PROJECT MANUAL

MARYLAND FOOD BANK

2200 Halethorpe Farms Rd, Baltimore, Maryland 21224

Maryland Food Bank





Date: November 30th, 2020

CONSTRUCTION DOCUMENTS ISSUE

for

MARYLAND FOOD BANK

2200 Halethorpe Farms Rd, Baltimore, Maryland 21224

Maryland Food Bank

NOVEMBER 30TH, 2020

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APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

1.2 SCHEDULE OF VALUES

- A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's construction schedule.
 - b. Application for Payment form.
 - c. List of subcontractors.
 - d. List of products.
 - e. List of principal suppliers and fabricators.
 - f. Schedule of submittals.
 - 2. Submit the Schedule of Values to the Owner and Architect at the earliest feasible date, but in no case later than 14 days before the date scheduled for submittal of the initial Application for Payment.
 - 3. Sub-Schedules: Where the work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: The Contractor should submit a format of "Schedule of Values" compatible with the Contractor's billing practice to establish the headings and Uniformat Coding for the Schedule(s) of Values to the Owner and the Architect for review and approval.
 - 1. Identification: Include the following project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

- 2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - a. Generic name.
 - b. Related Specification Section.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that have affected value.
 - g. Dollar value.
 - h. Percentage of contract sum to the nearest one hundredth percent, adjusted to total 100 percent.
- 3. Provide a breakdown of the contract sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide Schedules of Values as follows:
 - a. New Work (each building separately).
 - b. Alteration Work in Existing Building (each building separately).
 - c. Further, break down New Work and Alterations Work into "Building" (or each Building) and "Site." Exclude from "Building" all work outside the building such as site improvements, grading, site utilities, lighting, mechanical and other work not directly attributed to the square footage of the building.
 - d. Tie-Ins: For connecting new work to the existing, such as connecting utilities, tunnels, links, covered walks and bridges, and building interfaces.
- 4. Break down General Conditions and Division 1 costs proportionately assigning them to each Schedule.
- 5. Round amounts off to the nearest whole dollar; the total shall equal the contract sum.
- 6. For each part of the work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the work.
- C. Unit Cost Allowances: Show line item value of unit cost allowances as a product of unit cost times measured quantity as estimated from the best indication in the Contract Documents.
- D. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 - 1. General Conditions, Division One Costs and Contractor's Overhead and Fee shall appear on the Schedule of Values as separate line items.

APPLICATIONS FOR PAYMENT 01027-2

- E. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the contract sum. Modify the Schedule of Values to reflect changes made to affected line items, aggregating the new Contract Sum. The Schedule of Values shall list each change order as a separate line item.
 - 1. List breakdown of each change order on a separate sheet. Show breakdown of change order, referenced back to each line item affected in the Schedule of Values by U.F. Code.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
 - 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Application for Payment.
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required. Submit one electronic copy in Macintosh Excel or IBM-compatible Excel or PDF to Owner.
 - 1. Transmit the above with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

- F. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.
 - 1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. The Owner reserves the right to designate which entities involved in the work must submit waivers.
 - 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of work covered by the application who could lawfully be entitled to a lien.
 - 5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner acceptable to Owner.
- G. Initial application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. List of principal supplies and fabricators.
 - 3. Schedule of Values.
 - 4. Contractor's Construction Schedule (preliminary if not final).
 - 5. Schedule of principal products.
 - 6. Schedule of unit prices.
 - 7. Submittal Schedule (preliminary if not final).
 - 8. List of Contractor's staff assignments.
 - 9. List of Contractor's principal consultants.
 - 10. Copies of building permits.
 - 11. Copies of authorizations and licenses from governing authorities for performance of the work.
 - 12. Initial progress report.
 - 13. Report of pre-construction meeting.
 - 14. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the work. Administrative actions and submittals that shall proceed or coincide with this application include:
 - 1. Occupancy permits and similar approvals.
 - 2. Warranties (guarantees) and maintenance agreements.
 - 3. Test/adjust/balance records.
 - 4. Maintenance instructions.
 - 5. Meter readings.
 - 6. Start-up performance reports.

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- 7. Change-over information related to Owner's occupancy, use, operation and maintenance.
- 8. Final cleaning.
- 9. Application for reduction of retainage, and consent of surety.
- 10. Advice on shifting insurance coverages.
- 11. Final progress photographs.
- 12. List of incomplete work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- I. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
 - 1. Completion of Project closeout requirements.
 - 2. Completion of items specified for completion after Substantial Completion.
 - 3. Assurance that unsettled claims will be settled.
 - 4. Assurance that work not complete and accepted will be completed without undue delay.
 - 5. Transmittal of required project construction records to Owner.
 - 6. Certified property survey.
 - 7. Proof that taxes, fees and similar obligations have been paid.
 - 8. Removal of temporary facilities and services.
 - 9. Removal of surplus materials, rubbish and similar elements.
 - 10. Change of door locks to Owner's access.
 - 11. Submittal of an electronic copy of the Schedule(s) of Values. Submittal shall be in Macintosh Excel or IBM-compatible Excel or PDF format.

PART 2 - PRODUCTS

(not used)

PART 3 - EXECUTION

- 3.1 SCHEDULE
 - A. "Format" for the Schedule of Values to be determined.

SUMMARY OF WORK

PART 1 - GENERAL

1.1 PROJECT SUMMARY

Maryland Food Bank is a 21,000 sf, renovation and addition located at 2200 Halethorpe Farm Rd, Baltimore, MD 21224. The renovation and addition take place in an existing 80,000 sf warehouse and 2,000 sf commercial kitchen area. The warehouse is structurally comprised of concrete slab on grade with steel framing and tilt-up concrete wall panel construction.

The new addition and renovation scope is composed of developing both first and second floor office space as well as the renovation and expansion of the existing commercial kitchen.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SUMMARY OF WORK 01100-1

PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Preconstruction conferences.
 - 2. Preinstallation conferences.
 - 3. Progress meetings.
 - 4. Coordination meetings.

1.2 RELATED SECTIONS

- A. Division 1 Section Coordination: Procedures for coordinating project meetings with other construction activities.
- B. Division 1 Section Submittals: Construction schedules.

1.3 PRECONSTRUCTION CONFERENCE

- A. Schedule a preconstruction conference before starting construction, at a time convenient to the Owner and the Architect, but no later than 15 days after execution of the Agreement. Hold the conference at the Project Site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the 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 the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress, including the following:
 - 1. Tentative construction schedule.
 - 2. Critical work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.

PROJECT MEETINGS 01200-1

- 6. Distribution of Contract Documents.
- 7. Submittal of Shop Drawings, Product Data, and Samples.
- 8. Preparation of record documents.
- 9. Use of the premises.
- 10. Parking availability.
- 11. Office, work, and storage areas.
- 12. Equipment deliveries and priorities.
- 13. Safety procedures.
- 14. First aid.
- 15. Security.
- 16. Housekeeping.
- 17. Working hours.

1.4 PREINSTALLATION CONFERENCES

- A. Conduct a preinstallation conference at the Project Site before each construction activity that requires coordination with other construction.
- B. Attendees: The 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. Advice the Architect of scheduled meeting dates.
 - 1. Review the progress of other construction activities and preparations for the particular activity under consideration at each preinstallation conference, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Shop Drawings, Product Data, and quality-control samples.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - 1. Manufacturer's recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities.
 - q. Space and access limitations.
 - r. Governing regulations.
 - s. Safety.
 - t. Inspecting and testing requirements.

PROJECT MEETINGS 01200-2

- u. Required performance results.
- v. Recording requirements.
- w. Protection.
- 2. Record significant discussions and agreements and disagreements of each conference, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
- 3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project Site at regular intervals per owner's instruction. Notify the Owner and the Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier, or 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 the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present, including the following:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Status of submittals.
 - e. Deliveries.
 - f. Off-site fabrication problems.
 - g. Access.
 - h. Site utilization.

PROJECT MEETINGS 01200-3

- i. Temporary facilities and services.
- j. Hours of work.
- k. Hazards and risks.
- l. Housekeeping.
- m. Quality and work standards.
- n. Change Orders.
- o. Documentation of information for payment requests.
- D. Reporting: No later than 3 days after each meeting, 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.
 - 1. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for submittals required for performance of the work, including:
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Daily construction reports.
 - 4. Shop drawings, product data and samples

1.2 RELATED SECTIONS

- A. Administrative Submittals: Refer to other Division 1 sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Permits.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of Subcontractors.
- B. Division 1 Section Applications for Payment: Schedule of Values submitted.
- C. Division 1 Section Quality Control: Quality control services.

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 - 2. Coordinate transmittal of difference types of submittals for related elements of the work so that processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

SUBMITTALS 01300-1

- B. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
 - 1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Prepare the construction schedule in the form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation.
 - 2. Horizontal time scale: Identify the first workday of each week.
 - 3. Scale and spacing: To allow space for notations and future revisions.
 - 4. Minimum sheet size: 8-1/2 inches by 11 inches.
- B. Content of Construction Progress Schedule:
 - 1. Show the complete sequence of construction by activity.
 - 2. Show the dates for the earliest start/latest start, and earliest completion/latest completion of each major element of construction.
 - 3. Show projected percentage of completion for each item, as of the first day of each month.
- C. Progress Revisions:
 - 1. Indicate actual progress of each activity to date of submission.
 - 2. Show changes occurring since previous submission of schedule.
 - 3. Provide a narrative report as needed to define:
 - a. Problem areas, anticipated delays, and the impact on the schedule.
 - b. Corrective action recommended and its effect.

1.5 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.
 - 1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
 - 2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

SUBMITTALS 01300-2

- a. Schedule date for the first submittal.
- b. Related Section number.
- c. Submittal category.
- d. Name of subcontractor.
- e. Description of the part of the work covered.
- f. Scheduled date for resubmittal.
- g. Scheduled date for the Architect's final release or approval.
- 3. Allow a minimum of 10 working days for review of each submittal. Allow a minimum of 15 working days for the more complex submittals, such as structural systems and mechanical systems.
- 4. Submittal schedule shall be revised if, in the opinion of the Architect, sufficient time is not being allowed between scheduled dates of submittal and scheduled dates for the Architect's final release or approval.
- 5. No submittals will be processed until the Submittal Schedule has been submitted to Architect and approved.
- B. Distribution: Following response to initial submittal, print and distribute copies to the Architect, owner, subcontractors and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.
- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies of the Architect at weekly intervals:
 - 1. List of subcontractors at the site.
 - 2. Approximate count of personnel at the site.
 - 3. High and low temperatures, general weather conditions
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.
 - 6. Stoppages, delays, shortages, losses.
 - 7. Meter readings and similar recordings.
 - 8. Emergency procedures.
 - 9. Orders and requests of governing authorities.
 - 10. Change Orders received, implemented.
 - 11. Services connected, disconnected.

SUBMITTALS 01300-3

- 12. Equipment or system tests and start-ups.
- 13. Partial Completions, occupancies.
- 14. Substantial Completions authorized.

1.7 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop drawings shall be presented in a clear and thorough manner.
 - 1. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
 - 2. Minimum sheet size: 8-1/2 inches x 11 inches.
- B. Product data preparation:
 - 1. Clearly mark each copy to identify pertinent products or models.
 - 2. Show performance characteristics and capacities.
 - 3. Show dimensions and clearances required.
 - 4. Show wiring or piping diagrams and controls.
 - 5. Modify drawings and diagrams to delete information which is not applicable to the Work.
 - 6. Supplement standard information to provide information specifically applicable to the Work.
- C. Office samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.
- D. Contractor Responsibilities:
 - 1. Review and approve shop drawings, product data and samples prior to submission.
 - 2. Determine and verify:
 - a. Field measurements.
 - b. Field construction criteria.
 - c. Catalog numbers and similar data.
 - d. Conformance with Contract Documents.
 - 3. Coordinate each submittal with requirements of the Work and with the requirements of the Contract Documents.
 - 4. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
 - 5. Begin no fabrication or work which requires submittals until return of submittals with Architect approval.
- E. Submission Requirements:
 - 1. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the Work of any other Contractor.

- a. Submittals received from sources other than the Contractor will be returned to the sender "without action".
- b. Submittals received which are not required nor requested by the Contract Documents will be returned to sender "without action, submittal not required".
- c. Submittals received which are required for "Architect's information" such as inspection and test reports, survey data and fabricator's design calculations, will not be returned.
- 2. Submittal requirements:
 - a. Electronic submission: Submit signed and dated shop drawings and product data in the form of PDF.
 - b. Product Data: Submit the number of copies which the Contractor requires, plus requested copies by the Owner.
 - c. Samples: Submit the number stated in each specification section, or if not stated, submit 2 samples each, plus two to be retained by the Architect and the Owner.
- 3. Submittals shall contain:
 - a. The date submission and the dates of any previous submissions.
 - b. The Project title and number.
 - c. Contract identification.
 - d. The names of:
 - 1) Contractor
 - 2) Supplier
 - 3) Manufacturer
 - e. Identification of the product, with specification section number, article and paragraph number.
 - f. Field dimensions, clearly identified as such.
 - g. Relation to adjacent or critical features of Work or materials.
 - h. Applicable standards, such as ASTM or Federal Specification numbers.
 - i. Identification of deviations from Contract Documents.
 - j. Identification of revisions on resubmittals.
 - k. An 8 inch by 3 inch blank space for Contractor and Architect's stamps.
- 4. Each submittal shall contain the Contractor's stamp, dated and initialed or signed, certifying to review and approval of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with the requirements of the Work and of the Contract Documents. Submittals which do not have the Contractor's stamp, dated and initialed or signed, will be returned to the Contractor, without being reviewed, for resubmittal.
 - a. The Contractor's stamp shall contain the words "Reviewed and Approved as being in conformance with requirements of Contract Documents".

- F. Resubmission Requirements:
 - 1. Make any corrections or changes in the submittals required by the Architect and resubmit until approved.
 - 2. Shop Drawings and Product Data:
 - a. Revise initial shop drawings or product data, and resubmit as specified for the initial submittal.
 - b. Indicate any changes which have been made other than those requested by the Architect.
 - 3. Samples: Submit new samples as required for initial submittal.

1.8 ARCHITECT'S ACTION STAMP

- A. Except for submittals which are for "Architect's information", the Architect will stamp each submittal to be returned with a self explanatory action stamp, appropriately marked, dated and initialed or signed, as follows:
 - 1. Reviewed as required by the construction contract documents and approved, but only for conformance to the design concept of the work, and subject to further limitations and requirements contained in the construction contract documents.
 - 2. Reviewed and approved, except as noted, subject to limitations noted above. Resubmission not required.
 - 3. Resubmission Required.
 - 4. Disapproved.
- B. Above indicated notations on the Submittal Review Stamp mean the following:
 - 1. Submittals marked as indicated in items A-1 and A-2 above are self explanatory.
 - 2. When the submittal is marked as "Resubmission Required", do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise the submittal or prepare a new submittal in accordance with the Architect's notations which states the reasons for returning the submittal; resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals marked "Resubmission Required" to be used at the project site, or elsewhere where work is in progress.
 - 3. When the submittal is marked "Disapproved", do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Rejected submittals are considered as being non-responsive to the requirements of the Contract Documents. Prepare a new submittal in accordance with the Contract Requirements; resubmit the submittal without delay. Repeat submittal process until a different action marking is obtained. Do not permit submittals marked "Disapproved" to be used at the project site, or elsewhere where work is in progress.

1.9 DISTRIBUTION OF SUBMITTALS

- A. Construction Schedule:
 - 1. Distribute electronic submittal file in PDF format or hard copies of the reviewed construction schedule to:
 - a. Owner.
 - b. Architect.
 - c. Jobsite file.
 - d. Subcontractors.
 - e. Other concerned parties.
 - 2. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.
- B. Shop Drawings, Product Data and Samples:
 - 1. The Architect, after reviewing shop drawings, will keep a record PDF files of each submittal and will return the PDF files of product data and samples to the Contractor.
 - 2. The Contractor shall make black line prints of the approved shop drawings (reproducible transparencies) and distribute reproductions of shop drawings and copies of product data which carry the Architect's stamp of approval to:
 - a. Jobsite file.
 - b. Record Documents file.
 - c. Other affected contractors.
 - d. Subcontractors.
 - e. Supplier or fabricator.
 - 3. Distribute samples which carry the Architect's stamp of approval as directed by the Architect.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Cleaning and protection.

1.2 RELATED SECTIONS

- A. Division 1 Section Project Meetings: Progress meetings, coordination meetings, and preinstallation conferences.
- B. Division 1 Section Submittals: Preparing and submitting the Contractor's Construction Schedule.
- C. Division 1 Section Materials and Equipment: Requirements for coordinating general installation.

1.3 COORDINATION

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

- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 - 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of schedules.
 - 2. Installation and removal of temporary facilities.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Project closeout activities.
- D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 SUBMITTALS

- A. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.
 - 1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings: Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 - 1. Show the relationship of components shown on separate Shop Drawings.
 - 2. Indicate required installation sequences.
 - 3. Comply with requirements contained in Section 01300.

- B. Prepare coordination drawings where mechanical and electrical systems are to be installed in areas of limited space (such as above ceilings or in mechanical shafts) and work by subcontractors or fabricators requires off-site fabrication of products and materials which must accurately interface. Coordination drawings shall indicate how work shown by separate shop drawings will interface, and shall indicate sequence for installation. Nothing in this procedure shall be construed as a waiver to comply with the terms and conditions of the Contract Documents.
- C. Coordination drawings shall be required to show the work of all major trades and without excluding the work of any particular trade, and shall include but not be limited to the following:
 - 1. Sheet metal (HVAC) subcontractor.
 - 2. Plumbing subcontractor.
 - 3. Steamfitting subcontractor.
 - 4. Sprinkler subcontractor.
 - 5. Electrical subcontractor.
 - 6. Acoustical ceiling subcontractor.
 - 7. Drywall subcontractor.
- D. Contractor shall produce 3/8 inch scale reproducible transparencies that shall include the following information:
 - 1. Outline of all grid reference lines.
 - 2. Elevation reference lines.
 - 3. Structural steel beam sizes and column layout.
 - 4. Drop panels in concrete flat-slab floor construction.
 - 5. Partition and door layout.
 - 6. Room or space number.
 - 7. Fire rating of partition penetrations.
 - 9. Duct layout.
 - 10. Access panels.
- E. Copies of the coordination drawings shall be distributed to each subcontractor and subsequently each trade shall locate its work and shall show elevations, sizes, access panels, pipe insulation, junction boxes, and fixture sizes.
- F. The following colors shall be used to denote the various systems:
 - 1. HVAC Dark Blue.
 - 2. Plumbing Dark Green.
 - 3. Sprinkler Red.
 - 4. Electrical Orange.
 - 5. Other Brown
- G. Overlays of the various layouts shall be placed on a light table to reveal conflicts. Conflicts shall be flagged for immediate attention and resolution. Upon resolution of all conflicts, the coordinated drawings shall be signed by all

trades and submitted to the Architect in accordance with Section 01300, for review and confirmation of compliance with the Contract Documents.

