control, designed to operate at temperatures as low as 0 deg F.
- K. Sensor/ Thermostat: Provide temporary thermostat Honeywell Model T874D-1165 with sub-base model Q674A1019 or equal at all sensor locations. All thermostats will be removed and discarded by Energy Management System contractor.
- L. Smoke Detectors: Photoelectric detector to de-energize unit.
- M. Coastal Requirements: There are two different options to be specified in coastal area.
 - 1. Project located within five (5) miles of a body of salt water: The condenser coil and evaporator coil shall be coated using Technicoat 10-1 processes.
 - 2. Project located between five (5) and fifteen (15) miles from a body of salt water: The condenser coil shall be coated using Technicoat 10-1 processes.

0.3 ROOF CURBS

- A. Manufacturer's standard, insulated with corrosion-protection coating, gasketing, factory-installed wood nailer, according to NRCA standards.
 - 1. Curb Height: Minimum 14 inches.
 - 2. Burglar Bars: Furnished by rooftop A/C unit manufacturer for field installation. Designed to install in the supply and return air openings of the roof curb.

0.4 CONDENSATE PIPING

- A. Hard Copper Tube: ASTM B 88, Type M, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper alloy, hexagonal-stock body, with ball-and-socket, metal-to metal seating surfaces and solder-joint or threaded ends.
 - 4. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.
 - a. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

0.5 MOTORS

- A. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.
- B. Enclosure Type: Open, dripproof.

0.6 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate capacity according to ARI 210/240, "Unitary Air-Conditioning and Air Source Heat Pump Equipment" for units with capacity 135,000 BTUH or greater.
- B. Verification of Performance: Rate capacity according to ARI 360, "Commercial and Industrial Unitary Air-Conditioning Equipment."
 - 1. Sound Power Level Ratings: Comply with ARI 270, "Standard for Sound Rating of Outdoor Unitary Equipment."

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine roof for compliance with requirements for conditions affecting installation and performance of rooftop units. Do not proceed with installation until unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Install units according to manufacturer's written instructions.
- B. Install units level and plumb, maintaining manufacturer's recommended clearances.
- C. Curb Support: Install roof curb on roof structure, level, according to NRCA's written installation instructions. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing with roof construction.
- D. Condensate Piping:
 - 1. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
 - 2. Install condensate piping at minimum 1% downward slope in direction of flow unless otherwise indicated.
 - 3. Refer to Division 15 Section "Pipe Insulation" for basic piping insulation requirements.
 - 4. Condensate drain: All sizes Type "M" Copper

0.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
 - 1. Install piping to allow service and maintenance.
 - 2. Gas Piping: Conform to applicable requirements of Division 15 Section "Natural Gas Piping." Connect gas piping to burner, full size of gas train inlet, and provide union with sufficient clearance for burner removal and service.
- B. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 - 1. Install ducts to termination in roof mounting frames. Roof penetrations shall be no larger than the ductwork size plus 1-inch. Insulate space between roof and bottom of unit.
 - 2. Install burglar bars in both supply and return air openings of roof curb.
- C. Electrical: Conform to applicable requirements in Division 16 Sections.
- D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.4 TESTING

- A. Manufacturer shall perform an Equipment Performance Check (E.P.C.). The E.P.C. shall be conducted by a factory trained field service representative.
- B. Submit report to Owner for approval. Report shall include a list of items checked/verified and actual performance data under both heating and cooling operations.
- C. Schedule E.P.C. with manufacturer after complete installation and start-up of equipment. Give manufacturer a minimum of 2 weeks notice. System must be operational a minimum of 24 hours before E.P.C.

END OF SECTION 15782

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes rectangular and round, metal ducts for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg.

0.3 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

0.4 QUALITY ASSURANCE

- A. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

PART 2 - PRODUCTS

0.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

0.2 DUCT LINER

- A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."
- B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.
 - 1. Thickness: 1 inch.
 - 2. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - 3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
 - 4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - 5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.

0.3 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
 - 1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
 - 2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.

0.4 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.
 - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 - 1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

0.5 DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 - 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
 - 1. Supply Ducts: 1-inch wg.
 - 2. Return Ducts: 1-inch wg, negative pressure.
 - 3. Exhaust Ducts: 1-inch wg, negative pressure.

PART 3 - EXECUTION

0.1 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
- B. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- C. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- D. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

0.2 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

- B. Pressure Classification Less Than 2-Inch wg: Transverse joints.
- C. Seal externally insulated ducts before insulation installation.

0.3 HANGING AND SUPPORTING

- A. Install rigid round and rectangular, metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

0.4 CONNECTIONS

- A. Connect equipment with flexible connectors according to Division 15 Section "Duct Accessories."
- B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

0.5 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

END OF SECTION 15815

SECTION 15820 - DUCT ACCESSORIES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire and smoke dampers.
 - 4. Zoning Dampers
 - 5. Turning vanes.
 - 6. Duct-mounted access doors and panels.
 - 7. Flexible ducts.
 - 8. Flexible connectors.
 - 9. Duct accessory hardware.

0.3 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

0.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

0.2 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations.
- B. Frame: 0.052-inch- thick, galvanized, sheet steel, with welded corners and mounting flange.
- C. Blades: 0.025-inch- thick, roll-formed aluminum.

- D. Blade Seals: Neoprene.
- E. Tie Bars and Brackets: Aluminum.
- F. Return Spring: Adjustable tension.

0.3 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized, sheet steel.
 - 3. Blade Axles: Nonferrous.
 - 4. Tie Bars and Brackets: Galvanized steel.

0.4 FIRE DAMPERS

- A. General: Labeled to UL 555.
- B. Fire Rating: One and one-half hours.
- C. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- D. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.
 - 1. Minimum Thickness: 0.052 inch or 0.138 inch thick as indicated, and length to suit application.
 - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- E. Mounting Orientation: Vertical or horizontal as indicated.

- F. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
- G. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.
- H. Fusible Link: Replaceable, 165 deg F rated.

0.5 ZONING DAMPERS WITH THERMOSTAT

- A. Manufacturer: Honeywell, or an approved equal.
- B. General: Provide round, G60 galvanized steel dampers with the following features:
 - 1. Reversible shaft for power close, spring open.
 - 2. Gasket seal.
 - 3. Drive gear.
 - 4. Range stops for field adjustment of damper blades.
 - 5. Counter rotation pin.
 - 6. Mechanical position indicator.
 - 7. Two wire dampers.
 - 8. Clear labeling.
 - 9. Rigid spiral body; manufacturer's standard gage depending on damper size.
- C. Testing: Tested to 75 degrees - 140 degrees F; 20 percent - 80 percent Relative Humidity.
- D. Size: Refer to Drawings.
- E. Warranty: Manufacturer's standard five (5) year.
- F. Thermostat: Provide compatible digital, single stage, seven-day programmable thermostat equal to White-Rodgers 90 Series.