- H. At Contractor's option, where time permits, a single reproducible transparency may be prepared by the Contractor for use by all subcontractors in progressive order to show all systems on a single composite drawing.
- I. All subcontractors shall be responsible for fitting their work in accordance with the Contract Drawings. No subcontractor shall have the preemptive right to lay-out or install his work to effectively preclude the Work of others.
- J. Additional work required to accommodate a trade that failed to coordinate his work will be paid for by the subcontractor who failed to coordinate his work.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

- A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.
- B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.
- C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous,

damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

- 1. Excessive static or dynamic loading.
- 2. Excessive internal or external pressures.
- 3. Excessively high or low temperatures.
- 4. Thermal shock.
- 5. Excessively high or low humidity.
- 6. Air contamination or pollution.
- 7. Water or ice.
- 8. Solvents.
- 9. Chemicals.
- 10. Light.
- 11. Radiation.
- 12. Puncture.
- 13. Abrasion.
- 14. Heavy traffic.
- 15. Soiling, staining, and corrosion.
- 16. Bacteria.
- 17. Rodent and insect infestation.
- 18. Combustion.
- 19. Electrical current.
- 20. High-speed operation.
- 21. Improper lubrication.
- 22. Unusual wear or other misuse.
- 23. Contact between incompatible materials.
- 24. Destructive testing.
- 25. Misalignment.
- 26. Excessive weathering.
- 27. Unprotected storage.
- 28. Improper shipping or handling.
- 29. Theft.
- 30. Vandalism.

END OF SECTION

CONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.

1.2 RELATED SECTIONS

- A. Division 1 Section "Submittals" for submitting construction photographs.
- B. Division 1 Section " Project Record Documents " for submitting digital photos as Project Record Documents at Project closeout.

1.3 SUBMITTALS

- A. 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.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each digital photograph. Indicate elevation or story of construction. Include the same label information as the corresponding set of photograph.
- C. Construction Photographs: Submit digital image view files with each submittal within seven days of taking photographs. Organize the files with corresponding label with the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

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2. Digital Images: Submit a complete set of digital image electronic files with each submittal of prints as a Project Record Document. Identify electronic media with date photographs were taken. Submit images that have the same aspect ratio as the sensor, uncropped.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual of established reputation who has been regularly engaged as a professional photographer.

1.5 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities including temporary lighting.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPEG format, with minimum sensor size of 1.3 megapixels in focus and framed on subject.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Preconstruction Photographs: Before starting construction, take color digital photographs of Project site and surrounding properties from different vantage points, as directed by Architect.
 - 1. Take four images to show existing conditions adjacent to the property before starting the Work.
 - 2. Take four images of existing buildings either on or adjoining the property to accurately record the physical conditions at the start of construction.
- B. Periodic Construction Photographs: Take four color digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since the last photographs were taken.
- C. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of color digital photographs

CONSTRUCTION PHOTOGRAPHIC DOCUMENTATION 01322-2

and general directions on vantage points. Photographer shall select actual vantage points and take digital photographs to best show the status of construction and progress since the last photographs were taken.

- D. Final Completion Construction Photographs: Take eight color digital photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
- E. Additional Photographs: When it becomes necessary, the Architect may issue requests for additional photographs, in addition to periodic photographs specified. With the approval by the Owner, the additional photographs will be paid for by the Owner as additional services.
 - 1. Photographer will be given three days' notice, where feasible.
 - 2. In emergency situations, photographer shall take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

END OF SECTION

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this section.

1.2 **RESPONSIBILITIES**

A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

> QUALITY REQUIREMENTS 01400-1

- 1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
- 2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.
 - a. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
- 3. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were per formed on original construction.
- 4. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as required. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - c. Providing facilities for storage and curing of test samples and delivery of samples to testing laboratories.
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 - e. Security and protection of samples and test equipment at the project site.
- B. Owner Responsibility: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.
 - 1. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform specific testing services which are the Owner's responsibility.
- C. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification sections shall cooperate with the Architect and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

QUALITY REQUIREMENTS 01400-2

- 1. The agency shall notify the Architect and Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.
- 2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve of accept any portion of the work.
- 3. The agency shall not perform any duties of the Contractor.
- 4. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.3 SUBMITTALS

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
 - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
- B. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - 1. Date of issue.
 - 2. Project title and number
 - 3. Name, address and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making the inspection or test.
 - 6. Designation of the work and test method.
 - 7. Identification of product and Specification section.
 - 8. Complete inspection or test data.
 - 9. Test results and an interpretation of test results.
 - 10. Ambient conditions at the time of sample-taking and testing.
 - 11. Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting.

1.4 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing services agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

QUALITY REQUIREMENTS 01400-3 1. Each independent inspection and testing agency engaged on the project shall be authorized by authorities having jurisdiction to operate in the State in which the project is located.

PART 2 - PRODUCTS

2.1 BLOWER DOOR TEST REQUIREMENTS

A. N/A

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."
- B. Protect construction exposed by or for quality control services activities, and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 **DEFINITIONS**

- A. Basic contract definitions are included in the Conditions of the Contract.
- B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.
- D. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size

REFERENCE STANDARDS AND DEFINITIONS 01421-1
and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

- 2. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.2 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the 16-division format and CSI/CSC's "MasterFormat" numbering system.
- B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different but apparently equal to the Architect for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

1.4 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS

(not used)

PART 3 - EXECUTION

(not used)

END OF SECTION

MOCK-UPS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes requirements for "large scale" mock-ups and field samples constructed, applied, or assembled at the site for review, and used as a quality standard.
 - 1. Provide mock-ups as indicated in Paragraph 3.1 of this Section.
 - 2. Large scale mock-ups are mock-ups that include Work which is specified in more than one section.
 - 3. Individual mock-ups and field samples that are comprised of Work specified in one section only, are not included in this section.

1.2 RELATED SECTIONS

- A. Division 1 Section Cutting and Patching: Requirements for repair and restoration of construction disturbed by the construction of mock-ups and field samples.
- B. Division 1 Section Quality Control.
- C. Refer to other Sections of the Specifications for specific requirements and materials applicable to mock-ups and field samples for individual parts of the Work.

1.3 SUBMITTALS

A. Mock-up Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating starting date and completion date of each mock-up and field sample specified in this section.

1.4 QUALITY ASSURANCE

- A. Coordination: Coordinate the sequence of activities to accommodate required mock-ups and field samples with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing mock-ups and field samples to accommodate other construction.
 - 1. The Contractor is responsible for scheduling construction of mock-ups and field samples, and similar activities.

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B. Inspections: Arrange for Architect to review each mock-up and field sample. Obtain required approval before beginning any Work requiring approved mockup or field sample.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Products, materials and installation procedures are specified in the specification sections referenced in each Article specifying mock-up requirements under Part 3 of this section.

PART 3 - EXECUTION

3.1 EXTERIOR WALL MOCK-UP

- A. Prior to installing corrugated metal panels, construct sample wall panel to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Construct mock-up to comply with the following requirements, using materials indicated for final unit of Work.
- B. Locate mock-up on site in location indicated or, if not indicated, where directed by the Architect and the Owner.
 - 1. Consult and verify specific requirements with Architect before proceeding with construction of mock-up.
- C. Construct exterior wall mock-ups with the following material:
 - a. Include corrugated metal panel complying with requirements of Section 07412 Manufactured Wall Panels
 - 2. Include window complying with requirements of the following:
 - a. Section 08120 Interior Aluminum Frames
 - b. Section 08800 Glazing.
 - 3. Include perimeter sealant of window complying with requirements of Section 07920.
 - 4. Include sealant-filled expansion joint complying with requirements of the following:
 - a. Section 07412 Manufactured Wall Panels
 - b. Section 07900 Joint Sealants.
 - 5. Include coping complying with requirements of Section 07620.
- D. Reconstruct mock-ups as many as two more times for each one, if required by Architect, for approval.

3.2 PROTECTION AND CLEANING

- A. Clean exposed faces of mock-ups with masonry cleaner indicated.
- B. Protect mock-ups from the elements with weather resistant membrane.
- C. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 1. Acceptance of mock-up is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - 2. Acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups, unless such deviations are specifically approved by Architect in writing.
 - 3. When directed, demolish and remove mock-ups from Project site.

END OF SECTION

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Temporary electric light.
 - 2. Ventilation.
 - 3. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds.
 - 2. Hoists and temporary elevator use.
 - 3. Temporary project identification signs and bulletin boards.
 - 4. Waste disposal services.
 - 5. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, and lights.
 - 3. Sidewalk bridge or enclosure fence for the site.
 - 4. Environmental protection.

1.2 RELATED SECTIONS

- A. Section 06100 Rough Carpentry.
- B. Division 15 Plumbing.
- C. Division 15 Heating, Ventilating and Air Conditioning:
- D. Division 16 Electrical.

1.3 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department, and rescue squad rules.
 - 5. Environmental protection regulations.
- B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 **PROJECT CONDITIONS**

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
 - 1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
 - 2. For signs and directory boards, provide exterior-type, Grade B-B highdensity concrete form overlay plywood of sizes and thicknesses indicated.
 - 3. For fences and vision barriers, provide minimum 3/8-inch (9.5-mm) thick exterior plywood.
 - 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch (16-mm) thick exterior plywood.
- C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- D. Paint: Comply with requirements of Division 9 Section "Painting."
 - 1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
 - 2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
 - 3. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.
- E. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

2.2 EQUIPMENT

- A. Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 TEMPORARY UTILITY INSTALLATION

- A. Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.

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- 4. Use Charges: Because the existing water, electrical and heating systems will be accessible and usable during construction, the cost or use charges for these services will be paid for by the Owner.
- B. Water Service: Water for use during construction will be provided by and paid for by the Contractor.
- C. Temporary Electric Power Service: Electric power for use during construction will be provided by and paid for by the Contractor.
- D. Temporary Lighting: Provide temporary lighting with local switching.
 - 1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Heat: Heat for use during construction will be provided by and paid for by the Contractor.
- F. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first-aid station.
 - 1. Separate Telephone Lines: Provide additional telephone lines for the following:
 - a. Where an office has more than 2 occupants, install a telephone for each additional occupant or pair of occupants.
 - b. Provide a dedicated telephone line for a fax machine in the field office.
 - 2. At each telephone, post a list of important telephone numbers.
- G. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
 - 1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

- B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.
- C. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep the office clean and orderly for use for small progress meetings. Include a separate private office for Owner's Project Manager, to include telephone and data services, in addition to providing the furnishings and equipment listed below. Furnish and equip offices as follows:
 - 1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.
 - 2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.
- D. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
 - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
 - 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
- H. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Project Identification and Temporary Signs: Prepare project identification and other signs of size as directed by the Architect. Install signs where required to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
 - 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

- 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- J. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - 2. Store combustible materials in containers in fire-safe locations.
 - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
 - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.

- b. Replace significantly worn parts and parts subject to unusual operating conditions.
- c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. This section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

1.2 RELATED SECTIONS

- A. Division 1 Section Applications for Payment: Schedule of Values.
- B. Division 1 Section Submittals: Contractor's Construction Schedule and the Schedule of Submittals.

1.3 DEFINITIONS

- Definitions used in this article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the work.
 - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

- B. Substitutions: Requests for changes in products, materials, equipment and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
 - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this section for substitutions.
 - 2. Revisions to Contract Documents requested by the Owner or Architect.
 - 3. Specified options of products and construction methods included in the Contract Documents.
 - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.
 - 1. Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.
 - 2. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in 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.
 - 3. Initial Submittals: Within 30 days after date of commencement of the work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - a. At the Contractor's option, the initial submission may be limited to product selections and designations that must be established early in the Contract period.
 - 4. Completed Schedule: Within 60 days after date of commencement of the work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - 5. Architect's Action: The Architect will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to

listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include the following:

a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 - 1. Schedule delivery to minimize long-term storage at the 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.

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- 3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
- 4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
- 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
- 7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
 - 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 - 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:
 - 1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
 - 2. Semi-proprietary Specification Requirements: Where two or more products of manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - 3. Non-Proprietary Specifications: Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 - 4. Compliance with Standards, Codes and Regulations: Where the specifications only require compliance with an imposed code, standard or

regulation, select a product that complies with the standards, codes or regulations specified.

- 5. Visual Matching: Where specifications require matching an established sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
- 6. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work.
 - 1. Clean exposed surfaces and protect as necessary to ensure freedom for damage and deterioration at time of Substantial Completion.

END OF SECTION

SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 1 Section Submittals: Specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.
 - 2. Division 1 Section Material and Equipment: Specifies requirements governing the Contractor's selection of products and product options.

1.2 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:
 - 1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 - 2. Revisions to the Contract Documents requested by the Owner or Architect.
 - 3. Specified options of products and construction methods included in the Contract Documents.
 - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.3 SUBMITTALS

A. Substitution Request Submittal: The Architect will consider requests for substitution if received within 60 days after commencement of the Work.

Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of the Architect.

- 1. Submit 3 copies of each request for substitution for consideration. Submit requests as per the attached "Substitution Request Form" at the end of this section
- 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
- 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors, that will be necessary to accommodate the proposed substitution.
 - b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
 - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
- 4. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order.
 - a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents.
 - 3. The request is timely, fully documented, and properly submitted.
 - 4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 - 5. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
 - 6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.
 - 7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
 - 9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
 - 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
- B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION

3.2 ATTACHMENTS

A. The following is the format for the Substitution Request Form to be used.

SUBSTITUTION REQUEST MARYLAND FOOD BANK

The undersigned, as Contractor for the Project, requests that:

as manufactured by

be accepted for use in the Project in lieu of the "named" product or products specified in

Paragraph _____ of Section _____.

Reason for request:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

- 1. The proposed substitution does not affect dimensions shown on Drawings.
- 2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
- 3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
- 4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

All changes to Contract Sum related to use of proposed substitution are included in price listed below. Contractor waives claims for additional costs related to acceptance of substitution which may subsequently become apparent.

If proposed substitution is accepted, Contract Sum will be:

INCREASED BY: \$ DECREASED BY: \$	
Signature:	Date:
Firm:	
Address:	
Telephone:	_
Attachments:	

REQUESTS FOR INFORMATION (RFI)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section specifies administrative and procedural requirements for handling requests for information (RFIs) made after award of Contract.

1.2 RELATED SECTIONS

- A. Division 1 Section Submittals: Contractor's Construction Schedule and the Schedule of Submittals.
- B. Division 1 Section Material And Equipment: Administrative and procedural requirements for requests for substitutions.

1.3 DEFINITIONS

- A. Request For Information (RFI): Requests for additional information by Contractor on products, materials, equipment, construction details and other requirements of Contract Documents after award of Contract are considered "requests for information (RFI)."
- B. Bulletins: Refer to Document 00800 Supplementary Conditions, for the definition of Bulletins.

1.4 SUBMITTALS

- A. Request For Information (RFI) Submittal: Requests for information will be considered if submitted on a copy of RFI form attached at end of this section. Incomplete RFIs and RFIs not complying with requirements of this section will not be considered, and will be returned to Contractor with "no action taken" by Architect.
 - 1. Submit properly completed RFI forms to Architect with copies to Owner and appropriate Consulting Engineers.
 - 2. Before submitting RFI to Architect, have every supplier and subcontractor involved or affected by the RFI, review it for comment.
 - 3. Include the following minimum information:

- a. Identify Work affected by RFI by listing pertinent Drawing Numbers (and details) and Specification paragraph numbers.
- b. Identify pertinent field conditions and as-built conditions on sketches and attach them to RFI Form.
- c. If RFI addresses a conflict in Contract Documents, describe dimensions, materials and other data necessary to enable Architect to formulate a response.
- d. Include a suggested solution and state if the suggested solution will affect Construction Time or Construction Cost.
- B. Architect's Action:
 - 1. Architect may request additional information or documentation as necessary for evaluation of RFI.
 - 2. Architect will respond with reasonable promptness in writing and may issue a "Bulletin" as a clarification to the Contract Documents, (in accordance with General Conditions of the Contract, Paragraph 4.2.12 and Supplementary Conditions, paragraph 7.1.2.1.)

PART 2 - PRODUCTS

(not used)

PART 3 - EXECUTION

3.1 ATTACHMENTS

A. Copy and use the following Request For Information (RFI) Form (1 page)

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise Owner of pending insurance change-over requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 - 5. Deliver tools, spare parts, extra stock, and similar items.
 - 6. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
 - 7. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

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- B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
 - 1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
 - 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.3 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 - 1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 - 3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
 - 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 - 5. Submit consent of surety to final payment.
 - 6. Submit a final liquidated damages settlement statement.
 - 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
 - 1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advice the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 - 2. If necessary, reinspection will be repeated.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

CONTRACT CLOSEOUT 01700-3

FINAL CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for final cleaning at Substantial Completion.
 - 1. Special cleaning requirements for specific elements of the Work are included in appropriate Sections of Divisions 2 through 16.
- B. General Project closeout requirements are included in Section 01700.
- C. General cleanup and waste removal requirements are included in Section 01500.
- D. Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
 - 1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - 2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

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- B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for the entire Project or a portion of the Project.
 - 1. Clean the Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
 - 2. Remove tools, construction equipment, machinery and surplus material from the site.
 - 3. Remove snow and ice to provide safe access to the building.
 - 4. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free conditions, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - 5. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - 6. Broom clean concrete floors in unoccupied spaces.
 - 7. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - 8. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - 9. Remove labels that are not permanent labels.
 - 10. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence or repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
 - 11. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - 12. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - 13. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - 14. Clean food service equipment to a sanitary condition, ready and acceptable for its intended use.

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- 15. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
- 16. Leave the Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced licensed exterminator to make a final inspection, and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.
- D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.
 - 1. Where extra materials of value remain after completion of associated construction have become the Owner's property, dispose of these materials as directed.

END OF SECTION

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes administrative and procedural requirements for cutting and patching.

1.2 RELATED SECTIONS

- A. Division 1 Section Coordination: Procedures for coordinating cutting and patching with other construction activities.
- B. Division 9 Section Painting: Painting or touch-up painting of surfaces after cutting and patching work is performed.
- C. Division 15 Plumbing: Cutting and patching of plumbing systems (but does not include walls, floors, ceilings, and structures).
- D. Division 15 Heating, Ventilating and Air Conditioning: Cutting and patching of HVAC systems (but does not include walls, floors, ceilings, and structures).
- E. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 15 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Owner requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well

CUTTING AND PATCHING 01731-1 as changes in the building's appearance and other significant visual elements.

- 3. List products to be used and firms or entities that will perform Work.
- 4. Indicate dates when cutting and patching will be performed.
- 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
- 6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
- 7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
 - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Equipment supports.
 - k. Piping, ductwork, vessels, and equipment.
- B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
 - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.