0.6 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

0.7 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

0.8 FLEXIBLE CONNECTORS

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.

0.9 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Uninsulated: Corrugated aluminum.
- C. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 2-inch- thick, glass-fiber insulation around a continuous inner liner.
 - 1. Reinforcement: Steel-wire helix encapsulated in inner liner.
 - 2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
 - 3. Outer Jacket: Polyethylene film.
 - 4. Inner Liner: Polyethylene film.
- D. Pressure Rating: 6-inch wg positive, 1-inch wg negative.

0.10 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.

- B. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
- C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install fire dampers, smoke dampers, and zoning dampers according to manufacturer's UL-approved written instructions.
 - 1. Install fusible links in fire dampers.
- E. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- F. Label access doors according to Division 15 Section "Mechanical Identification."

0.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire dampers, smoke dampers, and zoning dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15820

SECTION 15838 - POWER VENTILATORS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following:
 - 1. Ceiling-mounting ventilators.

0.3 QUALITY ASSURANCE

- A. 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.
- B. Listing: U.L. listed.

0.4 COORDINATION

- A. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceiling-Mounting Ventilators:
 - a. Breidert Air Products, Inc.
 - b. Broan Mfg. Co., Inc.
 - c. Cook, Loren Company.
 - d. Dayton Electric Manufacturing Co.
 - e. NuTone Inc.
 - f. Penn Ventilation Companies, Inc.

0.2 CEILING-MOUNTING VENTILATORS

- A. Description: Centrifugal fans designed for installing in ceiling
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Plastic, louvered grille with flange on intake.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent.
 - 2. Isolation: Rubber-in-shear vibration isolators.
 - 3. Manufacturer's standard roof jack or wall cap, and transition fittings.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install power ventilators level and plumb in accordance with manufacturer's instructions.
- B. Support suspended units from structure using threaded steel rods and rubber-in-shear isolators.
- C. Install units with clearances for service and maintenance.

0.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 15 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment.

END OF SECTION 15838

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

0.3 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C. Register: A combination grille and damper assembly over an air opening.

0.4 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

PART 2 - PRODUCTS

0.1 MANUFACTURED UNITS

- A. Diffusers, registers, and grilles are scheduled on Drawings.

0.2 SOURCE QUALITY CONTROL

- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

0.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

0.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 15855

SECTION 15940 - SEQUENCE OF OPERATIONS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.

0.3 SINGLE-ZONE, SINGLE-DUCT, CONSTANT-VOLUME, AIR-HANDLING UNIT CONTROL SEQUENCES

- A. Fan Control: Thermostat starts fan to run continuously during occupied periods. Thermostat cycles fan during unoccupied periods.
- B. Smoke Detector: Smoke detector, located in supply air, signals alarm, stops fan, and closes smoke dampers when products of combustion are detected in air stream. Interlock manual firemen start/stop switch and fire alarm control panel to override smoke detector and provide manual override operation of RTU in accordance with local and state building codes.
- C. Mixed-Air Control: During occupied periods, when fan is running, economizer controller modulates outside-air, return-air, and relief-air dampers to maintain supply-air temperature.
 - 1. During occupied periods, when fan is running, open outside-air dampers to minimum position.
 - 2. During heating sequence, set outside-air dampers to minimum position.
 - 3. When outside-air enthalpy exceeds return-air enthalpy, set outside-air dampers to minimum position.
 - 4. During unoccupied periods, position outside-air and relief-air dampers closed and return-air dampers open.
- D. Filters: During occupied periods, when fan is running, differential air-pressure transmitter signals alarm when low- and high-pressure conditions exist.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 15940

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Adjusting total HVAC systems to provide indicated quantities.
 - 3. Measuring electrical performance of HVAC equipment.
 - 4. Setting quantitative performance of HVAC equipment.
 - 5. Verifying that automatic control devices are functioning properly.
 - 6. Reporting results of the activities and procedures specified in this Section.

0.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- G. Test: A procedure to determine quantitative performance of a system or equipment.
- H. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.

- I. AABC: Associated Air Balance Council.
- J. AMCA: Air Movement and Control Association.
- K. NEBB: National Environmental Balancing Bureau.
- L. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

0.4 QUALITY ASSURANCE

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC.
- B. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- C. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- D. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

0.5 PROJECT CONDITIONS

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

0.6 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

0.7 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. National Project Performance Guarantee: Provide a guarantee on AABC'S "National Standards" forms stating that AABC will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- D. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- E. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- F. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- G. Examine equipment for installation and for properly operating safety interlocks and controls.
- H. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

0.2 PREPARATION

- A. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance and fire dampers are open.

5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Windows and doors can be closed so design conditions for system operations can be met.

0.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

0.4 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Verify that motor starters are equipped with properly sized thermal protection.
- E. Check dampers for proper position to achieve desired airflow path.
- F. Check for airflow blockages.
- G. Check condensate drains for proper connections and functioning.
- H. Check for proper sealing of air-handling unit components.

0.5 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems.
- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.

1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 2. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 3. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.
- D. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

0.6 MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer, model, and serial numbers.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating if high-efficiency motor.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.

0.7 TEMPERATURE TESTING

- A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

0.8 TOLERANCES

- A. Set HVAC system airflow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans: Plus 10 or minus 5 percent.
 - 2. Supply Air Outlets: Plus or minus 5 percent.
 - 3. Return and Exhaust Air Inlets: Plus or minus 10 percent.

0.9 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.

3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
1. Title page.
 2. Name and address of testing, adjusting, and balancing Agent.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of testing, adjusting, and balancing Agent who certifies the report.
 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 11. Notes to explain why certain final data in the body of reports vary from design values.
- E. Instrument Calibration Reports: For instrument calibration, include the following:
1. Report Data: Include the following:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

0.10 ADDITIONAL TESTS

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION 15990

DIVISION 16

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NATIONAL ACCOUNTS

The following is a list of specification sections within this Division stipulating National Accounts the Owner has entered into with the specified manufacturer(s).

1. Section 16442 – PANELBOARDS: Electrical Switchgear.
2. Section 16511 – INTERIOR LIGHTING: Interior Lighting.
3. Section 16521 – EXTERIOR LIGHTING: Exterior Lighting.
4. Section 16700 – ELECTRONIC DETECTION SYSTEM: EAS and POS security system.
5. Section 16710 – BURGLAR ALARM SYSTEM.
6. Section 16729 – PUBLIC ADDRESS AND MUSIC SYSTEM
7. Section 16740 – COMMUNICATIONS EQUIPMENT
8. Section 16750 – ENERGY MANAGEMENT SYSTEM.

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SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the following:
 - 1. Supporting devices for electrical components.
 - 2. Electrical identification.
 - 3. Electricity-metering components.
 - 4. Concrete equipment bases.
 - 5. Cutting and patching for electrical construction.
 - 6. Touchup painting.

0.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.

0.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with NFPA 70.

0.5 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

0.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Comply with Division 5 Section "Metal Fabrications" for slotted channel framing.
 1. Channel Thickness: Selected to suit structural loading.
 2. Fittings and Accessories: Products of the same manufacturer as channel supports.

0.2 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.

1. Type: Pretensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
 3. Color: Black letters on orange background.
 4. Legend: Indicates voltage.
- C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
1. Not less than 6 inches wide by 4 mils thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous metallic strip or core.
 4. Printed legend that indicates type of underground line.
- E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- H. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
- I. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.
- J. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- 0.3 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING
- A. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.
- B. Meter Sockets: Comply with requirements of electrical power utility company.

0.4 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."

0.5 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

0.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

0.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

0.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.

- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- G. Simultaneously install vertical conductor supports with conductors.
- H. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- I. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- J. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- K. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. Wood: Fasten with wood screws or screw-type nails.
 - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 - 3. New Concrete: Concrete inserts with machine screws and bolts.
 - 4. Existing Concrete: Expansion bolts.
 - 5. Steel: Welded threaded studs or spring-tension clamps on steel.
 - a. Field Welding: Comply with AWS D1.1.
 - 6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 7. Light Steel: Sheet-metal screws.
 - 8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

0.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Identify raceways and cables with color banding as follows:
 - 1. Colors: As follows:
 - a. Fire Alarm System: Red.
 - b. Security System: Blue and yellow.
 - c. Telecommunication System: Green and yellow.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- F. Color-code 208/120-V system service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 - 1. Phase A: Black.
 - 2. Phase B: Red.
 - 3. Phase C: Blue.
 - 4. Neutral: White.
 - 5. Ground: Green.

0.5 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

- A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

0.6 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

0.7 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

0.8 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

0.9 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Concrete bases.
 - 6. Cutting and patching for electrical construction.
 - 7. Touchup painting.

0.10 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

0.11 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

SECTION 16060 - GROUNDING AND BONDING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

0.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- 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.
 - 1. Comply with UL 467.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Apache Grounding/Erico Inc.
 - b. Boggs, Inc.
 - c. Chance/Hubbell.
 - d. Copperweld Corp.
 - e. Dossert Corp.
 - f. Erico Inc.; Electrical Products Group.

- g. Framatome Connectors/Burndy Electrical.
- h. Galvan Industries, Inc.
- i. Harger Lightning Protection, Inc.
- j. Hastings Fiber Glass Products, Inc.
- k. Heary Brothers Lightning Protection Co.
- l. Ideal Industries, Inc.
- m. ILSCO.
- n. Kearney/Cooper Power Systems.
- o. Korns: C. C. Korns Co.; Division of Robroy Industries.
- p. Lightning Master Corp.
- q. Lyncole XIT Grounding.
- r. O-Z/Gedney Co.; a business of the EGS Electrical Group.
- s. Raco, Inc.; Division of Hubbell.
- t. Robbins Lightning, Inc.
- u. Salisbury: W. H. Salisbury & Co.
- v. Superior Grounding Systems, Inc.
- w. Thomas & Betts, Electrical.

0.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."
- B. Material: Copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.
- E. Grounding Electrode Conductors: Stranded cable.
- F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- G. Bare Copper Conductors: Comply with the following:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Assembly of Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
- H. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

- I. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

0.3 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

0.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel.

PART 3 - EXECUTION

0.1 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.
- D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

0.2 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install equipment grounding conductors in all feeders and circuits.
- C. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.
- D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at

equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

- E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment grounding conductor. Isolate equipment grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
- F. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- G. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
 - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- H. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

0.3 INSTALLATION

- A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
 - 1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

- D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

0.4 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

0.5 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

- A. Pad-Mounted Transformers and Switches: Install two ground rods and counterpoise circling pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Use tinned-copper conductor not less than No. 2 AWG for counterpoise and for taps to equipment ground pad. Bury counterpoise not less than 18 inches below grade and 6 inches from the foundation.

0.6 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
3. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

SECTION 16071 - SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It applies to and complements optional seismic-restraint requirements in the various electrical component Sections of these Specifications.

1.2 DEFINITIONS

- A. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.
- B. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independently of other structural elements during an earthquake.

1.3 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in BOCA, SBC, UBC, unless requirements in this Section are more stringent.
- B. Testing Agency Qualifications: An independent testing and inspection agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the inspection indicated.

1.4 PROJECT CONDITIONS

- A. Project Seismic Zone and Zone Factor as Defined in UBC: 2a and 0.15
- B. Occupancy Category as Defined in UBC: M (Mercantile)
- C. Acceleration Factor as Defined in UBC, BOCA, or SBC: .12g
- D. Project Seismic Hazard Exposure Group as Defined in BOCA or SBC: Group I

1.5 COORDINATION

- A. Coordinate layout and installation of seismic bracing with building structure, architectural features, and mechanical, fire-protection, electrical, and other building systems.

- B. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. B-Line Systems, Inc.
 - 2. Powerstrut.
 - 3. Thomas & Betts Corp.
 - 4. Unistrut Corporation.

2.2 MATERIALS

- A. Use the following materials for restraints:
 - 1. Indoor Dry Locations: Steel, zinc plated.
 - 2. Outdoors and Damp Locations: Galvanized steel.
 - 3. Corrosive Locations: Stainless steel.

2.3 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

- A. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to authorities having jurisdiction.
 - 1. Structural Safety Factor: Strength in tension and shear of components shall be at least twice the maximum seismic forces for which they are required to be designed.
- B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.
- C. Concrete Inserts: Steel-channel type.
- D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
- E. Welding Lugs: Comply with MSS SP-69, Type 57.
- F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.
- G. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.

- H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.4 SEISMIC-BRACING COMPONENTS

- A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch-thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.
 - 1. Materials for Channel: ASTM A 570, GR 33.
 - 2. Materials for Fittings and Accessories: ASTM A 575, ASTM A 576, or ASTM A 36.
 - 3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.
 - 4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.
- B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.
- C. Hanger Rod Stiffeners: Slotted steel channels, installed vertically, with internally bolted connections to hanger rod.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated.
- B. Install structural attachments as follows:
 - 1. Use bolted connections with steel brackets, slotted channel, and slotted-channel fittings to spread structural loads and reduce stresses.
 - 2. Attachments to New Concrete: Bolt to channel-type concrete inserts or use expansion anchors.
 - 3. Attachments to Existing Concrete: Use expansion anchors.
 - 4. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.
 - 5. Attachments to Solid Concrete Masonry Unit Walls: Use expansion anchors.
 - 6. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.
 - 7. Attachments to Wood Structural Members: Install bolts through members.
 - 8. Attachments to Steel: Bolt to clamps on flanges of beams or on upper truss chords of bar joists.