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- f. Noise and vibration control elements and systems.
- g. Control systems.
- h. Communication systems.
- i. Conveying systems.
- j. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
 - 1. If possible retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Ornamental metal.
 - b. Matched-veneer woodwork.
 - c. Firestopping.
 - d. Acoustical ceilings.
 - e. Carpeting.
 - f. Wall covering.
 - g. HVAC enclosures, cabinets, or covers.

1.5 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
 - 1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.

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- 4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
- 5. Where services are required to be removed, relocated, or abandoned, bypass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
 - 4. Patch, repair, or rehang existing ceilings as necessary to provide an evenplane surface of uniform appearance.
 - 5. Trim and refinish existing wood doors as necessary to clear new floors.
- D. Damaged Surfaces: Patch or replace any portion of an existing finished surface which is found to be damaged, lifted, discolored, or shows other imperfections, with matching material.
 - 1. Provide adequate support of substrate prior to patching the finish.
 - 2. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.
 - 3. When existing surface finish cannot be matched, refinish entire surface to nearest intersections.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION

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SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section 01700.
 - 3. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.2 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.3 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
 - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen days of completion of that designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.
- C. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Bind warranties and bonds in heavy-duty, commercial quality, durable 3 ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the installer.

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- 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
- 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for Project Record Documents.
- B. Project Record Documents required include:
 - 1. Marked-up copies of Contract Drawings.
 - 2. Marked-up copies of Shop Drawings.
 - 3. Newly prepared Drawings.
 - 4. Marked-up copies of Specifications, addenda and Change Orders.
 - 5. Marked-up Product Data submittals.
 - 6. Record Samples.
 - 7. Field records for variable and concealed conditions.
 - 8. Record information on Work that is recorded only schematically.
- C. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Divisions 2 through 16.
- D. General project closeout requirements are included in Section 01700.
- E. General requirements for submittal of Project Record Documents are included in Section 01300.
- F. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and Samples available at all times for inspection by the Architect.

1.2 RECORD DRAWINGS

- A. Mark-up Procedure: During the construction period, maintain a set of blue or black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes.
 - 1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which

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would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

- a. Dimensional changes to the Drawings.
- b. Revisions to details shown on the Drawings.
- c. Locations and depths of underground utilities.
- d. Revisions to routing of piping and conduits.
- e. Revisions to electrical circuitry.
- f. Actual equipment locations.
- g. Duct size and routing.
- h. Locations of concealed internal utilities.
- i. Changes made by Change Order.
- j. Details not on original Contract Drawings.
- 2. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
- 3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
- 4. Mark important additional information which was either shown schematically or omitted from original Drawings.
- 5. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.
- 6. Responsibility for Mark-up: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record Drawings.
 - a. Accurately record information in an understandable Drawing technique.
 - b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.
- 7. Architect to provide electronic copy of background drawings in Auto CADD format for Contractor's use in preparation of record documents.
- B. Preparation of Record Drawings: Immediately prior to inspection for Certification of Substantial Completion, review completed marked-up record Drawings with the Architect. When authorized, prepare a full set of corrected copy of Contract Drawings and Shop Drawings.
 - Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each drawing.
 - 2. Refer instances of uncertainty to the Architect for resolution.

- 3. One set of copy of original Contract Drawings will be furnished to the Contractor by the Owner for use in recording changes and additional information. Other printing as required is the Contractor's responsibility.
- 4. Review of Record Drawings: Before copying and distributing, submit corrected copy of Record Drawings and the original marked-up prints to the Architect for review. When acceptable, the Architect will initial and date each copy, indicating acceptance of general scope of changes and additional information recorded, and of the quality of drafting.
 - a. Copy of Record Drawings and the original marked-up prints will be returned to Contractor for organizing into sets, printing, binding and final submittal.
- C. Copies and Distribution: After completing the preparation of record drawings, print 3 blue-line or black-line prints of each Drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.
 - 1. Organize and bind original marked-up set of prints that were maintained during the construction period in the same manner.
 - 2. Organize record cpoies into sets matching the print sets. Place these sets in durable tube-type Drawing containers with end caps. Mark the end cap of each container with suitable identification.
 - 3. Submit the marked-up record set and 3 copy sets to the Architect for Owner's records; the Architect will retain one copy set.
- D. Newly Prepared Record Drawings: Prepare new Drawings instead of following procedures specified for preparation of Record Drawings where new Drawings are required by a Change Order issued as a result of acceptance of an alternate, substitution, or other modification, and the Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show the actual installation.
 - 1. Consult with the Architect for the proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. When completed and accepted, integrate newly prepared Drawings with procedures specified for organizing, copying, binding and submittal of record Drawings.

1.3 RECORD SPECIFICATIONS

- A. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.
 - 1. Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and

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modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.

- a. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
- b. Record the name of the manufacturer, supplier and installer, and other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.
- c. Note related record Product Data, where applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.
- 2. Upon completion of mark-up, submit record Specifications to the Architect for Owner's records.

1.4 RECORD PRODUCT DATA

- A. During the construction period, maintain one copy of each Product Data submittal for Project Record Document purposes.
 - 1. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.
 - 2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 3. Note related Change Orders and mark-up of record Drawings, where applicable.
 - 4. Upon completion of mark-up, submit a complete set of record Product Data to the Architect for the Owner's records.
 - 5. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual, instead of submittal as record Product Data.

1.5 RECORD SAMPLE SUBMITTAL

A. Immediately prior to date of Substantial Completion, the Contractor shall meet the Architect and, if desired, the Owner's personnel at the site to determine which of the Samples maintained during the construction period shall be transmitted to Owner for record purposes. Comply with the Architect's instructions for packaging, identification marking, and delivery to Owner's

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Sample storage space. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.6 MISCELLANEOUS RECORD SUBMITTALS

- A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the Architect for the Owner's records.
 - 1. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:
 - a. Field records on underground construction and similar Work.
 - b. Survey showing locations and elevations of underground lines.
 - c. Invert elevations of drainage piping.
 - d. Authorized measurements utilizing unit prices or allowances.
 - e. Records of plant treatment.
 - f. Ambient and substrate condition tests.
 - g. Certifications received in lieu of labels on bulk products.
 - h. Testing and qualification of tradesmen.
 - i. Documented qualification of installation firms.
 - j. Load and performance testing.
 - k. Inspections and certifications by governing authorities.
 - 1. Leakage and water-penetration tests.
 - m. Fire resistance and flame spread test results.
 - n. Final inspection and correction procedures.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

- 3.1 RECORDING
 - A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project. The Architect will periodically review record documents to assure compliance with this requirement.

END OF SECTION

PROJECT RECORD DOCUMENTS 01781-5

SECTION 01782

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This section specifies administrative and procedural requirements for operating and maintenance manuals including the following:
 - 1. Preparation and submittal of operating and maintenance manuals for building operating systems or equipment.
 - 2. Preparation and submittal of instruction manuals covering the care, preservation and maintenance of architectural products and finishes.
 - 3. Instruction of the Owner's operating personnel in operation and maintenance of building systems and equipment.
- B. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate Sections of Divisions 2 through 16.
- C. Preparation of Shop Drawings and Product Data are included in Section "Submittals."
- D. General closeout requirements are included in Section "Project Closeout."
- E. General requirements for submittal of Project Record Documents are included in Section "Project Closeout."

1.2 QUALITY ASSURANCE

- A. Maintenance Manual Preparation: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.
 - 1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.
 - 2. Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings or clearly in an understandable format.
- B. Instructions for the Owner's Personnel: For instruction of the Owner's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involved.

1.3 SUBMITTALS

- A. Submittal Schedule: Comply with the following schedule for submittal of operating and maintenance manuals.
 - 1. Before Substantial Completion, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit two draft copies of each manual to the Architect for review. Include a complete index or table of contents of each manual.
 - a. The Architect will return one copy of the draft with comments within fifteen days of receipt.
 - b. Submit one copy to Commissioning Agent.
 - 2. Submit one copy of data in final form at least fifteen days before final inspection. This copy will be returned within fifteen days after final inspection, with comments.
 - 3. After final inspection make corrections or modifications to comply with the Architect's comments. Submit the specified number of copies of each approved manual to the Architect within fifteen days of receipt of the Architect's comments.
- B. Form of Submittal: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.
- C. Binders: For each manual, provide heavy-duty, commercial quality, durable 3 ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8 1/2 inches by 11 inches paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
 - 1. Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.
 - 2. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter covered, and five-digit section number (corresponding to specification section.) Indicate the volume number for multiple volume sets of manuals.
- D. Dividers: Provide heavy paper dividers with celluloid covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the Section on each divider.
- E. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose a diagnostic software for computerized electronic equipment.

- F. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8-1/2 inches by 11 inches, 20 pound white bond paper.
- G. Drawings: Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.
 - 1. Where oversize drawings are necessary, fold the drawings to the same size as the text pages and use as a fold-out.
 - 2. If drawings are too large to be used practically as a fold-out, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents and drawing location at the appropriate location in the manual.

1.4 MANUAL CONTENT

- A. In each manual include information specified in the individual Specification Section, and the following information for each major component of building equipment and its controls:
 - 1. General system or equipment description.
 - 2. Design factors and assumptions.
 - 3. Copies of applicable Shop Drawings and Product Data.
 - 4. System or equipment identification, including:
 - a. Name of manufacturer.
 - b. Model number.
 - c. Serial number of each component.
 - 5. Operating instructions.
 - 6. Emergency instructions.
 - 7. Wiring diagrams.
 - 8. Inspection and test procedures.
 - 9. Maintenance procedures and schedules.
 - 10. Precautions against improper use and maintenance.
 - 11. Copies of warranties.
 - 12. Repair instructions including spare parts listing.
 - 13. Sources of required maintenance materials and related services.
 - 14. Manual Index.
- B. Organize each manual into separate Sections for each piece of related equipment. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond and service Contract issued.
 - 1. Title Page: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information.
 - a. Subject matter covered by the manual.
 - b. Name and address of the Project.
 - c. Date of submittal.

- d. Name, address, and telephone number of the Contractor.
- e. Name and address of the Architect.
- f. Cross reference to related systems in other operating and maintenance manuals.
- 2. Table of Contents: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.
 - a. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.
- 3. General Information: Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.
- 4. Product Data: Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.
- 5. Written Text: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.
- 6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.
 - a. Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.
- 7. Warranties, Bonds and Service Contracts: Provide a copy of each warranty, bond or service contract in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to be followed in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

OPERATION AND MAINTENANCE DATA 01782-4

1.5 MATERIAL AND FINISHES MAINTENANCE MANUAL

- A. Submit three copies of each manual, in final form, on material and finishes to the Architect for distribution. Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture-protection and products exposed to the weather.
 - 1. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.
- B. Architectural Products: Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.
 - 1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:
 - a. Manufacturer's catalog number.
 - b. Size.
 - c. Material composition.
 - d. Color.
 - e. Texture.
 - f. Reordering information for specially manufactured products.
 - 2. Care and Maintenance Instructions: Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information regarding cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.
- C. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.
 - 1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Installation details.
 - d. Inspection procedures.
 - e. Maintenance information.
 - f. Repair procedures.

1.6 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

A. Submit digital electronic copy in PDF format of each completed manual on equipment and systems, in final form, to the Architect for distribution. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.

OPERATION AND MAINTENANCE DATA 01782-5

- 1. Refer to Specification Sections for additional requirements on operating and maintenance of the various pieces of equipment and operating systems.
- B. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.
 - 1. Description: Provide a complete description of each unit and related component parts, including the following:
 - a. Equipment or system function.
 - b. Operating characteristics.
 - c. Limiting conditions.
 - d. Performance curves.
 - e. Engineering data and tests.
 - f. Complete nomenclature and number of replacement parts.
 - 2. Manufacturer's Information: For each manufacturer of a component part or piece of equipment provide the following:
 - a. Printed operating and maintenance instructions.
 - b. Assembly drawings and diagrams required for maintenance.
 - c. List of items recommended to be stocked as spare parts.
 - 3. Maintenance Procedures: Provide information detailing essential maintenance procedures, including the following:
 - a. Routine operations.
 - b. Trouble-shooting guide.
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
 - 4. Operating Procedures: Provide information on equipment and system operating procedures, including the following:
 - a. Start-up procedures.
 - b. Equipment or system break-in.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Instructions on stopping.
 - f. Shut-down and emergency instructions.
 - g. Summer and winter operating instructions.
 - h. Required sequences for electric or electronic systems.
 - i. Special operating Instructions.
 - 5. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.
 - 6. Controls: Provide a description of the sequence of operation and asinstalled control diagrams by the control manufacturer for systems requiring controls.
 - 7. Coordination Drawings: Provide each Contractor's Coordination Drawings.
 - a. Provide as-installed color-coded piping diagrams, where required for identification.

- 8. Valve Tags: Provide charts of valve tag numbers, with the location and function of each valve.
- 9. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:
 - a. Electric service.
 - b. Controls.
 - c. Communication.

1.7 INSTRUCTIONS OF THE OWNER'S PERSONNEL

- A. Prior to final inspection, instruct the Owner's personnel in operation, adjustment, and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon time.
 - 1. For equipment that requires seasonal operation, provide similar instruction during other seasons.
 - 2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

REQUEST FOR INTERPRETATION

Project:		R.F.I. Number:	
To:		From: Date: A/E Project Number:	
Re:		Contract For:	
Specification Section:	Paragraph:	Drawing Reference:	Detail:
Request:			
Signed by:			Date:
Response:			
Attachments			
Response From:	To:	Date Rec'd:	Date Returned:
Signed by:			Date:
Copies: 🗌 Owner	Consultants		🗌 🗌 File

SECTION 03100

CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Form-facing material for cast-in-place concrete.
 - 2. Shoring, bracing, and anchoring.

1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction, movement, contraction, and isolation joints
 - c. Forms and form-removal limitations.
 - d. Shoring and reshoring procedures.
 - e. Anchor rod and anchorage device installation tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

CONCRETE FORMING AND ACCESSORIES 03100-1

- 1. Exposed surface form-facing material.
- 2. Concealed surface form-facing material.
- 3. Form ties.
- 4. Waterstops.
- 5. Form-release agent.
- B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.
 - 1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
 - 2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
 - a. Location of construction joints is subject to approval of the Architect.
 - 3. Indicate location of waterstops.
 - 4. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
 - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
 - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-tocenter spacing of supports.
 - a. For architectural concrete specified in Section 03330 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).

2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

CONCRETE FORMING AND ACCESSORIES 03100-2

- 1. Provide continuous, true, and smooth concrete surfaces.
- 2. Furnish in largest practicable sizes to minimize number of joints.
- 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03300 "Cast-In-Place Concrete, and as follows:
 - a. Plywood, metal, or other approved panel materials.
- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
 - 1. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 WATERSTOPS

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

2.4 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 - 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 03300 "Cast-In-Place Concrete" for as-cast finishes.
- C. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
 - 2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
 - 3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
 - 1. Provide and secure units to support screed strips
 - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
 - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.

- 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
 - 1. Determine sizes and locations from trades providing such items.
 - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
 - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 3. Place joints perpendicular to main reinforcement.
 - 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 6. Space vertical joints in walls as indicated on Drawings.
 - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
 - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
 - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF 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.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
 - 5. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
 - 1. Install in longest lengths practicable.
 - 2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
 - 3. Protect exposed waterstops during progress of the Work.

3.4 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work.
 - 1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
 - 2. Apply new form-release agent.

- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
 - 1. Align and secure joints to avoid offsets.
 - 2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

END OF SECTION 03100

SECTION 03200

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel reinforcement bars.
 - 2. Welded-wire reinforcement.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction contraction and isolation joints.
 - c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of steel reinforcement.
 - 2. Epoxy repair coating.
 - 3. Bar supports.
 - 4. Mechanical splice couplers.
- B. Shop Drawings: Comply with ACI SP-066:
 - 1. Include placing drawings that detail fabrication, bending, and placement.
 - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details

CONCRETE REINFORCING 03200-1 of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

- 3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. and to avoid damaging coatings on steel reinforcement.
 - 1. Store reinforcement to avoid contact with earth.
 - 2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars:
 - 1. Steel Bars: ASTM A615/A615M, Grade 60, deformed bars.
 - 2. Epoxy Coating: ASTM A775/A775M or ASTM A934/A934M with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, ASTM A775/A775M epoxy coated.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

- 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
 - b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
- D. Mechanical Splice Couplers: ACI 318 Type 1, same material of reinforcing bar being spliced; tension-compression type mechanical-lap type.
- E. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
 - 1. Finish: Plain ASTM A884/A884M, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch wire length.
- F. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

2.3 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.

- 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
- 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 and as indicated in the structural drawings.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
 - 2. Stagger splices in accordance with ACI 318.
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 - 4. Lace overlaps with wire.
- H. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

3.3 JOINTS

- A. 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.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

END OF SECTION 03200

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - 2. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction joints, control joints, isolation joints, and joint-filler strips.
 - c. Semirigid joint fillers.
 - d. Vapor-retarder installation.
 - e. Anchor rod and anchorage device installation tolerances.

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- f. Cold and hot weather concreting procedures.
- g. Concrete finishes and finishing.
- h. Curing procedures.
- i. Forms and form-removal limitations.
- j. Methods for achieving specified floor and slab flatness and levelness.
- k. Floor and slab flatness and levelness measurements.
- 1. Concrete repair procedures.
- m. Concrete protection.
- n. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- o. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

- A. Design Mixtures: For each concrete mixture, include the following:
 - 1. Mixture identification.
 - 2. Minimum 28-day compressive strength.
 - 3. Durability exposure class.
 - 4. Maximum w/cm.
 - 5. Calculated equilibrium unit weight, for lightweight concrete.
 - 6. Slump limit.
 - 7. Air content.
 - 8. Nominal maximum aggregate size.
 - 9. Steel-fiber reinforcement content.
 - 10. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
 - 11. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
 - 12. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
 - 13. Intended placement method.
 - 14. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- B. Shop Drawings:
 - 1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.

- 2. Admixtures.
- 3. Curing compounds.
- 4. Bonding agents.
- 5. Adhesives.
- 6. Vapor retarders.
- 7. Semirigid joint filler.
- 8. Joint-filler strips.
- 9. Repair materials.
- B. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
 - 1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.
- 1.9 FIELD CONDITIONS
 - A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

- 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- 2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
- 3. Do not use frozen materials or materials containing ice or snow.
- 4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
- 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Source Limitations:
 - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 - 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 - 3. Obtain aggregate from single source.
 - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I/II, gray.
 - 2. Fly Ash: ASTM C618, Class C or F.
 - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

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- 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
- D. Lightweight Aggregate: ASTM C330/C330M, 1-inch nominal maximum aggregate size.
- E. Air-Entraining Admixture: ASTM C260/C260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- G. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A ; not less than 6 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.4 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
 - 1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- D. Curing Paper: Eight-feet-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

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- E. Water: Potable or complying with ASTM C1602/C1602M.
- F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
- J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.

- 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
- 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
- 4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 - 2. Slag Cement: 50 percent by mass.
 - 3. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.