- C. Install electrical equipment anchorage as follows:
1. Anchor panelboards, motor-control centers, motor controls, switchboards, switchgear, transformers, unit substations, fused power-circuit devices, transfer switches, busway, battery racks, static uninterruptible power units, power conditioners, capacitor units, communication system components, and electronic signal processing, control, and distribution units as follows:
 - a. Anchor equipment rigidly to a single mobile structural element or to a concrete base that is structurally tied to a single mobile structural element.
 - b. Size concrete bases so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base.
 - c. Concrete Bases for Floor-Mounted Equipment: Use female expansion anchors and install studs and nuts after equipment is positioned.
 - d. Bushings for Floor-Mounted Equipment Anchors: Install to allow for resilient media between anchor bolt or stud and mounting hole in concrete.
 - e. Anchor Bolt Bushing Assemblies for Wall-Mounted Equipment: Install to allow for resilient media where equipment or equipment-mounting channels are attached to wall.
 - f. Torque bolts and nuts on studs to values recommended by equipment manufacturer.
- D. Install seismic bracing as follows:
1. Install bracing according to spacings and strengths indicated by approved analysis.
 2. Expansion and Contraction: Install to allow for thermal movement of braced components.
 3. Attachment to Structure: If specific attachment is not indicated, anchor bracing to the structure at flanges of beams, upper truss chords of bar joists, or at concrete members.
- E. Accommodation of Differential Seismic Motion: Make flexible connections in raceways, cables, wireway, cable trays, and busway where they cross expansion- and seismic-control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate at electrical equipment anchored to a different mobile structural element from the one supporting them.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspection agency to inspect seismic-control installation for compliance with indicated requirements.
- B. Reinspection: Correct deficiencies and verify by reinspection that work complies with requirements.
- C. Provide written report of tests and inspections.

END OF SECTION 16071

SECTION 16120 - CONDUCTORS AND CABLES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

0.3 QUALITY ASSURANCE

- A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NFPA 70.

0.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26.

0.5 COORDINATION

- A. Coordinate layout and installation of cables with other installations.
- B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

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

1. Wires and Cables:
 - a. Alcan Aluminum Corporation; Alcan Cable Div.
 - b. American Insulated Wire Corp.; Leviton Manufacturing Co.
 - c. BICC Brand-Rex Company.
 - d. Carol Cable Co., Inc.
 - e. Senator Wire & Cable Company.
 - f. Southwire Company.
2. Connectors for Wires and Cables:
 - a. AMP Incorporated.
 - b. General Signal; O-Z/Gedney Unit.
 - c. Monogram Co.; AFC.
 - d. Square D Co.; Anderson.
 - e. 3M Company; Electrical Products Division.

0.2 BUILDING WIRES AND CABLES

- A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.
- B. Rubber Insulation Material: Comply with NEMA WC 3.
- C. Thermoplastic Insulation Material: Comply with NEMA WC 5.
- D. Cross-Linked Polyethylene Insulation Material: Comply with NEMA WC 7.
- E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.
- F. Conductor Material: Copper.
- G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

0.3 CONNECTORS AND SPLICES

- A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance

of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

0.2 WIRE AND INSULATION APPLICATIONS

- A. Service Entrance: Type RHW or THWN, in raceway.
- B. Feeders: Type THHN/THWN, in raceway.
- C. Fire-Pump Feeder: Type MI, 3-conductor.
- D. Branch Circuits: Type THHN/THWN, in raceway.
- E. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable.
- F. Class 2 Control Circuits: Power-limited tray cable, in cable tray.

0.3 INSTALLATION

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."
- B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Firestopping."
- G. Identify wires and cables according to Division 16 Section "Basic Electrical Materials and Methods."

0.4 CONNECTIONS

- A. Conductor Splices: Keep to minimum.
- B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

- C. Use splice and tap connectors compatible with conductor material.
- D. Use oxide inhibitor in each splice and tap connector for aluminum conductors.
- E. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
- F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- C. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

- 1. Raceways include the following:

- a. RMC.
- b. IMC.
- c. PVC externally coated, rigid steel conduits.
- d. PVC externally coated, IMC.
- e. EMT.
- f. FMC.
- g. LFMC.
- h. Wireways.
- i. Surface raceways.

- 2. Boxes, enclosures, and cabinets include the following:

- a. Device boxes.
- b. Floor boxes.
- c. Outlet boxes.
- d. Pull and junction boxes.
- e. Cabinets and hinged-cover enclosures.

0.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RMC: Rigid metal conduit.

0.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NECA's "Standard of Installation."
- C. Comply with NFPA 70.

0.5 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Metal Conduit and Tubing:
 - a. Alflex Corp.
 - b. Anamet, Inc.; Anaconda Metal Hose.
 - c. Anixter Brothers, Inc.
 - d. Carol Cable Co., Inc.
 - e. Cole-Flex Corp.
 - f. Electri-Flex Co.
 - g. Flexcon, Inc.; Coleman Cable Systems, Inc.
 - h. Grinnell Co.; Allied Tube and Conduit Div.
 - i. Monogram Co.; AFC.
 - j. Spiraduct, Inc.
 - k. Triangle PWC, Inc.
 - l. Wheatland Tube Co.
 - 2. Nonmetallic Conduit and Tubing:
 - a. Anamet, Inc.; Anaconda Metal Hose.
 - b. Arnco Corp.
 - c. Breeze-Illinois, Inc.
 - d. Cantex Industries; Harsco Corp.
 - e. Certainteed Corp.; Pipe & Plastics Group.
 - f. Cole-Flex Corp.
 - g. Condux International; Electrical Products.

- h. Electri-Flex Co.
 - i. George-Ingraham Corp.
 - j. Hubbell, Inc.; Raco, Inc.
 - k. Lamson & Sessions; Carlon Electrical Products.
 - l. R&G Sloan Manufacturing Co., Inc.
 - m. Spiraduct, Inc.
 - n. Thomas & Betts Corp.
3. Conduit Bodies and Fittings:
- a. American Electric; Construction Materials Group.
 - b. Crouse-Hinds; Div. of Cooper Industries.
 - c. Emerson Electric Co.; Appleton Electric Co.
 - d. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - e. Lamson & Sessions; Carlon Electrical Products.
 - f. O-Z/Gedney; Unit of General Signal.
 - g. Scott Fetzer Co.; Adalet-PLM.
 - h. Spring City Electrical Manufacturing Co.
4. Metal Wireways:
- a. Hoffman Engineering Co.
 - b. Keystone/Rees, Inc.
 - c. Square D Co.
5. Surface Metal Raceways:
- a. Airey-Thompson Co., Inc.; A-T Power Systems.
 - b. American Electric; Construction Materials Group.
 - c. Butler Manufacturing Co.; Walker Division.
 - d. Wiremold Co. (The); Electrical Sales Division.
6. Surface Nonmetallic Raceways:
- a. Anixter Brothers, Inc.
 - b. Butler Manufacturing Co.; Walker Division.
 - c. Hubbell, Inc.; Wiring Device Division.
 - d. JBC Enterprises, Inc.; Enduro Fiberglass Systems.
 - e. Lamson & Sessions; Carlon Electrical Products.
 - f. Panduit Corp.
 - g. Thermotools Co.
 - h. United Telecom; Premier Telecom Products, Inc.
 - i. Wiremold Co. (The); Electrical Sales Division.
7. Boxes, Enclosures, and Cabinets:
- a. American Electric; FL Industries.
 - b. Butler Manufacturing Co.; Walker Division.
 - c. Crouse-Hinds; Div. of Cooper Industries.
 - d. Electric Panelboard Co., Inc.
 - e. Erickson Electrical Equipment Co.