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2.8 CONCRETE MIXTURES

A. Refer to the Structural Drawings for all concrete mixture requirements.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
 - 2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 - 1. Daily access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
 - 4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Refer to 03100 for requirements related to the installation of embedded items.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

- 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
- 2. Face laps away from exposed direction of concrete pour.
- 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
- 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
- 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
- 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
- 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 - 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

- 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
- 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
 - 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
 - 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Do not place concrete floors and slabs in a checkerboard sequence.
 - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Level concrete, cut high areas, and fill low areas.
 - 6. Slope surfaces uniformly to drains where required.
 - 7. Begin initial floating using bull floats or darbies to form a uniform and opentextured surface plane, before excess bleedwater appears on the surface.
 - 8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

- A. As-Cast Surface Finishes:
 - 1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view .

- 2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/4 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view, .
- 3. ACI 301 Surface Finish SF-3.0:
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/8 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class A.
 - e. Locations: Apply to concrete surfaces prominently exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

3.8 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:
 - 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
 - 2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
 - 3. Apply scratch finish to surfaces to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish:
 - 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
 - 2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
 - 3. Apply float finish to surfaces to receive trowel finish and to be covered with fluidapplied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish:

- 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
- 2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
- 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
- 4. Do not add water to concrete surface.
- 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
- 6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- 7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15 for carpeted floor and other non-critical exposed floors (mechanical rooms, parking slabs, etc.).
 - 2) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17 for exposed floors and floors with thin floor coverings.
 - b. Suspended Slabs:
 - 1) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15 for carpeted floor and other non-critical exposed floors (mechanical rooms, parking slabs, etc.).
 - 2) Specified overall values of flatness, FF 35; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15 for exposed floors and floors with thin floor coverings.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
 - 1. Coordinate required final finish with Architect before application.
 - 2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 - 2. Coordinate required final finish with Architect before application.

- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings
 - 1. Apply in accordance with manufacturer's written instructions and as follows:
 - a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications.
 - b. Tamp aggregate flush with surface, but do not force below surface.
 - c. After broadcasting and tamping, apply float finish.
 - d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate .

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
 - 1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 - 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 - 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 4500 psi at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
 - 1. Cast-in inserts and accessories, as shown on Drawings.
 - 2. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
 - 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
 - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 - 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
 - 3. If forms remain during curing period, moist cure after loosening forms.
 - 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
 - 1. Begin curing immediately after finishing concrete.
 - 2. Interior Concrete Floors:

- a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12-inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 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.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 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.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.

- b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
- 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
 - 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
 - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
 - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.
- e. Floors to Receive Urethane Flooring:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
 - 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
 - 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.
- f. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
- g. Floors to Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least six month(s).
 - 2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
 - 1. Repair and patch defective areas when approved by Architect.
 - 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.

- b. Compact mortar in place and strike off slightly higher than surrounding surface.
- 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
 - 1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 3. After concrete has cured at least 14 days, correct high areas by grinding.
 - 4. Correct localized low areas during, or immediately after, completing surfacefinishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
 - 5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
 - 6. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 - 8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

- b. Dampen cleaned concrete surfaces and apply bonding agent.
- c. Place patching mortar before bonding agent has dried.
- d. Compact patching mortar and finish to match adjacent concrete.
- e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.

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- 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
 - 1. Headed bolts and studs.
 - 2. Verification of use of required design mixture.
 - 3. Concrete placement, including conveying and depositing.
 - 4. Curing procedures and maintenance of curing temperature.
 - 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 - 6. Verification of placement of steel reinforcing bars per the approved shop drawings.
 - 7. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the Structural Drawings:
 - 1. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - 2. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
 - 3. 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.
 - 4. Additional Tests:
 - a. 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.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

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- 5. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 6. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.15 **PROTECTION**

- A. Protect concrete surfaces as follows:
 - 1. Protect from petroleum stains.
 - 2. Diaper hydraulic equipment used over concrete surfaces.
 - 3. Prohibit vehicles from interior concrete slabs.
 - 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 - 5. Prohibit placement of steel items on concrete surfaces.
 - 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 - 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 - 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03300

SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes unit masonry assemblies consisting of the following:
 - 1. Concrete blocks.
 - 2. Mortar and grout.
 - 3. Reinforcing steel.
 - 4. Joint reinforcement.
 - 5. Ties and anchors.
 - 6. Miscellaneous masonry accessories.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. Steel lintels and other fabricated metal items to be built into masonry are furnished under Section 05500.
- B. Wood nailers and blocking built into unit masonry are furnished under Section 06100.
- C. Inserts for anchoring elevator rails are furnished under Division 14.
- D. Other products indicated on the Drawings as being built into masonry.

1.3 RELATED SECTIONS

- A. Division 3 Section Cast-In-Place Concrete.
- B. Division 5 Section Metal Fabrications.
- C. Division 7 Section Joint Sealants.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide masonry unit that develops the following net-area compressive strengths (fm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 1. For Concrete Unit Masonry: f'm = 2500 psi (17.2 MPa).

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
 - 1. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.
- F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1093 to conduct the testing indicated, as documented according to ASTM E548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Preconstruction Testing Service: Engage a qualified independent testing agency to perform the following preconstruction testing:
 - 1. Concrete Block Test: For each concrete block indicated, per ASTM C140.
 - 2. Grout Test: For compressive strength per ASTM C1019.
- E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
 - 1. Fire-resistant concrete block units shall comply with the requirements of TEK 7-1 (lastest issue) of the National Concrete Masonry Association.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
 - 1. Protect Type I concrete blocks from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. When air temperatures are below 40 degrees F. or when anticipated air temperatures are forecast to drop below 35 degrees F. during the next 24 hour period, provide a complete enclosure of the masonry work and auxiliary heat to maintain an air temperature of at least 40 degrees F. for 48 hours after laying masonry.
 - a. For masonry materials not stored within the heated enclosure and for mortar not mixed or stored within the heated enclosure, perform construction procedures stipulated in IMIAWC "Recommended Practices and Guide Specifications for Cold Weather Masonry."
 - b. Maintain at the Project Site, a copy of the document "Recommended Practices and Guide Specifications for Cold Weather Masonry" as published by the International Masonry Institute All Weather Council.
 - 2. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements.
 - a. For units with surface temperatures above 32 degrees, wet with water heated to above 70 degrees.
 - b. For units with surface temperatures below 32 degrees, wet with water heated to above 130 degrees F.
 - 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F (4 degrees C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

When ambient temperature exceeds 100 degrees F (38 degrees C), or 90 degrees F (32 degrees C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 CONCRETE BLOCK

- A. General: Provide shapes indicated and as follows:
 - 1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners, unless indicated as bullnose.
- B. Concrete Block: ASTM C90 and as follows:
 - 1. Weight Classification: Normal weight, unless otherwise indicated.
 - 2. Provide Type I, moisture-controlled units.
 - 3. Size (Width): Manufactured to the following dimensions:
 - a. 4 inches (102 mm) nominal; 3-5/8 inches (92 mm) actual.
 - b. 6 inches (152 mm) nominal; 5-5/8 inches (143 mm) actual.
 - c. 8 inches (203 mm) nominal; 7-5/8 inches (194 mm) actual.
 - d. 10 inches (254 mm) nominal; 9-5/8 inches (244 mm) actual.
 - e. 12 inches (305 mm) nominal; 11-5/8 inches (295 mm) actual.
 - 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
 - a. Where units are to be left exposed, provide color and texture matching the range represented by Architect's sample.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I. Provide natural color or white cement as required to produce required mortar color to match the Architect's sample.
- B. Hydrated Lime: ASTM C207, Type S, special finishing hydrated lime, non-airentrained.
- C. Aggregate for Mortar: ASTM C144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.
 - 1. White-Mortar Aggregates: Natural white sand or ground white stone.
 - 2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
- D. Aggregate for Grout: ASTM C404.

E. Water: Clean and potable, free of deleterious materials which would impair strength or bond, or which may cause efflorescence.

2.3 REINFORCING STEEL

A. Zinc-Coated Reinforcing Steel: ASTM A615/A615M, Grade 60 (Grade 400); zinc coated (hot-dip galvanized) to comply with ASTM A767/A767M.

2.4 JOINT REINFORCEMENT

1.

A. General: ASTM A951 and as follows:

- Galvanized carbon-steel wire, coating class as follows:
 - a. ASTM A153, Class B-2, for both interior and exterior walls.
- B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet (3 m), with prefabricated corner and tee units, and complying with requirements indicated below:
 - 1. Wire Diameter for Side Rods: 0.1875 inch (4.8 mm).
 - 2. Wire Diameter for Cross Rods: 0.1483 inch (3.8 mm).
- C. For single-wythe masonry, provide type as follows with single pair of side rods:
 - 1. Ladder design with perpendicular cross rods spaced not more than 16 inches (407 mm) o.c.
 - 2. Product: D/A 320 Ladur by Dur-O-Wall, Inc. or equal.
- D. For multi-wythe masonry, provide type as follows:
 - 1. Ladder design with perpendicular cross rods spaced not more than 16 inches (407 mm) o.c.
 - a. Number of Side Rods for Multiwythe Concrete Masonry: One side rod for each face shell of hollow masonry units more than 4 inches (100 mm) in width, plus 1 side rod for each wythe of masonry 4 inches (100 mm) or less in width.
 - b. Provide integral drips on cross rods at cavity walls.
 - 2. Adjustable (2-piece) tab design with single pair of side rods and rectangular box-type cross ties spaced not more than 16 inches (407 mm) o.c., with side rods spaced for embedment within each face shell of back-up wythe and with separate adjustable ties engaging the cross ties and extended to engage the outer wythe by at least 1-1/2 inches (38 mm) and spaced not more than 16 inches (407 mm) o.c.
 - a. Use where horizontal joints of facing wythe do not align with those of back-up and where indicated.

TIES AND ANCHORS, GENERAL

- E. Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- F. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A82; with ASTM A153, Class B-2 coating.
- G. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

2.5 ANCHORS FOR CONNECTING TO CONCRETE

- A. Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section: Dovetail anchor section formed from 0.1094 inch (2.8 mm) thick, stainless-steel sheet. 0.108 inch (2.8 mm) thick, galvanized sheet may be used at interior walls where humidity does not exceed 75 percent.
 - Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.1875 inch (4.8 mm) diameter, hotdip galvanized steel wire.

2.6 RIGID ANCHORS

- A. Fabricate from steel bars as follows:
 - 1. 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
 - 2. Finish: Hot-dip galvanized to comply with ASTM A153.
 - 3. Provide one of the following or equal:
 - a. D/A 301Z; Dur-O-Wal, Inc.
 - b. No. 140; Heckmann Building Products, Inc.

2.7 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:
 - 1. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
 - 1. For masonry veneer over wood studs and sheathing and with 2-1/2 inch thick cavity insulation:
 - a. Anchors and Ties:
 - 1) Hohmann & Barnard : 2-Seal Concrete Tie

- a) Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
- b) Sealer Tape: Hohmann & Barnard Textroseal.
- c) Ties: Hohmann & Barnard Box Tie with moisture drips, 1/4 inch diameter stainless steel. Length as required to extend 1-1/2 inches (38 mm) into masonry wythe of veneer face.
- Bloc-Loc BL-407, consisting of 16 gauge, stainless steel anchor plate, a 3/16" diameter stainless steel tie, and Wedge-Lok[®] Insulation Retainer where required. System by Blok-Lok Ltd., Ontario, Canada.
- Screws: Fabco H-3 (300 Series) Stainless Steel Topseal Screw, No. 14 by 4 inches, assembled with 20 gauge stainless steel bonded EPDM washer or equal. (NOTE: Fabco H-3 screws are not self-drilling screws and holes must be pre-drilled.)
 - 1) Provide 2 screws per anchor.
- 2. For masonry veneer over cast-in-place concrete and concrete block back-up and with 2-1/2 inch thick cavity insulation:
 - a. Anchors and Ties:
 - 1) Hohmann & Barnard DW-10-X by 3 inches, 0.1094 inch (2.8 mm) stainless steel.
 - a) Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
 - b) Sealer Tape: Hohmann & Barnard Textroseal.
 - c) Ties: Hohmann & Barnard Box Tie with moisture drips, 1/4 inch diameter stainless steel. Length as required to extend 1-1/2 inches (38 mm) into masonry wythe of veneer face.
 - Bloc-Loc BL-407, consisting of 16 gauge, stainless steel anchor plate, a 3/16" diameter stainless steel tie, and Wedge-Lok[®] Insulation Retainer where required. System by Blok-Lok Ltd., Ontario, Canada.
 - b. Screws: Type 410 stainless steel, 0.265 inch major diameter, .201 inch minor diameter, 4 inches long; MF430 CreteFlex[™] SS4 Masonry Fastener by Elco Textron, or equal.
 - 1) Provide 2 screws per anchor.
- C. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint, complying with the following requirements:
 - 1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation

or sheathing and contact studs; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

- a. Plate 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long with strap 5/8 inch (16 mm) wide by 6 inches (150 mm) long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more then 1/32 inch (0.8 mm).
- b. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
- 2. Connector Section: Triangular wire tie and rigid PVC extrusion with snapin grooves for inserting continuous wire. Size wire tie to extend at least halfway through veneer but with at least 5/8 inch (16 mm) cover on outside face.
- 3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.1094 inch (2.8 mm) thick, stainless-steel sheet.
- 4. Fabricate wire connector sections from 0.25 inch (6.4 mm) diameter, stainless-steel wire.
- 5. Continuous Wire: 0.1875 inch (4.8 mm) diameter, stainless-steel wire.
- 6. Screws:
 - a. Into Metal Studs: Fabco H-3 (300 Series) Stainless Steel Topseal Screw, No. 14 by 4 inches, assembled with 20 gauge stainless steel bonded EPDM washer or equal. (NOTE: Fabco H-3 screws are not self-drilling screws and holes must be pre-drilled.)
 - b. Into Cast-In-Place Concrete: Type 410 stainless steel, .265 inch major diameter, .201 inch minor diameter, 4 inches long; MF430 CreteFlex[™] SS4 Masonry Fastener by Elco Textron, or equal.
 - c. Provide 2 screws per anchor section.
- 7. Products:
 - a. For masonry veneer over metal studs and sheathing and with 2-1/2 inch thick cavity insulation: Hohmann & Barnard DW-10-X with 3 inch long legs, or equal.
 - b. For masonry veneer over cast-in-place concrete and concrete block back-up and with 2-1/2 inch thick cavity insulation: Hohmann & Barnard DW-10-X with 2-1/2 inch long legs, or equal.

2.8 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.
- B. Dovetail Slots: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.0336 inch (0.85 mm), galvanized steel sheet.
- C. Anchor Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568, Property Class 4.6); with ASTM A563 (ASTM A563M) hex nuts and, where

indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of diameter and length indicated and in the following configurations:

- 1. Headed bolts.
- 2. Nonheaded bolts, bent in manner indicated.
- D. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E488, conducted by a qualified independent testing agency.
 - 1. Type: Chemical anchors.
 - 2. Corrosion Protection: Stainless-steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A167 or ASTM A276, Type 304 or 316, for anchors.
 - 3. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to 4 times the loads imposed by masonry.
 - 4. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.
- E. Partition Top Anchors (PTA): 3/8 inch diameter steel dowel with tube or sleeve and 0.093 inch thick plate; hot-dip galvanized to comply with ASTM A153, Class C.
 - 1. Products: Subject to compliance with requirements, provide one of the following or equal:
 - a. D/A 411; Dur-O-Wal, Inc.
 - b. PTA-420; Hohmann & Barnard, Inc.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
 - 1. Provide one of the following or equal:
 - a. Rapid Expansion Joint; Dur-O-Wal, Inc.
 - b. No. 26020; National Wire Products Industries, Inc.
- B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - 1. Styrene-Butadiene-Rubber Compound: ASTM D2000, Designation M2AA-805.
 - 2. Provide one of the following or equal:
 - a. D/A 2001; Dur-O-Wall, Inc.
 - b. No. 26021; National Wire Products Industries, Inc.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).

- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.187 inch (4.8 mm) steel wire, hot-dip galvanized after fabrication.
 - 1. Provide units with either two loops or four loops as needed for number of bars indicated.
 - 2. Provide one of the following or equal:
 - a. D/A 816; Dur-O-Wal, Inc.
 - b. No. 376 Rebar Positioner; Heckman Building Products, Inc.
 - c. #RB Rebar Positioner; Hohmann & Barnard, Inc.
- E. Cavity Drainage Mesh: 2 inch thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
 - 1. Provide one of the following or equal:
 - a. Mortar Net by Mortar Net USA, Ltd.
 - b. Mortar Maze by Advanced Building Products, Inc.
- F. Plastic Bearing Strips: Korolath-NS plastic bearing strips by Korolath Corporation, Hudson, MA or equal.
 - 1. Provide 3 by 8 by 1/8 inch thick plastic bearing strips with one non-skid surface and one smooth surface.

2.10 MORTAR AND GROUT MIXES

- A. Preblended mortar mixes will not be accepted.
- B. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specifications, except limit materials to those specified herein, and limit cement/lime ratio (by volume) as follows:
 - 1. For reinforced masonry and where indicated, use Type S mortar, minimum 1800 psi at 28 days. Mortar proportions by volume shall be one part Portland Cement; over 1/4 to 1/2 part hydrated lime; and not less than 2-1/4 and not more than 3 times the sum of the volumes of cement and lime shall be aggregate.
- D. Grout for Unit Masonry: Comply with ASTM C476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C143.

E. Measurement: Use methods which will ensure that specified proportions are controlled and accurately maintained. Measure aggregate materials in a damp, loose condition, use of a tile box or similar device is required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - 2. Verify that reinforcing dowels are properly placed.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.

3.3 CONSTRUCTION TOLERANCES

- A. Variations from Plumb: For vertical lines and surfaces of columns, walls and arises, do not exceed 1/8 inch in 10 feet, nor 1/4 inch in a story height not to exceed 20 feet, nor 3/8 inch in 40 feet or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/8 inch in any story or 20 feet maximum, nor 3/8 inch in 40 feet or more. For vertical alignment of head joints do not exceed plus or minus 1/8 inch in 10 feet, 1/4 inch maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 20 feet (3 mm in 6 m), nor 1/4 inch in 40 feet (6 mm in 12 m) or more. For top surface of bearing walls, do not exceed 1/8 inch (3 mm) in 10 feet (3 m), nor 1/16 inch (1.5 mm) within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/4 inch in 20 feet, nor 3/8 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/8 inch nor plus 1/4 inch.
- E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch (3 mm). Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch (3 mm). Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch (3 mm). Do not vary from collar-joint thickness indicated by more than minus 1/4 inch (6 mm) or plus 3/8 inch (10 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4 inch (100 mm) horizontal face dimensions at corners or jambs.
 - 1. Running bond, unless indicated otherwise.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4 inch (100 mm) horizontal face dimensions at corners or jambs.