- f. Hoffman Engineering Co.; Federal-Hoffman, Inc.
- g. Hubbell Inc.; Killark Electric Manufacturing Co.
- h. Hubbell Inc.; Raco, Inc.
- i. Lamson & Sessions; Carlon Electrical Products.
- j. O-Z/Gedney; Unit of General Signal.
- k. Parker Electrical Manufacturing Co.
- l. Robroy Industries, Inc.; Electrical Division.
- m. Scott Fetzer Co.; Adalet-PLM.
- n. Spring City Electrical Manufacturing Co.
- o. Thomas & Betts Corp.
- p. Woodhead Industries, Inc.; Daniel Woodhead Co.

0.2 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Rigid Aluminum Conduit: ANSI C80.5.
- C. IMC: ANSI C80.6.
- D. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.
- E. Plastic-Coated IMC and Fittings: NEMA RN 1.
- F. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Set-screw or compression type.
- G. FMC: Zinc-coated steel.
- H. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

0.3 METAL WIREWAYS

- A. Material: Sheet metal sized and shaped as indicated.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

0.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
- B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

0.5 OUTLET AND DEVICE BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

0.6 FLOOR BOXES

- A. Floor Boxes: Cast metal, fully adjustable, rectangular.

0.7 PULL AND JUNCTION BOXES

- A. Small Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

0.8 ENCLOSURES AND CABINETS

- A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

0.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Exposed: EMT.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

0.3 INSTALLATION

- A. Minimum Raceway Size: $\frac{3}{4}$ -inch trade size (DN21)
- B. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.
- C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Install raceways level and square and at proper elevations. Provide adequate headroom.
- E. Complete raceway installation before starting conductor installation.
- F. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- G. Use temporary closures to prevent foreign matter from entering raceways.
- H. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- I. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

- J. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
- K. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
- L. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- M. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
 - 1. Run parallel or banked raceways together, on common supports where practical.
 - 2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- N. Join raceways with fittings designed and approved for the purpose and make joints tight.
 - 1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
 - 2. Use insulating bushings to protect conductors.
- O. Tighten set screws of threadless fittings with suitable tools.
- P. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.
- Q. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
- R. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

- S. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- T. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.
- U. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.
- V. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

0.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

0.5 CLEANING

- A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes receptacles, connectors, switches, and finish plates.

0.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.

0.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NEMA WD 1.
- C. Comply with NFPA 70.

0.5 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Bryant Electric, Inc.
 - b. Eagle Electric Manufacturing Co., Inc.
 - c. GE Company; GE Wiring Devices.
 - d. Hubbell, Inc.; Wiring Devices Div.

- e. Killark Electric Manufacturing Co.
 - f. Leviton Manufacturing Co., Inc.
 - g. Pass & Seymour/Legrand; Wiring Devices Div.
 - h. Pyle-National, Inc.; an Amphenol Co.
2. Multioutlet Assemblies:
- a. Airey-Thompson Co.
 - b. Wiremold.
3. Poke-through, Floor Service Outlets and Telephone/Power Poles:
- a. American Electric.
 - b. Hubbell, Inc.; Wiring Devices Div.
 - c. Pass & Seymour/Legrand; Wiring Devices Div.
 - d. Square D Co.
 - e. Wiremold.

0.2 RECEPTACLES

- A. Straight-Blade Receptacles: Specification grade.
- B. GFCI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.
- C. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap.
 - 1. Devices: Listed and labeled as isolated-ground receptacles.
 - 2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

0.3 SWITCHES

- A. Snap Switches: General-duty, quiet type.

0.4 WALL PLATES

- A. Single and combination types match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.04-inch- thick, Type 302, satin-finished stainless steel.
 - 3. Material for Unfinished Spaces: Smooth plastic.

0.5 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Type: Modular, pop-up, dual-service units suitable for wiring method used.
- C. Type: Modular, above-floor, dual-service units suitable for wiring method used.
- D. Compartmentation: Barrier separates power and signal compartments.
- E. Housing Material: Die-cast aluminum, satin finished.
- F. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- G. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

0.6 MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: Metal, with manufacturer's standard finish.
- C. Wire: No. 12 AWG.

0.7 FINISHES

- A. Color: White, unless otherwise indicated or required by Code.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install devices and assemblies plumb and secure.
- B. Install wall plates when painting is complete.
- C. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- D. Protect devices and assemblies during painting.
- E. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.

0.2 IDENTIFICATION

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods."
 - 1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
 - 2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

0.3 CONNECTIONS

- A. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
- B. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.
- C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

0.4 FIELD QUALITY CONTROL

- A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.
- B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- C. Replace damaged or defective components.

0.5 CLEANING

- A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 16140

SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:
 - 1. Service disconnecting means.
 - 2. Feeder and branch-circuit protection.
 - 3. Motor and equipment disconnecting means.

0.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. RMS: Root mean square.
- C. SPDT: Single pole, double throw.

0.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with NFPA 70.

0.5 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fusible Switches:
 - a. Eaton Corp.; Cutler-Hammer Products.
 - b. General Electric Co.; Electrical Distribution & Control Division.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D Co.
 2. Molded-Case Circuit Breakers:
 - a. Eaton Corp.; Cutler-Hammer Products.
 - b. General Electric Co.; Electrical Distribution & Control Division.
 - c. Klockner-Moeller.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D Co.

0.2 ENCLOSED SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

0.3 ENCLOSED CIRCUIT BREAKERS

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.

- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
 - 1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
 - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

0.4 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

0.5 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard grey paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 - EXECUTION

0.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

0.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."

- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

0.4 CONNECTIONS

- A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.
- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each enclosed switch, circuit breaker, component, and control circuit.
 - 2. Test continuity of each line- and load-side circuit.
- B. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

0.6 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

0.7 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16410

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:
 - 1. Lighting and appliance branch-circuit panelboards.
 - 2. Distribution panelboards.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with NESCO Inc. for furnishing the electrical switchgear specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call NESCO, Inc. at (800) 244-6980.