- D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for onehalf running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.
- E. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- F. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - 1. At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated, but not less than 3/4 inch (19 mm) to act as a thermal break between frame and masonry.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow concrete blocks with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
 - 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.
- Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.6 BONDING OF MULTI-WYTHE MASONRY

- A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties as shown, but not less than 1 metal tie for 4 sq. ft. (0.37 sq. m) of wall area spaced not to exceed 24 inches (610 mm) o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
- B. Use joint reinforcement installed in horizontal mortar joints to bond wythes together.
- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.
 - 1. Provide continuity with joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide individual metal ties not more than 8 inches (203 mm) o.c.
 - 2. Provide continuity with joint reinforcement by using prefabricated "T" units.
 - 3. Provide rigid metal anchors not more than 24 inches (610 mm) o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 JOINT REINFORCING

- A. Provide continuous joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
 - 2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.

- a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch (25 mm) in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 CONTROL AND EXPANSION JOINTS

- A. Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
 - 1. If location of expansion joints and control joints is not shown, place vertical joints where directed by Architect, spaced not to exceed 35 feet on centers for concrete masonry wythes if reinforced, or 30 feet on centers if not reinforced.
- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Build-in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07900 "Joint Sealants."
 - 1. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.10 LINTELS

A. Install steel lintels where indicated.

- B. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick size units and 24 inches (610 mm) for block size units are shown without structural steel or other supporting lintels.
 - 1. Provide precast lintels made from concrete matching concrete blocks in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated. Cure precast lintels by same method as CMU.
 - 2. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
 - 3. Provide either of above at Contractor's option or provide precast or formedin-place concrete lintels complying with requirements of Division 3 Section "Cast-in-Place Concrete."
- C. Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.
- D. Install a plastic bearing strip under lintel at each jamb where a control joint occurs. Install plastic bearing strips with non-skid surface down, set in mortar, and smooth surface up, under lintel.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - Comply with requirements of [ACI 530.1/ASCE 6/TMS 602] [Section 2104.6 of the Uniform Building Code] for cleanouts and for grout placement, including minimum grout space and maximum pour height.
- 3.12 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
 - 1. Payment for these services will be made by Owner.
 - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. (465 sq. m) of wall area or portion thereof.
- C. Mortar properties will be tested per ASTM C780.
- D. Grout will be sampled and tested for compressive strength per ASTM C1019.
- E. Concrete Block Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C140.

3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
 - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.14 MASONRY WASTE DISPOSAL

- A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 2 Section "Earthwork."
 - 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION
SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Shear stud connectors.
 - 3. Shrinkage-resistant grout.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.
- B. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
 - 2. Welded built-up members with plates thicker than 2 inches.
 - 3. Column base plates thicker than 2 inches.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 - 5. Identify members not to be shop primed.
- B. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified in accordance with AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3.
- D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.

- 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 - 1. Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
- C. Moment Connections: Type FR, fully restrained.
- 2.2 STRUCTURAL-STEEL MATERIALS
 - A. W-Shapes: ASTM A992/A992M.
 - B. Channels, Angles, M-Shapes, S-Shapes: ASTM A36/A36M.
 - C. Plate and Bar: ASTM A36/A36M.
 - D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
 - E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
 - 1. Weight Class: Standard .
 - 2. Finish: Black except where indicated to be galvanized.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbonsteel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressiblewasher type with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nutwasher assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 490-1, compressiblewasher type with plain finish.

- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavyhex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressiblewasher type with mechanically deposited zinc coating, baked epoxy-coated finish.
- D. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

2.4 RODS

- A. Headed Anchor Rods: ASTM F1554, Grade 55, weldable, straight.
 - 1. Nuts: ASTM A563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A36/A36M carbon steel.
 - 3. Washers: ASTM F436, Type 1, hardened carbon steel.
 - 4. Finish: Plain.

2.5 FORGED-STEEL STRUCTURAL HARDWARE

- A. Clevises and Turnbuckles: Made from cold-finished carbon-steel bars, ASTM A108, AISI C-1035.
- B. Eye Bolts and Nuts: Made from cold-finished carbon-steel bars, ASTM A108, AISI C-1030.
- C. Sleeve Nuts: Made from cold-finished carbon-steel bars, ASTM A108, AISI C-1018.

2.6 PRIMER

- A. Steel Primer:
 - 1. Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

2.7 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.8 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- C. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- D. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 2.
- E. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.9 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: as indicated in the drawings. .
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.10 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize all steel exposed to moisture, including, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.11 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces unless indicated to be painted.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 3.
- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

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- 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
 - 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.

- 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: as indicated in the drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
 - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 - 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 05120

SECTION 05210

STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. K-series steel joists.
 - 2. K-series steel joist substitutes.
 - 3. Steel joist accessories.

1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.
- B. Shop Drawings:
 - 1. Include layout, designation, number, type, location, and spacing of joists.
 - 2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
 - 3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.7 SEQUENCING

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated on Drawings.
 - 1. Use ASD; data are given at service-load level.
 - 2. Design special joists to withstand design loads with live-load deflections no greater than the following:
 - a. Floor Joists: Vertical deflection of 1/360 of the span.

2.2 STEEL JOISTS

- A. K-Series Steel Joist: Manufactured steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steelangle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists .
 - 2. K-Series Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

- 3. Provide holes in chord members for connecting and securing other construction to joists.
- 4. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated on Drawings, complying with SJI's "Specifications."
- 5. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated on Drawings, complying with SJI's "Specifications."
- 6. Camber joists according to SJI's "Specifications."
- 7. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3 PRIMERS

- A. Primer:
 - 1. SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
 - 2. Provide shop primer that complies with

2.4 STEEL JOIST ACCESSORIES

- A. Bridging:
 - 1. 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. Furnish additional erection bridging if required for stability.
- B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction.
 - 1. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated on Drawings.
 - 2. Finish: Plain, uncoated.
- C. Welding Electrodes: Comply with AWS standards.
- D. Galvanizing Repair Paint: ASTM A780/A780M.
- E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.5 CLEANING AND 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. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.
- C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- D. Shop priming of joists and joist accessories is specified in

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. 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 instructions, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.
- C. Field weld joists to supporting steel framework. 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. 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.

3.3 REPAIRS

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Touchup Painting:
 - 1. Immediately after installation, clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists abutting structural steel, and accessories.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - b. Apply a compatible primer of same type as primer used on adjacent surfaces.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709.
 - c. Ultrasonic Testing: ASTM E164.
 - d. Radiographic Testing: ASTM E94.
- C. Visually inspect bolted connections.
- D. Prepare test and inspection reports.

END OF SECTION 05210

SECTION 05310

STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
 - 2. Noncomposite form deck.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Roof deck.
 - 2. Noncomposite form deck.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized-Steel Sheet: , as noted in the structural drawings.
 - 2. Deck Profile: As indicated.
 - 3. Profile Depth: As indicated.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: As indicated.
 - 6. Side Laps: Overlapped.

2.3 NONCOMPOSITE FORM DECK

- A. Noncomposite 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. 31, with the minimum section properties indicated, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), , G60 zinc coating.
 - 2. Profile Depth: As indicated.
 - 3. Design Uncoated-Steel Thickness: As indicated.
 - 4. Span Condition: As indicated.

5. Side Laps: Overlapped .

2.4 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbonsteel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated .
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, with factory-punched hole of 3/8-inch minimum diameter.
- J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: ASTM A780/A780M.
- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. 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.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 5/8 inch , nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Fasten with a minimum of 1-1/2-inch- long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 INSTALLATION OF FLOOR DECK

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

- 1. Weld Diameter: 5/8 inch , nominal.
- 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
- 3. Weld Spacing: Space and locate welds as indicated.
- 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch- long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped .
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. 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 deck.
- F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

3.5 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting:
 - 1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

- 4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- 3.6 FIELD QUALITY CONTROL
 - A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - B. Field welds will be subject to inspection.
 - C. Prepare test and inspection reports.

END OF SECTION 05310

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Load-bearing wall framing.
 - 2. Exterior non-load-bearing wall framing.
 - 3. Soffit framing.

1.3 PREINSTALLATION MEETINGS

1.4 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- B. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer registered in the Commonwealth of Pennsylvania to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Wall Framing: Horizontal deflection of 1/600 of the wall height.
 - b. Interior Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.
 - c. Ceiling Joist and Soffit Framing: Vertical deflection of 1/360 of the span for live loads and wind loads and 1/240 for total loads of the span.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope 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 of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
 - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Wall Studs: AISI S211.

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2. Headers: AISI S212.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60, A60, AZ50, or GF30.
- B. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: **G60**.

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Minimum Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Minimum Flange Width: 1-1/4 inches.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Minimum Flange Width: 1-5/8 inches.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Minimum Flange Width: 1-3/8 inches.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Minimum Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0538 inch.
 - 2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Minimum Flange Width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Stud kickers and knee braces.
 - 7. Hole-reinforcing plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - 3. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 or Group 2 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M.
- B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.9 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

COLD-FORMED METAL FRAMING 05400-5

- 1. Fabricate framing assemblies using jigs or templates.
- 2. Cut framing members by sawing or shearing; do not torch cut.
- 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M 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 Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
- 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: 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.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

COLD-FORMED METAL FRAMING 05400-6

- C. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
- 3.3 INSTALLATION, GENERAL
 - A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
 - B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
 - C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
 - D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
 - E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
 - F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 - G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
 - H. Install insulation, specified in Section 072100 "Thermal Insulation," in framingassembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF LOAD-BEARING WALL FRAMING

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track.
 - 1. Fasten both flanges of studs to top and bottom tracks.
 - 2. Space studs as follows:
 - a. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

- I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection. Design bridging for the stud bracing forces and transfer cumulative bracing force at the ends of bridging into the floor diaphragms. Wall sheathing is not an acceptable means of bracing the studs for buckling.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION TOLERANCES

- A. Install cold-formed steel 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.

3.7 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.8 **PROTECTION**

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05400

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Types of work in this section include but are not limited to metal fabrications for the following:
 - 1. Rough hardware.
 - 2. Ladders N/A
 - 3. Cast nosings, treads and thresholds.
 - 4. Loose bearing and leveling plates.
 - 5. Loose steel lintels.
 - 6. Miscellaneous framing and supports.
 - 7. Miscellaneous steel trim.
 - 8. Shelf and relieving angles.
 - 9. Floor plate and supports.
 - 10. Steel railings.
 - 11. Metal stairs.
 - 12. Metal pipe guards.
 - 13. Custom guard rails.
 - 14. Custom mechanical screens.
- B. Products Furnished but not Installed under this Section: Furnish the following items for installation under the designated Sections:
 - 1. Section 03300: Nosings; items to be cast into concrete.
 - 2. Section 04200: Loose steel lintels; loose bearing and leveling plates; items to be built into unit masonry.
 - 3. Section 06100: Rough hardware.
- C. Definitions:
 - 1. Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not part of structural steel or other metal systems specified elsewhere.
 - 2. Definitions in ASTM E985 for railing-related terms apply to this section.

1.2 RELATED SECTIONS

- A. Division 3 Section Cast-In-Place Concrete.
- B. Division 4 Section Unit Masonry Assemblies.

- C. Division 6 Section Rough Carpentry: Rough hardware.
- D. Division 9 Section Painting.
- E. Division 14 Section Elevators.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer, fabricate, and install the following metal fabrications to withstand 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 respective component of each metal fabrication.
 - 1. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 pounds applied at any point and in any direction.
 - b. Uniform load of 50 pounds per foot applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 pounds applied at any point and in any direction.
 - b. Uniform load of 50 pounds per foot applied horizontally at the required guardrail height and a simultaneous uniform load of 100 pounds per foot applied vertically downward at the top of the guardrail.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 pounds applied to a one square foot area at any point in the system including panels, intermediate rails, balusters, or other elements composing the infill area.
 - a. Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.
 - 4. Treads of Steel Stairs: Capable of withstanding a uniform load of 100 pounds per square foot or a concentrated load of 300 pounds on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.
 - 5. Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 pounds per square foot.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300, manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.
- B. Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
 - 1. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural engineer's certification, material properties and other information needed for structural analysis.
- C. Engage the services of a Professional Structural Engineer registered to practice in the State in which the Project is located, to prepare complete shop drawings for metal railings and stairs, including their attachments. Structural Engineer shall do a complete analysis of all typical and special conditions and certify conformance to governing laws, the Building Code and Contract Documents. Shop drawings and certification shall bear the Engineer's professional seal.
 - 1. Fabricator's shop drawings stamped with the Engineer's professional stamp will be acceptable instead of shop drawings actually prepared by the Engineer.
- D. Submit 2 sets of representative samples of materials and finished products as may be requested by the Architect.
- E. Submit welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.
- F. Submit a notarized certificate of compliance from the galvanizer, with an itemized listing and description of all items that have been hot-dip galvanized, hot-dip galvanized/shop prime painted, and hot-dip galvanized/shop finished.
 - 1. Submit a laboratory analysis of the zinc bath with the names and percentages of metals.
- G. Submit qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects and Owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firms experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.
- B. Installer Qualifications: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.
- C. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Engineer Qualifications: Professional engineer licensed to practice in jurisdiction where project is located and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Check by accurate field measurements before fabrication, actual locations of walls and other construction to which metal fabrications must fit; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.7 SEQUENCING AND SCHEDULING

- A. Sequence and coordinate installation of wall handrails as follows:
 - 1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.
 - 2. Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.
PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Ferrous metals:
 - 1. Steel Plates, Shapes and Bars: ASTM A36.
 - 2. Rolled Steel Floor Plates: ASTM A786.
 - 3. Steel Bars for Grating: ASTM A569 or ASTM A36.
 - 4. Wire Rod for Grating Cross Bars: ASTM A510.
 - 5. Steel Tubing: Cold-formed, ASTM A500; or hot-rolled, ASTM A501.
 - 6. Structural Steel Sheet: Hot-rolled, ASTM A570; or cold-rolled ASTM A611, Class 1; of grade required for design loading.
 - 7. Galvanized Structural Steel Sheet: ASTM A653, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
 - 8. Steel Pipe: ASTM A53; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.
 - 9. Grey Iron Castings: ASTM A48, Class 30.
 - 10. Malleable Iron Castings: ASTM A47, grade 32510.
 - 11. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails unless otherwise indicated.
 - 12. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts washers and shims as required, hot-dip galvanized, ASTM A153.
 - 13. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.
- C. Non-Shrink Non-Metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107, Grade B or C at a fluid consistency (flow cone) of 20 to 30 seconds. Provide grout specifically recommended by manufacturer for interior and exterior applications.
 - 1. "Burke Non-Ferrous, Non-Shrink Grout" by The Burke Company, San Mateo, CA or equal.
- D. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

- 1. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- 2. Lag Bolts: Square head type, ASME B18.2.1 (ASME B18.2.3.8M).
- 3. Machine Screws: Corrosion resistant steel, ASME B18.6.3 (ASME B18.6.7M).
- 4. Wood Screws: Flat head carbon steel, ASME B18.6.1.
- 5. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
- 6. Lock Washers: Helical spring type carbon steel, ASME B18.21.1 (ASME B18.21.2M).
- 7. Drilled-In Expansion Anchors: Expansion anchors complying with Federal Specification FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with Federal Specification FF-B-575, Grade 5.
- 8. Epoxy Anchors: Epoxy complying with ASTM C881, Type IV, Grade 3 epoxy; and machine bolts complying with Federal Specification FF-B-575, Grade 5.
 - a. Product: "Epcon System" by ITW Ramset/Red Head or equal.
- 9. Power Driven Fasteners: Federal Specification FF-P-395 or Federal Specification GGG-D-777. Use when permitted by ANSI A10.3. Follow safety provisions of ANSI A10.3.
- 10. Toggle Bolts: Tumble-Wing type, Federal Specification FF-B-588, type, class and style as required.
- E. Paint:
 - 1. Shop Primer for Ferrous Metals: Provide manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer equal to primer specified in Section 09900.
 - Shop Primer for Galvanized Ferrous Metals: Epoxy primer applied at 2.5 to 3.0 mils DFT. Provide one of the following products or equal:
 - a. Carboline 190 High Build Epoxy Primer.
 - b. DuPont 823 HB.
 - c. Tnemec 66 Hi-Build Epoxoline Primer.
 - 3. Shop Primer and Finish for Galvanized Ferrous Metals: Provide epoxy primer and aliphatic top coat, shop applied by the galvanizer.
 - 4. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint-20; one of the following or equal:
 - a. Tnemec-Zinc 90-93.
 - b. ZRC Cold Galvanizing Compound.
 - c. ZiRP; Duncan Galvanizing.
 - 5. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

2.2 FABRICATION

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 - 1. 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.
 - 2. Shear and punch metals cleanly and accurately. Remove burrs.
 - 3. Remove sharp or rough areas on exposed traffic surfaces.
- C. Thermal Movement: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies (including handrails and railings) to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
 - 1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
- D. Weld corners and seams continuously to comply with AWS recommendations and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.
- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated Phillips flathead (countersunk) screws and bolts. Locate joints where least conspicuous.
- F. Provide for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- G. 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.

- H. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- I. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

2.3 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- B. Fabricate items to sizes, shapes and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- 2.4 STEEL LADDERS
 - A. N/A

2.5 CAST NOSINGS

- A. Fabricate units of material, sizes, and configurations indicated. If not indicated, provide cast-iron units with integral abrasive finish. Furnish in lengths as required to accurately fit each opening or conditions.
 - 1. Cast units with an integral abrasive grit consisting of aluminum oxide, silicone carbide, or a combination of both.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
 - 1. American Abrasive Metals Co.
 - 2. American Mason Safety Tread Co.
 - 3. American Safety Tread Co., Inc.
 - 4. Armstrong Products, Inc.
 - 5. Safe-T-Metal Co., Inc.
 - 6. Wooster Products Inc.
- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

- D. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.
- E. Provide a plain surface texture, except where fluted or cross-hatched surfaces are indicated.

2.6 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.
 - 1. Hot-dip galvanize after fabrication.

2.7 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, except as follows:
 - 1. All lintels indicated to be a part of structural metal framing.
 - 2. Over metal door bucks in interior partitions with openings less than 3 feet 0 inches.
 - 3. Where concrete or reinforced masonry block lintels are indicated.
- B. Weld adjoining members together where two or more lintels are placed side by side. Drill and tap lintels to receive other work where required. Provide not less than 8 inch bearing at each side of opening.
- C. Provide lintels in accordance with the following schedule (one angle for each 4 inch thickness of masonry.)
 - 1. For openings up to 3 feet 0 inches: 3-1/2 by 3 by 1/4 inch angle with 3-1/2 inch leg vertical.
 - 2. For openings 3 feet 0 inches to 4 feet 6 inches: 4 by 3-1/2 by 5/16 inch angle with 4 inch leg vertical.
 - 3. For openings 4 feet 6 inches to 6 feet 0 inches: 5 by 3-1/2 by 5/16 inch angle with 5 inch leg vertical.
 - 4. For openings 6 feet 0 inches to 8 feet 0 inches: 6 by 3-1/2 by 3/8 inch angle with 6 inch leg vertical.
- D. Hot-dip galvanize loose steel lintels.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - 1. Except as otherwise indicated, space anchors 24 inches on centers and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inches by 8 inches long.
- D. Hot-dip galvanized and prime paint units to be installed in exterior walls; prime paint all other units.

2.9 MISCELLANEOUS STEEL TRIM

- A. Provide shapes and sizes indicated for profiles shown. Fabricate units from structural steel shapes, plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
 - 1. Hot-dip galvanized and prime paint steel trim units to be installed in exterior walls; prime paint all other units.

2.10 SHELF AND RELIEVING ANGLES

- A. Provide structural steel shelf and relieving angles of sizes indicated for attachment to concrete framing. Provide slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches on center.
- B. For cavity walls, provide vertical channel brackets with anchors, to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.
- C. Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.
- D. Hot-dip galvanized shelf and relieving angles.

2.11 STEEL PIPE RAILINGS AND HANDRAILS

A. Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of

pipe, post spacings, and anchorage, but not less than that required to support structural loads.

- B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
 - 1. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
- C. Form changes in direction of railing members as follows:
 - 1. By insertion of prefabricated elbow fittings.
- D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.
- G. Toe Boards: Unless otherwise indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 6 inches high by 1/8 inch steel plate welded to, and centered between, each railing post.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
 - 1. For railing posts set in concrete, fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.
- I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.
- J. For exterior steel railings and handrails formed from steel pipe with galvanized finish, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

- K. For interior steel railings formed from steel pipe with black finish, provide nongalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- L. Hot-dip galvanized and prime paint exterior pipe railings, handrails, infills, brackets, flanges, sleeves and fasteners.

2.12 STEEL FRAMED STAIRS

- A. Construct stairs to conform to sizes and arrangements as indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.
 - 1. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for class of stair designated, except where more stringent requirements are indicated:
 - a. Architectural class where indicated.
 - 2. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.
- B. Stair Framing: Fabricate stringers of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to strings, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.
 - 1. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.
- C. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.
 - 1. Form metal pans of galvanized steel shee.
 - 2. Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill.
 - 3. Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

- D. Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:
 - 1. Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.
 - 2. Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
 - 3. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

2.13 CUSTOM GUARDRAILS

- A. Provide guardrail components to conform to sizes and arrangements as indicated.
- B. Product:
 - Perforated Metal Round, Aluminum, Alloy 3003-H14, 16 Gauge (.0500" Thick), 3/16" Round on 1/4" Stg. Ctrs. 51% Open Area Model: McNichols 1731145041
 - Metal Edging U-Edging, Aluminum, Alloy 3003-H14, .0630" Thick (14 Gauge), Type 402 U-Edging (1/8" Opening x 1" Width). Model: McNichols 4071440210

2.14 CUSTOM MECHANICAL ENCLOSURE - INTERIOR / EXTERIOR

- A. Provide metal components as indicated on architectural and structural drawings to conform to sizes and arrangements.
- B. Finishes: Powder Coated White
- C. Product Interior Application
 - Perforated Metal Round, Aluminum, Alloy 3003-H14, 16 Gauge (.0500" Thick), 3/16" Round on 1/4" Stg. Ctrs. 51% Open Area Model: McNichols 1731145041
 - Metal Edging U-Edging, Aluminum, Alloy 3003-H14, .0630" Thick (14 Gauge), Type 402 U-Edging (1/8" Opening x 1" Width). Model: McNichols 4071440210
- D. Product Exterior Application
 - Perforated Metal Round, Aluminum, Alloy 3003-H14, 8 Gauge (.1250" Thick), 1/2" Round on 11/16" Stg. Ctrs. 48% Open Area Model: McNichols 1712611241

 Metal Edging – U-Edging, Aluminum, Alloy 3003-H14, .0630" Thick (14 Gauge), Type 402 U-Edging (1/8" Opening x 1" Width). Model: McNichols 4071440210

2.15 COLD ROLLED STEEL WALL PANELS - INTERIOR @ KITCHEN DEMISING WALL

- A. Provide metal components as indicated on architectural and structural drawings to conform to sizes and arrangements.
- B. Finishes: "Natural" finish w/ clear top coat
- C. Product Interior Application
 - 7. 24 GA. (or lighter per fabricator) Steel Panels with 7/8" Z-clip attachments.
 - 8. Sizing and scope to be determined from Architect drawings. Shop drawings to be provided.

2.16 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize all ferrous metal items exposed to the weather or on the exterior of the building using an enhanced galvanizing process including state of the art Quality Assurance/Quality Control methods. The hot-dip galvanized coating shall consist of zinc and other metals ("Deltagalv" by Duncan Galvanizing or equal). Use the "dry kettle" process to prevent flux inclusions or entrapment. Use of a flux blanket on the surface of the galvanizing bath is not acceptable. Provide hot-dip galvanized coating for those items indicated or specified to be galvanized, as follows:
 - 1. ASTM A153 for Galvanizing Iron And Steel Hardware.
 - 2. ASTM A123 for Galvanizing Both Fabricated And Unfabricated Iron And Steel Products Made Of Uncoated Rolled, Pressed, And Forged Shapes, Plates, Bars, And Strip 0.0299 Inch Thick And Heavier.
 - 3. ASTM A384 for Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

- 4. ASTM A385 for Standard Practice for Providing High Quality Zinc Coatings (Hot-dip).
- 5. ASTM A386 for Galvanizing Assembled Steel Products.
- 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-SP6 "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning."
- C. Shop Priming and Shop Finishing:
 - 1. Shop Priming Non-Galvanized Metals: Apply shop primer to all surfaces of metal fabrication items except those which are indicated to be embedded in concrete or masonry. Comply with requirements of SSPC-PAL "Paint Application Specification No. 1" for shop painting.
 - a. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.
 - 2. Shop Priming Galvanized Metals: Within 12 hours after galvanizing ferrous metals, apply epoxy primer at 2.5 to 3.0 mils DFT, shop applied by the galvanizer ("Primergalv" by Duncan Galvanizing or equal).
 - 3. Shop Finishing:
 - a. For galvanized metal items indicated to be shop finished, apply epoxy primer specified above and apply top coat of aliphatic urethane at 2.5 to 3.0 mils DFT, shop applied by the galvanizer ("Colorgalv" by Duncan Galvanizing or equal).
 - b. For non-galvanized metal items indicated to be shop finished, shop primer specified above and apply top coat of paint finish specified in Section 09900.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.
- B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.
- C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous 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 as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication 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 the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.3 SETTING LOOSE PLATES

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

3.4 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

- A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
 - 1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.
 - a. Nonshrink, nonmetallic grout.
 - b. Cover anchorage joint with a round steel flange attached to post as follows:
 - 1) Welded to post after placement of anchoring material.
 - c. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.
 - 2. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.
 - 3. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
 - 4. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
- B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 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 and wall return fittings to building construction as follows:
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 - 3. For hollow masonry anchorage, use toggle bolts having square heads.
 - 4. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

3.5 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same

material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

- 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 05520 HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Aluminum handrails.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Steel: 72 percent of minimum yield strength.
 - 2. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - 3. Stainless Steel: 60 percent of minimum yield strength.
- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
 - 3. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of finishing and connecting members at intersections.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum."
 - 3. AWS D1.6, "Structural Welding Code Stainless Steel."
- D. Mockups: Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Include (1) end post to top rail connection for initial review.
 - 2. Include (1) full railing assembly after review and approval of end post to top rail connection.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 **PROJECT CONDITIONS**

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

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

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

- 2.1 METALS, GENERAL
 - A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
 - B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.2 ALUMINUM

- A. Aluminum, General: Provide 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 properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated. D.

Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

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- F. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.3 FASTENERS

A. General: Provide the following:

1. Aluminum Railings: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads. C. Fasteners for Interconnecting Railing Components:

- 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
- 2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
- 3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Intermediate Coats and Topcoats: Provide products that comply with Division 09 painting Sections
- H. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- I. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- J. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- K. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

- B. Assemble railings in the 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. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 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 flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method. K. Form changes in direction as follows:
 - 1. As detailed.

- L. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- M. Close exposed ends of railing members with prefabricated end fittings.
- N. 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 (6 mm) or less.
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crushresistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- Q. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Landscape 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.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 ALUMINUM FINISHES

- A. Refer to Section 09960 "High Performance Coatings"
 - 1. Color: Railing: RAL 9004 "Signal Black"

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches (125 mm) deep and 1/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and epoxy anchor in place, placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

3.5 ATTACHING RAILINGS

- A. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

3.6 ADJUSTING AND CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

- B. 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 (0.05-mm) dry film thickness.
- C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections
- D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 **PROTECTION**

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 06072

FIRE RETARDANT WOOD SHEATHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire-retardant wall sheathing.
- B. Fire-retardant roof sheathing.

1.2 RELATED SECTIONS

- A. Section 06100 Rough Carpentry.
- B. Section 06200 Finish Carpentry.
- C. Section 07465 Composition Siding.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D 1037 Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 2. ASTM D 5516 Standard Test Method for Evaluating the Flexural Properties of Fire Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
 - 3. ASTM D 6305 Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant- Treated Plywood Roof Sheathing.
 - 4. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E 108 Standard Test Methods for Fire Tests of Roof Coverings.
 - 6. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 7. ASTM E 661 Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads.
 - 8. ASTM E 2126 Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings.

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- B. California Department of Forestry & Fire Protection Office of State Fire Marshal Fire Engineering (CSFM):
 - 1. CSFM 12-7A-1 Fire Resistive Standard for Exterior Wall Siding and Sheathing
 - 2. CSFM 12-7A-3 Fire Resistive Standard for Soffited Eaves of Exterior Walls.
 - 3. BML No. 8140-2027:0005 LP FlameBlock & LP SmartSide Siding.
 - 4. BML No. 8140-2027:0006 LP FlameBlock & solid wood siding.
 - 5. BML No. 8140-2027:0007 LP FlameBlock & cedar or redwood siding.
- C. City of LA Research Report (RR):
 - 1. RR 25875 LP FlameBlock Fire-Rated OSB Sheathing.
- D. ICC Evaluation Service (ICC-ES):
 - 1. ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12).
 - 2. ICC-ES Acceptance Criteria for Wood Structural Panels Laminated with an Inert, Inorganic Fire Shield (AC264)
 - 3. ESR-1365 LP FlameBlock Fire-Rated OSB Sheathing
- E. Material-Method Approval No. for City & County of Honolulu, Hawaii (MM):
 - 1. MM2011-0017 LP FlameBlock Fire-Rated OSB Sheathing.
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials.
 - 2. NFPA 286 Standard Test Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, National Fire Protection Association.
- G. NYC Building Office of Technical Certification and Research (OTCR):
 - 1. Material Acceptance #29-18 LP FlameBlock Fire-Rated OSB Sheathing.
- H. PEI Evaluation Services Product Evaluation Report (PER):
 - 1. PER-06013 LP FlameBlock Fire-Rated OSB Sheathing.
- I. Underwriters Laboratories (UL) & Underwriters Laboratories Canada (ULC):
 - 1. UL 723 Standard for Surface Burning Characteristics of Building Materials.
 - 2. UL 790 Standard for Tests for Fire Resistance of Roof Covering Materials.
 - 3. UL 1715 Standard for Fire Test for Interior Finish Material.
 - 4. ULC S101 Standard Method of Fire Endurance Tests of Building & Construction Material
- J. Uniform Building Code (UBC):
 - 1. UBC 26-2 Test Method for the Evaluation of Thermal Barriers.
- K. US Voluntary Product Standard (PS):
 - 1. PS 2-10 Performance Standard for Wood-Based Structural-Use Panels.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to beused.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- C. Test Reports: Certified test reports from recognized testing laboratories showing compliance with specified structural fire sound and performance characteristics and physical properties.
- D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: LP Building Products, which is located at: 414 Union St. Suite 2000; Nashville, TN 37219; Toll Free Tel: 888-820-0325; Fax: 877-523-7192; Email:request info (customer.support@lpcorp.com); Web:<u>https://lpcorp.com</u>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 PERFORMANCE REQUIREMENTS

- A. Flame Spread and Smoke Developed Performance:
 - 1. Flame Spread: Less than 25 when tested in accordance with ASTM E 84, UL 723, or NFPA 255.
 - 2. Smoke Developed: Less than 100 when tested in accordance with ASTM E 84, UL 723, or NFPA 255.

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- 3. Advance of Flame: Not to exceed 10.5 feet (3200 mm) after 30 minutes test duration.
- B. Thermal Barrier Index: Minimum 20 minutes when tested in accordance with ASTM E 119, UBC 26.2, and UL 1715.
- C. Structural Performance:
 - 1. Meet or exceed structural and Exposure 1 requirements for Category indicated.
 - 2. Meet or exceed bond durability and weather resistance requirements of ICC Acceptance Criteria AC264.

2.3 FIRE-RETARDANT WALL SHEATHING

- A. Basis of Design: LP FlameBlock; as manufactured by LP Building Products. Firerated OSB sheathing certified to meet building code requirements for fire resistant construction and provide designs values greater than or equal to FRT plywood of the same thickness.
 - 1. Exterior Wall Sheathing:
 - a. Coating location: 2 sides, reference assemblies.
 - b. Coating location: 1 side, reference assemblies.
 - 2. Interior Wall Sheathing:
 - a. Coating location: 1 side, reference assemblies.
 - b. Coating location: 2 sides, reference assemblies.

2.4 FIRE-RETARDANT ROOF SHEATHING

- A. Basis of Design: LP FlameBlock; as manufactured by LP Building Products.
 - 1. Fire-rated OSB sheathing certified to meet building code requirements for fire resistant construction and provide designs values greater than or equal to FRT plywood of the same thickness.
 - 2. Roof Sheathing:
 - a. Coating location: 1 side.
 - b. Panels lie flat with no delamination.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

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3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions approved submittals and in proper relationship with adjacent construction.
 - 1. Accurately fit, align, securely fasten, and install free from distortion or defects.
 - 2. Impose no loads other than the weight of the erectors on the structure before it is permanently sheathed.
 - 3. Exercise caution when removing temporary bracing to apply sheathing.
 - 4. After sheathing, do not exceed design loads on members with construction materials.

3.4 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 06100 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Framing with engineered wood products.
 - 3. Shear wall panels.
 - 4. Rooftop equipment bases and support curbs.
 - 5. Wood blocking, cants, and nailers.
 - 6. Wood furring and grounds.
 - 7. Wood sleepers.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. 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. WCLIB: West Coast Lumber Inspection Bureau.
 - 4. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

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

1.

Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

- 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 based on testing by a qualified independent testing agency.
- 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
- 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any ruleswriting agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

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- 1. Factory mark each piece of lumber with grade stamp of grading agency.
- 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less, no limit for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1.

- 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

- 2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.
- 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
- 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
- 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
 - 1. All framing for exterior non-load bearing and bearing walls.
- 2.4 DIMENSION LUMBER FRAMING
 - A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade.
 - 1. Application: Interior partitions not indicated as load-bearing.
 - 2. Species:
 - a. Spruce-pine-fir; NLGA.
 - B. Load-Bearing Partitions: No. 2 grade.
 - 1. Application: Exterior walls and interior load-bearing partitions.
 - 2. Species:
 - a. Spruce-pine-fir; NLGA.
 - C. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
 - 1. Species:
 - a. Spruce-pine-fir; NLGA.
 - D. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - 1. Application: Exposed exterior framing indicated to receive a stained or natural finish.
 - 2. Species and Grade: Spruce-pine-fir; No. 1 grade; NLGA.
1.

2.5 ENGINEERED WOOD PRODUCTS

- A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

See Structural Drawings for minimum required properties.

- C. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. See Structural Drawings for minimum required properties.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
 - 1. Spruce-pine-fir; NLGA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 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, pressurepreservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M. B. Nails, Brads, and Staples: ASTM F 1667.

- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies 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 and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- 2.8 METAL FRAMING ANCHORS
 - A. Manufacturers: Subject to compliance with requirements,
 - B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Simpson Strong-Tie Co., Inc.
 - 2. USP Structural Connectors.
 - C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall

1.

be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.

MARYLAND FOOD BANK ADDITION AND RENOVATION

2.9 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c.

Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38mm actual) thickness.

- 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservativetreated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

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- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal (19by-63-mm actual) size furring horizontally and vertically at 24 inches (610 mm) o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal (19-by-38-mm actual) size furring vertically at 16 inches (406 mm) o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
 - 1. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less

in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.

3.5 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches (76 mm) and do not embed more than 4 inches (102 mm).
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches (50 mm) from top or bottom.
- E. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch (6.4-by-32-mm) metal strap anchors spaced not more than 96 inches (2438 mm) o.c., extending over and fastening to three joists. Embed anchors at least 4 inches (102 mm) into grouted masonry with ends bent at right angles and extending 4 inches (102 mm) beyond bend. H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

- J. Provide bridging of type indicated below, at intervals of 96 inches (2438 mm) o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal (19-by-64mm actual) size lumber, double-crossed and nailed at both ends to joists.
 - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.6 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- B. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-(19-by-140-mm actual-)size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- C. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.7 **PROTECTION**

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100

SECTION 06402

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Interior standing and running trim.
 - 2. Wood cabinets.
 - 3. Laminate-clad cabinets.
 - 4. Solid surfacing material countertops.
 - 5. Interior ornamental work.
 - 6. Shop finishing of woodwork where indicated.

1.2 RELATED SECTIONS

- A. Division 6 Section Rough Carpentry: Exposed framing and furring, blocking, shims, and hanging strips for installing woodwork.
- B. Division 8 Section Door Hardware.
- C. Division 9 Section Painting: Field finishing of installed architectural woodwork where indicated.

1.3 **DEFINITIONS**

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

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
- B. Submit fire-retardant-treatment data for material treated to reduce combustibility. Include certification by treating plant that treated materials comply with requirements.

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- C. Submit shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcing specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
- D. Submit samples for initial selection of the following in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
 - 1. Shop-applied transparent finishes.
 - 2. Plastic laminates.
 - 3. Thermoset decorative overlays.
 - 4. Solid surfacing materials.
- E. Samples for verification of the following:
 - 1. Lumber with or for transparent finish, 50 sq. in. (300 sq. cm), for each species and cut, finished on one side and one edge.
 - 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
 - 3. Wood-veneer-faced panel products, with or for transparent finish, 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish one-half of face as specified.
 - a. Step finish materials on sample to show and clearly define each coat.
 - b. Provide separate samples of unfaced panel product used for core.
 - 4. Lumber and panel products with shop-applied opaque finish, 8 by 10 inches (200 by 250 mm) for panels and 50 sq. in. (300 sq. cm) for lumber, for each finish system and color, with one-half of exposed surface finished.
 - 5. Laminate-clad panel products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
 - 6. Thermoset decorative-overlay surfaced panel products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
 - 7. Solid surfacing materials, 6 inches (150 mm) square.
 - 8. Corner pieces as follows:
 - a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.
 - 9. Exposed cabinet hardware, one unit for each type and finish.
- F. Product certificates signed by woodwork fabricator certifying that products comply with specified requirements.