0.4 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. RFI: Radio-frequency interference.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

0.5 QUALITY ASSURANCE

- A. 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.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

0.6 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

0.7 EXTRA MATERIALS

- A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - a. General Electric Co.; Electrical Distribution & Control Div.

0.2 FABRICATION AND FEATURES

- A. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.
- B. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
- C. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
- D. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.
- E. Bus: Tin-plated aluminum.
- F. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.
- G. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

- H. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box.
- I. Feed-through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

0.3 PANELBOARD SHORT-CIRCUIT RATING

- A. MDP fully rated to interrupt symmetrical short-circuit current available at terminals.
- B. Branch panelboards to be series rated.

0.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

0.5 DISTRIBUTION PANELBOARDS

- A. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.
- B. Main Overcurrent Protective Devices: Circuit breaker.
- C. Branch overcurrent protective devices shall be one of the following:
 - 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
 - 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

0.6 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I²t response.

- B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.
 - 1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
 - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

0.7 CONTROLLERS

- A. Motor Controllers: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:
 - 1. Melting-alloy overload relay.
 - 2. Indicating lights.
 - 3. Seal-in contact.
 - 4. Two (2) convertible auxiliary contacts.
 - 5. Push buttons.
- B. Contactors: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:
 - 1. Individual control-power transformers.
 - 2. Fuses for control-power transformers.
 - 3. Indicating lights.
 - 4. Seal-in contact.
 - 5. Four (4) convertible auxiliary contacts.
 - 6. Push buttons.
 - 7. Selector switches.
- C. Controller Disconnect Switches: Fused switch and interlocked with controller.
 - 1. Auxiliary Contacts: Integral with disconnect switches to de-energize external control-power source.

0.8 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: To test functions of solid-state trip devices without removal from panelboard.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- E. Install filler plates in unused spaces.
- F. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

0.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."
- B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

0.3 CONNECTIONS

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:
1. Measure as directed during period of normal system loading.
 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

0.5 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

0.6 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

SECTION 16511 - INTERIOR LIGHTING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Wiedenbach – Brown Co., Inc. for furnishing the interior lighting specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Wiendenbach – Brown Co., Inc @ (888) 230-1569.

0.4 QUALITY ASSURANCE

- A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NFPA 70.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

0.5 COORDINATION

- A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

0.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Warranty for Batteries: Written warranty, executed by manufacturer agreeing to replace rechargeable batteries that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Interior Lighting Fixture Schedule at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Interior Lighting Fixture Schedule at the end of Part 3.

0.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
 - 1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
 - 2. Lens Thickness: 0.125 inch minimum, unless greater thickness is indicated.

0.3 FLUORESCENT LAMP BALLASTS

- A. General Requirements: Unless otherwise indicated, features include the following:
 - 1. Designed for type and quantity of lamps indicated at full light output.
 - 2. Total Harmonic Distortion Rating: Less than 10 percent.

- B. Electronic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:
 - 1. Certified Ballast Manufacturer Certification: Indicated by label.
 - 2. Encapsulation: Without voids in potting compound.
 - 3. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
- C. Electromagnetic Ballasts for Linear Lamps: Unless otherwise indicated, features include the following, besides those in "General Requirements" Paragraph above:
 - 1. Type: Energy saving.
 - 2. Certified Ballast Manufacturer Certification: Indicated by label.
 - 3. Encapsulation: Without voids in potting compound.
- D. Ballasts for Compact Lamps in Recessed Fixtures: Unless otherwise indicated, additional features include the following:
 - 1. Type: Electronic or electromagnetic, fully encapsulated in potting compound.
 - 2. Power Factor: 90 percent, minimum.

0.4 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

- A. General: Comply with ANSI C82.4. Unless otherwise indicated, features include the following:
 - 1. Type: Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.
 - 2. Operating Voltage: Match system voltage.
 - 3. Minimum Starting Temperature: Minus 22 deg F for single lamp ballasts.
 - 4. Normal Ambient Operating Temperature: 104 deg F.
 - 5. Open-circuit operation that will not reduce average life.
 - 6. Auxiliary, Instant-on, Quartz System: Automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. Automatically turns quartz lamp off when high-intensity-discharge lamp reaches approximately 60 percent light output.
- B. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.
 - 1. Instant Restrike Device: Solid-state, potted module, mounted inside high-pressure sodium fixture and compatible with high-pressure sodium lamps, ballasts, and sockets up to 150 W.
 - a. Restrike Range: 105- to 130-V ac.
 - b. Maximum Voltage: 250-V peak or 150-V ac RMS.

0.5 EXIT SIGNS

- A. General Requirements: Comply with UL 924 and the following:
 - 1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.
- B. Internally Lighted Signs: As follows:
 - 1. Lamps for AC Operation: Incandescent, two for each fixture, 50,000 hours rated lamp life.
 - 2. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours rated lamp life.
 - 3. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

0.6 EMERGENCY FLUORESCENT POWER SUPPLY UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
 - 1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - 2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
 - 3. Charger: Fully automatic, solid-state, constant-current type.
 - 4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.

0.7 LAMPS

- A. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500 K and 85 CRI, unless otherwise indicated.
- B. Fluorescent Color Temperature and Minimum Color-Rendering Index: 4100 K and 85 CRI, unless otherwise indicated.

- C. Noncompact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid-start circuits.
- D. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

0.8 FINISHES

- A. Fixtures: Manufacturer's standard, unless otherwise indicated.
 - 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
 - 2. Metallic Finish: Corrosion resistant.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
- B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
 - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
 - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- C. Suspended Fixture Support: As follows:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

0.2 CONNECTIONS

- A. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Advance Notice: Give dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: As follows:
 - 1. Verify normal operation of each fixture after installation.
 - 2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
 - 3. Verify normal transfer to battery source and retransfer to normal.
 - 4. Report results in writing.
- E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- F. Corrosive Fixtures: Replace during warranty period.

0.4 CLEANING AND ADJUSTING

- A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities.

0.5 INTERIOR LIGHTING FIXTURE SCHEDULE

- A. Refer to Drawings.

END OF SECTION 16511

SECTION 16521 - EXTERIOR LIGHTING

PART 1 - GENERAL

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes exterior lighting units with luminaires, lamps, ballasts, poles/support structures, and accessories.

0.3 NATIONAL ACCOUNTS

- A. CVS Pharmacy has entered into a national account agreement with Wiendenbach-Brown Co., Inc. for furnishing the exterior lighting specified in this section. Complete installation shall be by the Contractor. For pricing quotations, placing orders, and further information, call Wiendenbach-Brown Co., Inc. at (888) 230-1569.

0.4 SITE PHOTOMETRIC

- A. Thru CVS Pharmacy's national account agreement with Wiendenbach-Brown Co., Inc., use the following consultants to prepare the photometric requirements for this section.
 1. Primary Consultant: Hubbell Lighting Inc., contact Arnel Uy at (864) 327-3124.
 2. Secondary Consultant: Cooper Lighting, contact Joe Robertson at (770) 486-4582.

0.5 DEFINITIONS

- A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.
- B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

0.6 QUALITY ASSURANCE

- A. Luminaires and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use, location, and installation conditions by a testing agency acceptable to authorities having jurisdiction

- B. Comply with ANSI C2.
- C. Comply with NFPA 70.
- D. FM Compliance: Units for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM.

0.7 DELIVERY, STORAGE, AND HANDLING OF POLES

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent surface more than 1/4 inch deep. Do not apply tools to section of poles below ground-line.
- D. Retain factory-applied pole wrappings on fiberglass poles until just before pole installation. Handle poles with web fabric straps.
- E. Retain factory-applied pole wrappings on metal poles until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

0.8 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by manufacturer and Installer agreeing to replace external parts of luminaires and poles exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies Owner may have under requirements of the Contract Documents.
 - 1. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
 - 2. Color Retention: Warranty against fading, staining, and chalking due to effects of weather and solar radiation.
 - 3. Warranty Period: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

0.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in the Exterior Lighting Unit Schedule at the end of Part 3.
- B. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Exterior Lighting Unit Schedule at the end of Part 3.

0.2 LUMINAIRES

- A. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- B. Metal Parts: Free from burrs, sharp corners, and edges.
- C. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.
- F. Exposed Hardware Material: Stainless steel.
- G. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
- H. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- I. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.
- J. Photoelectric Relays: As follows:
 - 1. Contact Relays: Single throw, arranged to fail in the on position and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay.
 - 2. Relay Mounting: In luminaire housing.
- K. High-Intensity-Discharge Ballasts: Comply with ANSI C82.4. Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.

1. Ballast Fuses: One in each ungrounded supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
 2. Single-Lamp Ballasts: Minimum starting temperature of minus 40 deg C.
 3. Open-circuit operation will not reduce average life.
 4. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.
 5. Noise: Uniformly quiet operation, with a noise rating of B or better.
 6. Surge Protector: Hard-wired unit external to ballast case, rated for supply circuit line voltage, and encapsulated for circuit and moisture protection. Three-stage surge protection with three suppression modes provides 330-V peak clamping, line to neutral, line to ground, and neutral to ground. Pulse life is 500 3KA-8x20 microsecond impulses, and response time is less than 1 nanosecond. Internal fuse takes device off line on failure and lights a light-emitting diode failure indicator.
- L. Lamps: Comply with the standard of the ANSI C78 series that is applicable to each type of lamp. Provide luminaires with indicated lamps of designated type, characteristics, and wattage. Where a lamp is not indicated for a luminaire, provide medium wattage lamp recommended by manufacturer for luminaire.
1. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

0.3 LUMINAIRE SUPPORT COMPONENTS

- A. Description: Comply with AASHTO LTS-3 for pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.
- B. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 100 mph with a gust factor of 1.3. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.
- C. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.
- D. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 1. Materials: Will not cause galvanic action at contact points.
 2. Mountings: Correctly position luminaire to provide indicated light distribution.
 3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.
 4. Anchor-Bolt Template: Plywood or steel.
- E. Pole/Support Structure Bases: Anchor type with hold-down or anchor bolts, leveling nuts, and bolt covers.

- F. Pole Bases: Hinged-anchor type with hold-down or anchor bolts, leveling nuts, and bolt covers.
- G. Pole Bases: Embedded type with underground cable entry.
- H. Steel Poles: Tubing complying with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig; one-piece construction up to 40 feet in length with access handhole in pole wall.
- I. Laminated-Wood Poles: Pressure treat with pentachlorophenol preservative and have a concealed raceway path connected to access handhole.
- J. Metal Pole Brackets: Match pole metal. Provide cantilever brackets without underbrace, in sizes and styles indicated, with straight tubular end section to accommodate luminaire.
- K. Concrete for Pole Foundations: Comply with Division 3 Section "Cast-in-Place Concrete."
 - 1. Design Strength: 3000-psig, 28-day compressive strength.

0.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Steel: Grind welds and polish surfaces to a smooth, even finish.
 - 1. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123.
 - 2. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. 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."
 - 3. Interior: Apply one coat of bituminous paint on interior of pole, or otherwise treat to prevent corrosion.
 - 4. Polyurethane Enamel: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

PART 3 - EXECUTION

0.1 INSTALLATION

- A. Concrete Foundations: Construct according to Division 3 Section "Cast-in-Place Concrete."

1. Comply with details for reinforcement and for anchor bolts, nuts, and washers. Verify anchor-bolt templates by comparing with actual pole bases furnished.
 2. Finish for Parts Exposed to View: Trowel and rub smooth. Comply with Division 3 Section "Cast-in-Place Concrete" for exposed finish.
- B. Embedded Poles: Set poles to indicated depth, but not less than one-sixth of pole length below finish grade. Dig holes large enough to permit use of tampers the full depth of hole. Backfill in 6-inch layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
- C. Install poles as follows:
1. Use web fabric slings (not chain or cable) to raise and set poles.
 2. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
 3. Secure poles level, plumb, and square.
 4. Grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space.
 5. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- D. Luminaire Attachment: Fasten to indicated structural supports.

0.2 CONNECTIONS

- A. Ground equipment.
1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

0.3 FIELD QUALITY CONTROL

- A. Inspect each installed unit for damage. Replace damaged units.
- B. Advance Notice: Give dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:
- E. Prepare a written report of tests, inspections, observations and verifications indicating and interpreting results.
- F. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

0.4 CLEANING AND ADJUSTING

- A. Clean units after installation. Use methods and materials recommended by manufacturer.

END OF SECTION 16521

SECTION 16700 – ELECTRONIC DETECTION SYSTEM

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes electronic article surveillance (EAS) and point of sale (POS) security system.
- B. System shall detect unscanned merchandise.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Checkpoint for furnishing the electronic detection system specified in this section. Complete installation shall be by manufacturer. The General Contractor is responsible for contacting the manufacturer for pricing quotations, placing orders, and further information, call Checkpoint at (401) 770-3920.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Installer: Complete installation shall be by manufacturer.

0.5 DELIVERY, STORAGE AND HANDLING

- A. Protect materials in accordance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

0.1 ELECTRONIC DETECTION SYSTEM

- A. Provide system including the following components:
 - 1. Set of two (2) pedestals consisting of one (1) primary pedestal with electronics and light and one (1) secondary pedestal with remote antenna.
 - 2. One (1) deactivator pad per POS register.
 - 3. One (1) deactivator chassis per POS register.

- B. Miscellaneous Materials: Provide as required and as standard with the manufacturer for the Owner for the units required.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for a clean and level floor space; and materials for electronic connections. Areas shall be broom clean, free of construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Complete installation to be performed by the manufacturer.
- B. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that electronic detection system will be free of damage or deterioration at the time of substantial completion.