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G. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.
 - 1. Work in this section shall be performed by a woodworking firm certified by the Architectural Woodwork Institute (AWI) Quality Certification Program.
- B. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating, finishing, and installing woodwork specified in this Section.
- C. Quality Standard: Except as otherwise indicated, comply with the following standard:
 - 1. AWI Quality Standard: Comply with current edition of "Architectural Woodwork Institute Quality Standards" of the Architectural Woodwork Institute for specified grades of woodwork, construction, finishes, and other requirements.
 - a. Compliance shall be evidenced by the woodworking firm through the application of AWI Quality Certification Program labels on the work according to AWI/QCP labeling guidelines.
 - 1) For items of work where an inconspicuous location for labeling is not practical (i.e. on standing and running trim), provide an AWI/QCP letter of certification.
- D. Make wood paneling veneer lay-up available for examination by Architect for appearance characteristics before fabricating panels.
- E. Fire-Test-Response Characteristics: Provide materials with the following firetest-response characteristics as determined by testing identical products per ASTM test method indicated below by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify fireretardant-treated material with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
 - 1. Surface-Burning Characteristics: Not exceeding values indicated below, tested per ASTM E84 for 30 minutes with no evidence of significant combustion. In addition, the flame front shall not progress more than 10-

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- a. Flame Spread: 25.
- b. Smoke Developed: 450.
- F. Mockup: Prior to fabricating or installing interior architectural woodwork, construct mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockup of the size indicated, using materials indicated for final unit of work, and complying with the following requirements.
 - 1. Locate mockup on site in the location indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect one week in advance of the date and time when fabrication of mockup will begin.
 - 3. Notify Architect one week in advance of the date and time when mockup will be installed.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's acceptance of mockup before start of final unit of Work.
 - 6. Retain and maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Accepted mockup in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Section 01200.
 - 1. Meet at project site prior to delivery of woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor, Architect and other Owner Representatives (if any); Installers of woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
- B. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

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MARYLAND FOOD BANK ADDITION AND RENOVATION

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
 - 2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

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 architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved schedule for cabinet hardware specified in Division 8 Section "Door Hardware" to fabricator of architectural woodwork; coordinate cabinet shop drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards that apply to product characteristics indicated:
 - 1. Hardboard: AHA A135.4.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, formaldehydefree.
 - a. Product: Medite II by SierraPine Ltd or equal.
 - 3. Softwood Plywood: PS 1, exterior grade.

- 4. Hardwood Plywood and Face Veneers: HPVA HP-1, formaldehyde-free core or made with phenol-formaldehyde resins.
- B. Adhesive for Bonding Plastic Laminate: Contact cement.
- C. Thermoset Decorative Overlay: Decorative surface of thermally fused polyester or melamine-impregnated web, bonded to specified substrate and complying with ALA 1992.
 - 1. Substrate: Medium-density fiberboard.
- D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
 - 1. Products: Subject to compliance with requirements, provide product one of the following:
 - a. Avonite, Inc.
 - b. Corian
 - c. Formica Corporation.
 - d. Wilsonart International; Div. of Premark International, Inc.
- E. Stainless Steel Trim: Type 304, No. 4 finish.
- F. FIRE-RETARDANT-TREATED MATERIALS
- G. Where indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.
- H. Fire-Retardant Chemicals: Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- I. Fire-Retardant-Treated Lumber: Comply with the following:
 - 1. Low-Hygroscopic Formulation: Interior Type A per AWPA C20.
 - 2. Mill lumber after treatment, within limits set for wood removal that does not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 - 3. Discard treated material that does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective material.
 - 4. Product: Dricon by Hickson Corporation or equal.
- J. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve products identical to those tested for flame spread of 25 or less and for smoke developed of 200 or less per ASTM E84 by UL, Warnock Hersey, or another testing and

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1. Product: Subject to compliance with requirements, provide Medite FR by SierraPine Ltd. or equal.

2.2 CABINET HARDWARE AND ACCESSORY MATERIALS

- A. Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware."
- B. Provide the following hardware and accessories for cabinets and casework:
 - 1. Adjustable Shelf Supports:
 - a. Pilaster Shelf Standards and Shelf Rests: Knape & Vogt No. 255/256 or equal.

Drawer Slides (clear zinc finish): Full extension and Self-closing with platform-mount

- b. Keyboard slides: Accuride Model 3832ESC or equal.
- c. Desk and credenza box drawers, medium duty (100 lb. capacity): Accuride Model 3832ESC or equal.
- d. Desk and credenza box drawers and file drawers, heavy duty (150 lb. capacity): Accuride Model C3600-201D or equal.
- e. Lateral file drawers (up to 42 inches wide) and heavy duty storage drawers, (200 lb. capacity): Accuride Model 3640 or equal.
- 2. Door Hinges (concealed type): Blum 170 Series Hinge, self-closing; Julius Blum, Inc., Stanley, NC. or equal.
- 3. Flipperdoor/Slides: Accuride Model 123.
- 4. Door and Drawer Pulls (Handles):
 - a. All Lower Cabinets and Drawers: Häfele Bar Handle Stainless Steel Finish Code 100ST50, Pull No. 101.20.744, with Threaded Screw M4 No. 022.35.887 or equal.
- 5. Countertop Support Brackets: Rakks Counter Bracket Model No. EH-1824 by Rangine Corporation, Millis, MA or equal.
- C. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.
 - 1. Satin Stainless Steel, Stainless-Steel Base: BHMA 630.
- D. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

2.3 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

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- C. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
 - 1. For metal framing supports, provide screws as recommended by metalframing manufacturer.
- D. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.
- E. 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 bolt devices for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide woodwork complying with the referenced quality standard and of the following grade:
 - 1. Grade: Premium.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of cabinets and edges of solid-wood (lumber) members and rails: 1/16 inch (1.5 mm).
- E. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at the fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on approved shop drawings before disassembling for shipment.
- F. Shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped

openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

- G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- H. Fabricators: Subject to compliance with requirements, manufacturers whose products may be incorporated into the work include, but are not limited to the following:
 - 1. Regent Cabinetry
 - 2. Crown America International, Inc
 - 3. Granite America LLC
 - 4. Multi-Residential Kitchens LLC

2.5 STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Quality Standard: Comply with AWI Section 300.1. Grade: Premium.
- B. AWI Type of Cabinet Construction: Modified full overlay.
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- D. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.
- F. Wood Species: Any closed-grain hardwood listed in referenced woodworking standard.

2.6 LAMINATE-CLAD CABINETS (PLASTIC-COVERED CASEWORK)

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate-clad cabinets.
 - 1. Grade: Premium.
- B. AWI Type of Cabinet Construction: Modified full overlay.
- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other than Tops: HGS (0.048 inch).
 - 2. Vertical Surfaces: HGS (0.048 inch).

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- 3. Edges: Flat-edge PVC, 0.020 inch thick or 0.030 inch HPDL if PVC match is unavailable, hot-melt applied.
- 4. Door and Drawer Edges: 3 mm (0.118 inches nominal thickness) rigid PVC hot-melt applied.
 - a. Provide contrasting color to HPDL face.
- D. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other than Drawer Bodies: High-pressure decorative laminate, VGS.
 - 2. Drawer Sides and Backs: Solid hardwood lumber, shop finished.
 - 3. Drawer Bottoms: Hardwood plywood, shop finished.
 - 4. Loose (adjustable) Shelves: High pressure decorative plastic laminate, HGS, on both faces and front and rear edges.
- E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Laminart Metropolitan Oak 3133, Supermatte Finish
 - 2. Architect to provide sample; to be matched.
- F. Provide dust panels of 1/4 inch (6.4 mm) plywood or tempered hardboard above compartments and drawers except where located directly under tops.
- G. Substrate: Medium density fiberboard, conforming to ANSI A208.2.
 - 1. Provide 5 mm "Systems" screws for attachment of hardware to case body and nylon inserts for attachment of hardware to doors.

2.7 SOLID SURFACING MATERIAL COUNTERTOPS AND LAVATORY

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.1. Grade: Premium.
- B. Fabrication: Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid surfacing material manufacturer's recommendations for adhesives, sealers, fabrication, and finishing.
 - 1. Drill holes in countertops for plumbing fittings and soap dispensers in the shop.
- C. Countertops: 3/4 inch thick, solid surface material with front edge built up with same material and integral backsplash and sink as indicated. Ease corner.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid surface material complying with the following requirements:
 - 1. Kitchenette / Copy Area Corian Quartz Snow White
 - 2. Bathroom Countertop Corian Quartz Snow White

2.8 SHOP FINISHING OF ARCHITECTURAL WOODWORK

- A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.1. Grade: Provide finishes of same grades as items to be finished.
- B. General: The entire finish of interior architectural woodwork is specified in this Section, regardless of whether shop applied or applied after installation.
 - 1. Shop Finishing: To the greatest extent possible, finish architectural woodwork at the fabrication shop. Defer only final touch up, cleaning, and polishing until after installation.
- C. General: The priming and shop finishing (if any) of interior architectural woodwork required to be performed at the fabrication shop are specified in this Section. Refer to Division 9 Section "Painting" for final finishing of installed architectural woodwork and for material and application requirements of prime coats for woodwork not specified to receive final finish in this Section.
- D. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer compatible with finish coats to concealed surfaces of woodwork, including backs of trim, cabinets, paneling, and ornamental work and the underside of countertops. Apply 2 coats to back of paneling. Concealed surfaces of plastic laminate-clad woodwork do not require backpriming when surfaced with plastic laminate or thermoset decorative overlay.
- E. Washcoat for Stained Finish: Apply a vinyl washcoat to woodwork made from closed-grain wood before staining and finishing.
- F. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
- G. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D523.
 - 1. Grade: Premium.
 - 2. AWI Finish System TR-6: Catalyzed polyurethane.
 - 3. Staining: Match Architect's sample.
 - 4. Sheen: Satin 30-50 gloss units.
- H. Opaque Finish: Comply with requirements indicated below for grade, finish system, color, effect, and sheen, with sheen measured on 60-degree gloss meter per ASTM D523.
 - 1. Grade: Premium.
 - 2. AWI Finish System OP-6: Catalyzed polyurethane.
 - 3. Color: Match Architect's sample.
 - 4. Sheen: Satin 30-50 gloss units.

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PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type of woodwork involved.
- B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) for plumb and level (including tops).
- C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Do not use pieces less than 36 inches (900 mm) long, except where necessary. Stagger joints in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
 - 1. Install standing and running trim with no more than 1/8 inch in 96 inch (3 mm in 2400 mm) variation from a straight line.
- G. Cabinets: Install without distortion so that 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 the installation of hardware and accessory items as indicated.

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- 1. Install cabinets with no more than 1/8 inch in 96 inch (3 mm in 2400 mm) sag, bow, or other variation from a straight line.
- 2. Maintain veneer sequence matching of cabinets with transparent finish.
- 3. Provide filler panels to ceiling above all wall cabinets.
- H. Tops: Anchor securely to base units and other support systems as indicated. Caulk space between backsplash and wall with mildew-resistant silicone sealant. Field assembled counters shall have a bead of mildew-resistant silcone sealant installed between the backsplash and the countertop.
 - 1. Install countertops with no more than 1/8 inch in 96 inch (3 mm in 2400 mm) sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c.
- I. Complete the finishing work specified in this Section to the 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 the shop.
- J. 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 defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

3.4 **PROTECTION**

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which will ensure that woodwork will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 07111

COMPOSITE SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Rubberized-asphalt sheet waterproofing, fabric reinforced.

1.2 RELATED SECTIONS

- A. Division 2 Section Foundation Drainage Systems: For drainage panels and geotextile filter fabrics.
- B. Division 7 Section Joint Sealants: For joint-sealant materials and installation.

1.3 PERFORMANCE REQUIREMENTS

A. Provide waterproofing that prevents the passage of water.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300, product data including manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include Setting Drawings showing layout, sizes, sections, profiles, and joint details of concrete pavers with paver support assemblies.
- C. Samples: For the following products:
 1. 12 by 12 inch (300 by 300 mm) square of waterproofing and flashing sheet.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.

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F. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.
- B. Source Limitations: Obtain waterproofing materials and protection course through one source from a single manufacturer.
- C. Mockups: Apply waterproofing to 100 sq. ft. (9.3 sq. m) of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.
 - 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
 - 2. Warranty Period: Five years after date of Substantial Completion.
- B. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling protection board.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following or equal:
 - 1. Rubberized-Asphalt Sheet Waterproofing:
 - a. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW 701.
 - b. W. R. Grace & Co.; Bituthene.
 - c. W. R. Meadows, Inc.; Mel-Rol.
 - d. T. C. Miradri; Miradri.
 - e. Monsey Bakor; Elasto-Seal 2000.

2.2 RUBBERIZED-ASPHALT SHEET WATERPROOFING

A. Rubberized-Asphalt Sheet: 60 mil (1.5 mm) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4 mil (0.10 mm) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

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- 1. Physical Properties: As follows, measured per standard test methods referenced:
 - a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 degrees F (minus 29 degrees C); ASTM D1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8 inch (3 mm) movement; ASTM C836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E154.
 - f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 degrees F (21 degrees C); ASTM D570.
 - h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E96, Water Method.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.
- E. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- F. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
 - 1. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches (114 mm) wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.

- H. Protection Course: Semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: 1/8 inch (3 mm), nominal.
 - 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.
- I. Drainage Board: Prefabricated, composite drainage panels, manufactured with a permeable geotextile facing laminated to a molded-plastic-sheet drainage core.
 - 1. Drainage Core: Three-dimensional, nonbiodegradable, molded-plasticsheet material designed to effectively drain water under backfill pressure; complying with the following properties determined according to tests indicated:
 - a. Compressive Strength: 15,000 psf (103.4 MPa), minimum; ASTM D1621.
 - b. Flow Rate: 17 gpm/ft^2 , per ASTM D4716.
 - 2. Product: MiraDrain 6000 Prefabricated Drainage Composite by MiraDri or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 - 3. Verify that compacted subgrade is dry, smooth, and sound; ready to receive HDPE sheet.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

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- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4 inch (19 mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
 - b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D6135.

3.3 RUBBERIZED-ASPHALT SHEET APPLICATION

- A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2 inch- (64 mm) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 degrees F (minus 4 and plus 5 degrees C), install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 degrees F (16 degrees C).
- D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.

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- F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches (150 mm) beyond repaired areas in all directions.
- G. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 PROTECTION COURSE INSTALLATION

A. Install protection course with butted joints over waterproofing membrane before starting subsequent construction operations.

3.5 FIELD QUALITY CONTROL

- A. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
 - 2. Flood each area for 24 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- B. Owner will engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3.6 PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.

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

END OF SECTION

SECTION 07135

UNDER-SLAB GAS AND WATER VAPOR BARRIER

PART 1 - GENERAL

1.1. SUMMARY

- A. Insulated under-slab gas and water vapor barrier consisting of membrane that forms an integral bond to poured concrete for the following application:
- 1 Rigid insulation installed on prepared sub-base.
- 2 Membrane applied on rigid insulation prior to placement of concrete slabs.

1.2. RELATED SECTIONS

- A. Division 2 Section Earthwork.
- B. Division 3 Section Cast-In-Place Concrete.

1.3. SUBMITTALS

A. Submit, in accordance with Section 01300, manufacturer's product data, installation instructions and membrane and insulation samples for approval.

1.4. REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
 - 1 Standard Test Methods for Rubber Properties in Tension
 - 2 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - 3 Standard Practice for Rubber Measurements of Dimensions
 - 4 Standard Test Methods for Water Vapor Transmission of Materials
 - 5 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - 6 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 7 Plastic Vapor Retarders Used in Contact with Soil or Granular fill under Concrete Slabs.
- C. American Concrete Institute (ACI)

1 ACI 302.1R-96 Addendum Vapor Retarder Location: For slabs with vapor-sensitive floor coverings, locate retarder in direct contact with the slab (not beneath a layer of granular fill or beneath insulation layer).

1.5. QUALITY ASSURANCE

- Manufacturer: Sheet membrane system used as gas and water vapor barrier shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in sheet membrane water vapor barrier of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
- E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

1.6. DELIVERY, STORAGE AND HANDLING

A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

1.7. PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.8. WARRANTY

A. Sheet Membrane Waterproofing used as under-slab gas and water vapor barrier: Provide written five (5) year material warranty issued by the membrane manufacturer upon completion of work.

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PART 2 - PRODUCTS

2.1 MATERIALS

A. Integrally Bonded Vapor Protection: Florprufe[™] 120 Membrane by Grace Construction Products, a 0.5mm (0.021 in) nominal thickness composite sheet membrane comprising 0.4 mm (0.016 in.) of polyolefin film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent vapor migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

Property	Typical Value	Test Method
Color	White	
Thickness	0.5 mm (0.021 in.) nominal	ASTM D3767 Method A
Elongation	300%	ASTM D412
Tensile Strength	68 lb./in	ASTM E154*
Peel Adhesion to Concrete	>4 lb./in	ASTM D903
Puncture Resistance	3300 grams	ASTM D1709*
Water Vapor Permeance	0.03 perms	ASTM E96 Method B*

* ASTM E1745 Requirements.

- B. Tape: Tape for covering cut edges, roll ends, and penetrations, Grace Preprufe Tape by Grace Construction Products, or as recommended by the manufacturer of the membrane used.
- C. Penetration Sealant: Sealant for sealing around penetrations, Bituthene Liquid Membrane by Grace Construction Products, or as recommended by the manufacturer of the membrane used.
- D. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C578 for type and with other requirements indicated below:
 - 1 Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density (60 psi compressive strength.)
 - 2 Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 75 and 450, respectively.

- 3 Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.
- 4 Thickness: 1 inch.

PART3 - EXECUTION

3.1 EXECUTION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION FOR HORIZONTAL APPLICATIONS

- A. Earth and stone substrates shall be well compacted to produce an even, solid substrate. Remove loose aggregate or sharp protrusions. Concrete substrates shall be smooth or broom finished and monolithic. Remove standing water prior to application.
- B. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98, including but not limited to, the following:
 - 1 Apply membrane with the HDPE film facing the prepared substrate. Remove the release liner during application.
 - 2 Apply succeeding sheets by overlapping the previous sheet 50-mm (2 in.) along the marked lap line. End Laps should be staggered to avoid a build up of layers.
 - a. Taped Lap Method For additional security use Grace Preprufe® Tape to secure and seal the overlaps. Overband the lap with the 100mm (4in) wide Preprufe® Tape using the lap line for alignment. Remove plastic release liner to ensure bond to concrete.
 - 3 Bring membrane up at slab perimeters against vertical surfaces to the full thickness of the slab. Prepare interior and exterior corners of vertical membrane at slab perimeters, and detail all penetrations using Grace liquid detailing compound, in accordance with the manufacturer's recommended details.
 - 4 Mix and apply Grace liquid detailing compound to seal around penetrations such as drainage pipes, etc.