0.5 DEMONSTRATION

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".
 - 4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 16700

SECTION 16710 – BURGLAR ALARM SYSTEM

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes a burglar alarm system.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers listed below for furnishing the burglar alarm system specified in this section. Complete installation shall be by the contractor. The General Contractor is responsible for contacting the manufacturer for pricing quotations, placing orders, and further information, please call the appropriate manufacturer for the area the store is located in.

1. Vector Security at (603) 329-7221
Area: Michigan Only.
2. AFA Protective System at (617) 312-5598
Areas: AL, CT, DC, DE, GA, MA, ME, MD, NC, NH, NY, PA, RI, SC, VA, VT, WV
3. BCI Technologies at (817) 649-0686
Areas: IN, IL, KS, KY, LA, MO, MS, MT, OH, OK, TN
4. MRJ Security at (978) 372-3489
Areas: MN
5. Integrated Security Solutions at (800) 505-0868
Area: New Jersey Only.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the manufacturer for installation of the type of burglar alarm system required for this Project.

0.5 DELIVERY, STORAGE AND HANDLING

- A. Protect materials in accordance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

0.1 BURGLAR ALARM SYSTEM

- A. Provide components including, but not necessarily limited to, electronics, hard wire, alarms, alarm panels, key pads, batteries, contacts, detectors/sensors, recorders and miscellaneous accessories, as required and as standard with the manufacturer for the Owner.
- B. Verify Security System/Monitoring for NY and PA with CVS loss prevention department.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for readiness of system including materials for electrical wiring and connections.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, burglar alarm system will be free of damage or deterioration at the time of Substantial Completion.

0.5 TESTING

- A. Engage a factory-authorized service representative to perform testing and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and equipment. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup, troubleshooting, servicing, and preventive maintenance.

3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".
4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 16710

SECTION 16729 – PUBLIC ADDRESS AND MUSIC SYSTEM

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes a public address and music system.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with Muzak for furnishing the public address and music system specified in this section. The General Contractor is responsible for contacting the manufacturer. The General Contractor is responsible for contacting the manufacturer for pricing quotations, placing orders, and further information, call Patricia Mc Clurkin of Muzak at (800) 331-3340 ext. 3037.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Installer Qualifications: Contractor shall enter into a contract with Muzak Music for complete installation of the public address and music system.

0.5 DELIVERY, STORAGE AND HANDLING

- A. Protect materials in accordance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

0.1 PUBLIC ADDRESS AND MUSIC SYSTEM SPEAKERS

- A. Provide components including, but not necessarily limited to, electronics, hard wire, and miscellaneous accessories, as required and as standard with the manufacturer for the Owner.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for readiness of system including materials for electrical wiring and connections.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, public address and music system will be free of damage or deterioration at the time of Substantial Completion.

0.5 TESTING

- A. Engage a factory-authorized service representative to perform testing and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and equipment. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup, troubleshooting, servicing, and preventive maintenance.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".
 - 4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 16729

SECTION 16740 – COMMUNICATIONS EQUIPMENT

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes communications system.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with the manufacturers below. Complete installation shall be by the contractor. The general contractor shall call the appropriate manufacturer in the area the store is located in for all pricing quotations, placing orders and further information.
 - 1. CrossCom National at (847) 421-2764
Areas: DC, DE, MD, MS, NJ, NM, NY, TN, MO and WV.
 - 2. EGC Inc. at (888) 834-2462
Area: CT, MA, ME, NH, RI and VT.
 - 3. Intelex/Comm-Works at (317) 428-1266
Areas: GA, IA, IL, IN, KY, MI, NC, PR and WA.
 - 4. Net at (608) 827-7949 ext. 5300
Areas: AL, AR, CO, ID, KS, LA, MN, MT, ND, NE, OH, OK, OR, PA, SC, SD, UT, VA, WI and WY.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Installer Qualifications: Contractor shall enter onto a contract with the national account manufacturer listed above for complete installation of the communications system.

0.5 DELIVERY, STORAGE AND HANDLING

- A. Protect materials in accordance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

0.1 COMMUNICATIONS EQUIPMENT

- A. Provide components including, but not necessarily limited to, electronics, hardware/software, cabling, and miscellaneous accessories, as required and as standard with the manufacturer for the Owner.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for readiness of system including materials for electrical wiring and connections.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, except for normal weathering, communication system will be free of damage or deterioration at the time of Substantial Completion.

0.5 TESTING

- A. Engage a factory-authorized service representative to perform testing and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and equipment. Replace damaged and malfunctioning controls and equipment.

2. Train Owner's maintenance personnel on procedures and schedules related to startup, troubleshooting, servicing, and preventive maintenance.
3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".
4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 16740

SECTION 16750 – ENERGY MANAGEMENT SYSTEM

0.1 RELATED DOCUMENTS

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

0.2 SUMMARY

- A. This Section includes the Energy Management System.

0.3 NATIONAL ACCOUNT

- A. CVS/Pharmacy has entered into a national account agreement with CPC for furnishing the Energy Management System specified in this section. For pricing quotations, placing orders, and further information, call CPC at (800) 829-2724.

0.4 QUALITY ASSURANCE

- A. Standards: Comply with applicable industry standards.
- B. Installer Qualifications: Contractor shall enter into a contract with CPC for complete installation of the Energy Management System.

0.5 DELIVERY, STORAGE AND HANDLING

- A. Protect materials in accordance with manufacturer's instructions and recommendations.

PART 2 - PRODUCTS

0.1 ENERGY MANAGEMENT SYSTEM

- A. Provide components including, but not necessarily limited to, Controllers, Sensors, EMS Panel, control boards, and miscellaneous accessories, as required and as standard with the manufacturer for the Owner.

PART 3 - EXECUTION

0.1 INSPECTION

- A. Inspect installation areas for readiness of system including materials for electrical wiring and connections.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for a complete installation.
- B. Provide proper support as standard with the manufacturer and anchor securely to surrounding construction with approved fasteners.
- C. Coordinate installation with other components of the work.
 - 1. Repair abraded areas of factory applied finishes.

0.3 CLEANING

- A. Clean surfaces promptly after installation. Exercise care to avoid damage to the finish. Remove excess dirt and other substances.

0.4 PROTECTION

- A. Initiate and maintain protection and other precautions required through the remainder of the construction period to ensure that, public address and music system will be free of damage or deterioration at the time of Substantial Completion.

0.5 TESTING

- A. Engage a factory-authorized service representative to perform testing and to train Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and equipment. Replace damaged and malfunctioning controls and equipment.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to startup, troubleshooting, servicing, and preventive maintenance.
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures".
 - 4. Schedule training with Owner, through Architect, with at least seven (7) day's advance notice.

END OF SECTION 16750