3.3 **PROTECTION**

A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

MARYLAD FOOD BANK ADDITION AND RENOVATION

END OF SECTION

SECTION 07162

CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes crystalline waterproofing.
 - 1. Crystalline waterproofing system, applied to the negative side of walls and floor construction of elevator pits, and where indicated.
 - 2. Crack repair and sealing of active leaks.

1.2 RELATED SECTIONS

- A. Division 3 Section Cast-in-Place Concrete: Formwork, waterstops, and finishing concrete walls and slabs to receive waterproofing.
- B. Division 3 Section Concrete Toppings: Concrete floor topping to be applied over waterproofing.
- C. Division 7 Section Joint Sealants: Elastomeric and preformed sealants in concrete and masonry walls and floors.
- D. Division 9 Section Painting: Paint finishes to be applied over waterproofing.

1.3 SUBMITTALS

A. Submit in accordance with Section 01300, product data for each type of product specified.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: An experienced applicator who has completed crystalline waterproofing similar in material, design, and extent to that indicated for this Project and whose work has resulted in application with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

A. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been

completed. Proceed only after concrete and masonry substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

B. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 degrees F (4.4 degrees C) or above during work and cure period and space is well ventilated and kept free of water.

1.6 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: Written warranty, signed by Applicator and countersigned by Contractor agreeing to repair or replace waterproofing that does not comply with requirements or that fails to perform as required, and to maintain watertight conditions within specified warranty period. Warranty includes responsibility for removing and replacing other work that conceals crystalline waterproofing. During warranty period, repairs and replacements required because of unusual weather phenomena and other events beyond Contractor's or Applicator's control shall be completed by Contractor or Applicator and paid for by Owner at prevailing rates.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide one of the following:
 - 1. Hydro Cap; Anti Hydro International, Inc.
 - 2. Hey'Di K-11; Tamms Industries Co.
 - 3. Vandex Super; Vandex.
 - 4. Xypex; Xypex Chemical Corporation.

2.2 MATERIALS

- A. Portland Cement: ASTM C150, Type I.
- B. Slurry-Coat Aggregate: ASTM C144, sand.
- C. Trowel-Coat Aggregate: ASTM C33, fine aggregate.
- D. Water: Potable.

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- E. Crystalline Waterproofing: A blend of portland cement, specially treated sand, and active chemicals formulated to penetrate by capillary action into concrete or masonry and to chemically react with free lime in the presence of water to develop crystalline growth within concrete or masonry capillaries. This produces impervious, dense, waterproof concrete or masonry with properties meeting or exceeding the following criteria:
 - 1. Permeability: 30 feet (9 m) when tested according to CE CRDC 48.
 - 2. Compressive Strength: 9000 psi (62.1 MPa) at 28 days when tested according to ASTM C 109/C 109M.
 - 3. Flexural Strength: 6000 psi (41.4 MPa) at 28 days when tested according to ASTM C 348.
 - 4. Bond Strength: 690 psi (4.8 MPa) at 14 days when tested according to ASTM C321.
- F. Patching Compound: Ready-mixed cementitious waterproofing and repair mortar for filling and patching tie holes, honeycombs, reveals, and other imperfections with properties meeting or exceeding the following:
 - 1. Compressive Strength: 7600 psi (52.44 MPa) at 28 days when tested according to ASTM C 109/C 109M.
 - 2. Flexural Strength: 710 psi (4895 kPa) at 28 days when tested according to ASTM C348.
 - 3. Shrinkage: Minus 0.093 percent at 28 days and plus 0.073 percent at 90 days when tested according to ASTM C596.
- G. Plugging Compound: Cementitious, ready-mixed, efflorescence-free, surface waterproofing compound with hydrophobic properties that requires only the addition of water, and is resistant to water and moisture but is vapor permeable for all standard applications (vertical, overhead and horizontal surfaces not exposed to vehicular traffic); with properties meeting or exceeding the following criteria:
 - 1. Permeability: 30 feet (9 m) when tested according to CE CRDC 48.
 - 2. Compressive Strength: 6000 psi (41.4 MPa) at 28 days when tested according to ASTM C109/C 109M.
 - 3. Flexural Strength: 1000 psi (6.9 MPa) at 28 days when tested according to ASTM C348.
 - 4. Bond Strength: 300 psi (2.1 MPa) at 14 days when tested according to ASTM C321.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and other surfaces where waterproofing is to be applied with Applicator present, for compliance with requirements for surface preparation, cleaning, and other conditions affecting waterproofing performance.

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- 1. Proceed with application only after unsatisfactory conditions have been corrected.
- 2. Begin waterproofing application only after unsatisfactory conditions have been corrected.
- 3. Application of waterproofing indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect other work from dripping or splatter from crystalline waterproofing during application. Provide temporary enclosure to confine operation, to prevent polluting the air, and to ensure adequate ambient temperatures and ventilation conditions for application.
- B. Stop active water leaks with plugging and patching compounds according to waterproofing manufacturer's written instructions.
- C. Schedule cleaning and surface preparation so dust and other contaminants from the cleaning and preparation process will not fall on wet, newly coated surfaces.
- D. Surface Preparation of Concrete: Comply with waterproofing manufacturer's written instructions and requirements indicated below to ensure that waterproofing bonds to concrete surfaces. Clean concrete surfaces according to ASTM D4258 by using one or a combination of procedures as needed to effectively remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, curing compounds, and form-release agents.
 - 1. Prepare scratch- and float-finished concrete by etching with 10 percent muriatic (hydrochloric) acid solution according to ASTM D4260.
 - 2. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D4259.
 - 3. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.
- E. Mask-off surfaces adjoining areas to receive waterproofing treatment where surface damage or discoloration might result from application of waterproofing. Do not allow crystalline waterproofing or crystalline compound to migrate into reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves, unless indicated to be filled with calking.

3.3 APPLICATION

- A. Comply with waterproofing manufacturer's written instructions, unless more stringent requirements are indicated.
- B. Mix waterproofing components according to waterproofing manufacturer's written instructions.

- C. Protect all adjacent surfaces. Dampen wall surface with water before applying waterproofing.
- D. Apply waterproofing coating evenly and fill voids and pores of substrate with waterproofing slurry. Keep tools clean and free from build-up.
- E. Apply the number of coats at the rates recommended by the manufacturer for each coat. After allowing previous coat to cure, dampen the wall before applying additional coats.
- F. Mist-cure waterproofing for two to three days immediately after application as recommended by the manufacturer.
- G. Waterproofing Treatment Extensions: Apply treatment to columns that are integral with walls to be treated, and extend treatment onto interior, nontreated walls that intersect exterior, treated walls, for a distance of 24 inches (600 mm) for cast-in-place concrete and 48 inches (1200 mm) for masonry. Where floors (but not walls) are treated, extend treatment 12 inches (300 mm) high onto exterior walls and onto both exterior and interior columns. Unless otherwise indicated, extend treatment to every surface of substrate in area indicated for treatment, including stair treads and risers, pipe trenches, pipe chases, pits, sumps, and similar offsets and features.

3.4 **PROTECTION**

A. Protect applied crystalline waterproofing from rapid drying, severe weather exposure, and water accumulation. Maintain completed Work in moist condition for not less than seven days by covering with impervious sheeting or by other curing procedures recommended by waterproofing manufacturer.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Foundation wall insulation (supporting backfill).
 - 2. Concealed building insulation.
 - 3. Exposed building insulation.

1.2 RELATED SECTIONS

- A. Division 4 Section Unit Masonry Assemblies: Masonry cavity wall insulation.
- B. Division 7 Section TPO Single-Ply Membrane Roofing: Roof insulation.
- C. Division 7 Section Firestopping: Safing insulation.
- D. Division 7 Section Joint Sealants: SFS foam sealant.
- E. Division 9 Section Gypsum Board Assemblies: Acoustical insulation.
- F. Division 15 Section Plumbing: Pipe insulation.
- G. Division 15 Section Heating, Ventilating, and Air Conditioning: Ductwork insulation.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.
- 1.5 QUALITY ASSURANCE

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- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section 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 E84.
 - 2. Fire-Resistance Ratings: ASTM E119.
 - 3. Combustion Characteristics: ASTM E136.

1.6 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.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide insulation products by one of the following:
 - 1. Extruded-Polystyrene Board Insulation:
 - a. DiversiFoam Products.
 - b. Dow Chemical Co.
 - c. Owens-Corning Co.
 - d. Tenneco Building Products.
 - 2. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville.
 - c. Knauf Fiber Glass.

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- d. Owens-Corning Fiberglas Corporation.
- 3. SFI (Sprayed Foam Insulation):
 - a. Insta-Seal (a one-component product) by Insta-Foam Products, Inc.
 - b. Froth-Pak (a two-component product) by Insta-Foam Products, Inc.
 - c. Corbond (a two-component product) by Corbond Corporation, Bozeman, Montana.

2.2 INSULATING MATERIALS

- A. 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. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C578 for type and with other requirements indicated below:
 - 1. Type IV, 1.60-lb/cu. ft. (26-kg/cu. m) minimum density, unless otherwise indicated (25 psi compressive strength.)
 - 2. Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density (60 psi compressive strength.)
 - 3. Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 75 and 450, respectively.
 - 4. Recycled Content: Not less than 50 percent blend of postconsumer and recovered polystyrene resins.
- C. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665, Type I (blankets without membrane facing).
 - 1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
 - 2. Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 25 and 50, respectively.
- D. Foil-Faced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665, Type III, Class A (blankets with reflective vapor-retarder membrane facing and flame spread of 25 or less); with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.
 - 1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
- E. Unfaced, Flexible Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders to comply with ASTM C612,

Type IA; or with ASTM C553, Types I, II, and III; and with other requirements indicated below:

- 1. Nominal Density: Not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.65 lb/cu. ft. (26 kg/cu. m).
- 2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).
- 3. Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 25 and 50, respectively.
- F. Foil-Faced, Flexible Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders and faced on one side with foil-scrim-kraft vapor retarder to comply with ASTM C612, Type IA; or with ASTM C553, Types I, II, and III; and with other requirements indicated below:
 - 1. Nominal Density: 1.5 lb/cu. ft. (24 kg/cu. m).
 - 2. Thermal Resistivity: 4.13 deg F x h x sq. ft./Btu x in. at 75 deg F (28.6 K x m/W at 24 deg C).
 - 3. Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 25 and 50, respectively.
- G. Foil-Faced, Glass-Fiber Board Insulation: Thermal insulation combining glass fibers with thermosetting resin binders and faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder to comply with ASTM C612, Type IA or Type IA and IB; and with other requirements indicated below:
 - 1. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F (30.5 K x m/W at 24 deg C).
 - 2. Surface-Burning Characteristics: Maximum flame-spread and smokedeveloped indices of 25 and 50, respectively.
- H. SFI (Sprayed Foam Insulation) Insulation: Provide one- or two-component, foamed-in-place, polyurethane foam insulation with the following characteristics:
 - 1. Density: 1.5 to 2.0 PCF.
 - 2. Flame Spread (ASTM E84): 25 or less.
 - 3. Initial R-Value (at 1 inch): Not less than 7.

2.3 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- B. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch (6 mm) thick, formed under heat and pressure, standard sizes.
- 2.4 INSULATION FASTENERS

- A. Mechanically Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - 1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 - 2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.
- B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation, of thickness indicated, securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - 1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 - 2. Spindle: Copper-coated low carbon steel, fully annealed, 0.105 inches (2.67 mm) in diameter, length to suit depth of insulation indicated.
- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016 inch (0.41 mm) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
 - 1. Where spindles will be exposed to human contact after installation, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.
- D. Mechanical Fastener for Spindle-Type Anchor: Product with demonstrated capability to secure insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
- F. Products: Subject to compliance with requirements, provide one of the following:
 1. Mechanically and Adhesively Attached, Spindle-Type Anchors:
 - TACTOO Insul Hencome ACM Industries Inc
 - a. TACTOO Insul-Hangers; AGM Industries, Inc.
 - b. Spindle Type Gemco Hangers; Gemco.
 - 2. Insulation-Retaining Washers:
 - a. RC150; AGM Industries, Inc.
 - b. SC150; AGM Industries, Inc.
 - c. Dome-Cap; Gemco.
 - d. R-150; Gemco.
 - e. S-150; Gemco.
 - 3. Anchor Adhesives:
 - a. TACTOO Adhesive; AGM Industries, Inc.
 - b. Tuff Bond Hanger Adhesive; Gemco.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or that interfere 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, unsoiled, and has not been 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. Apply single layer of insulation to produce thickness indicated.
- 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 PERIMETER INSULATION

- A. On vertical surfaces, set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - 1. Install Type IV extruded polystyrene board insulation for perimeter insulation.
- B. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to written instructions of insulation manufacturer.

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3.5 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. Set reflective, foil-faced units with not less than 0.75 inch (19 mm) air space in front of foil as indicated.
- E. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill cavities formed by framing members. Where 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.
- F. Install board insulation on concrete substrates by adhesively attached, spindletype insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- G. Install board insulation in curtain wall construction as indicated on Drawings and according to curtain wall manufacturer's written instructions.

- 1. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width between insulation and glass of dimension indicated.
- 2. Brace insulation where it contacts safing insulation to prevent insulation from bowing under pressure from safing insulation.
- H. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
- I. Installation of SFI: Using dispenser of appropriate size and type for the project application, install SFI in voids around perimeter of door frames, louver frames, window frames and curtain wall frames in exterior walls; between boards of exterior wall insulation; voids around penetrations in roof deck construction; and where indicated, to prevent the infiltration of outside air. Installation shall be in accordance with the recommendations of the foamed-in-place insulation manufacturer.
 - 1. Depending on sizes of voids to be filled, and at Contractor's option, provide both one-component and two-component products specified.
- J. Install reflective insulation beneath snow melt system as detailed, and in strict accordance with the manufacturer's instructions.

3.6 PROTECTION

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

END OF SECTION

SECTION 07250

FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Concealed sprayed-on fireproofing.
 - 2. Sealer.

1.2 RELATED SECTIONS

- A. Division 3 Section Cast-In-Place Concrete: Concrete protecting structural steel.
- B. Division 4 Section Unit Masonry Assemblies: Masonry protecting structural steel.
- C. Division 5 Section Structural Steel: Surface conditions required for structural steel receiving sprayed fire-resistive materials.
- D. Division 5 Section Steel Decking.
- E. Division 7 Section Firestopping: Through-penetration firestop systems
- F. Division 9 Section Gypsum Board Assemblies: Gypsum-board-based fire protection.

1.3 **DEFINITIONS**

- A. Concealed sprayed-on fireproofing refers to applications where sprayed-on materials are applied to surfaces which will be concealed from view behind other construction when the work is completed.
- B. Exposed sprayed-on fireproofing refers to applications where sprayed-on materials are applied to surfaces which are exposed to view when the work is completed.

1.4 SUBMITTALS

A. Submit in accordance with Section 01300, product data for each fire-resistive product specified.

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- B. Shop Drawings: Submit structural framing plans indicating the following:
 - 1. Locations and types of surface preparations required before applying sprayed fire-resistive material.
 - 2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
 - a. Applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
 - c. Designation of restrained and unrestrained conditions based on definitions in ASTM E119, Appendix X3 as determined by a qualified professional engineer.
 - 3. Treatment of sprayed fire-resistive material after application.
- C. Samples for Initial Selection: Submit manufacturer's color charts showing the full range of colors and glosses available.
- D. Samples for Verification: Submit samples of each type of exposed finish required, prepared on 2 samples, each 4 inches (102 mm) square, of each color, gloss, texture and material formulation to be applied. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- E. Product Certificates: Submit product certificates signed by manufacturer of sprayed fire-resistive material certifying that the products furnished comply with requirements.
- F. Installer Certificates: Submit Installer certificates signed by manufacturer certifying that installers comply with specified requirements.
- G. Qualification Data: Submit 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.
- H. Compatibility and Adhesion Test Reports: For primers and other coatings applied to structural steel. Provide reports from a qualified independent testing and inspecting agency engaged by Contractor. Confirm that primers and coatings proposed for application in shop or field are compatible with fire-resistive material. Instruct laboratory to determine compatibility according to requirements specified in "Quality Assurance" Article.
- I. Product Test Reports: Indicate that physical properties of proposed sprayed fireresistive materials comply with specified requirements based on comprehensive testing of current product formulations by a qualified testing and inspecting agency according to requirements specified in "Quality Assurance" Article.

J. Research/Evaluation Reports: Evidence of sprayed fire-resistive material's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements. 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. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the 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 sprayed fire-resistive materials that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing and inspecting agency with the experience and capability to conduct the testing indicated without delaying the Work, as documented according to ASTM E 699.
- D. Testing of Fire-Resistive Materials: By a qualified testing and inspecting agency engaged by Contractor or manufacturer according to the following requirements:
 - 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.
 - 3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
- E. Testing for Compatibility and Adhesion: Engage a qualified testing and inspecting agency to prepare compatibility and adhesion test reports required in "Submittals" Article based on testing that complies with the following requirements:
 - 1. Testing for bond per ASTM E736 and requirements specified in UL's "Fire Resistance Directory" about coating materials.

- 2. Verify that manufacturer of fire-resistive material has not found primers or coatings to be incompatible with fire-resistive material based on its own laboratory testing or field experience.
- F. Source Limitations: Obtain each type of sprayed fire-resistive material from one source and by a single manufacturer.
- G. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials and assemblies identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing sprayed fire-resistive material with appropriate markings of applicable testing and inspecting agency.
 - 1. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL's "Fire Resistance Directory," or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection, tested per ASTM E119.
 - 2. Surface-Burning Characteristics: As indicated for each sprayed fire-resistive product required, tested per ASTM E84.
- H. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
- I. Mockups: Before installing sprayed fire-resistive material, apply products specified to demonstrate aesthetic effects, where applicable, and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work:
 - 1. Locate mockups in the location indicated or, if not indicated, as directed by Architect.
 - 2. Extent of Mockups: Approximately 100 sq. ft. (9.3 sq. m) of surface for each product indicated.
 - 3. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship, including patching.
 - 5. Obtain Architect's approval of mockups before starting application of product.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
- J. Conditions of Restraint: Floor and roof assemblies and individual beams shall be assumed to be "unrestrained" when determining minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies

for fire-resistive designs listed in UL "Fire Resistance Directory" unless the shop drawing submittal includes calculations by a qualified professional engineer indicating restrained and unrestrained conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.
- B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
- C. Store materials inside, under cover, aboveground, so they are kept dry until ready for use. Remove from Project site and discard materials that have deteriorated.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperatures are 40 degrees F (4 degrees C) or lower, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.8 SEQUENCING

- A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.
 - 2. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 3. 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.
 - 4. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

- 5. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
- 6. 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.

1.9 WARRANTY

- A. General Warranty: The 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: Submit a written warranty, executed by Contractor and cosigned by Installer, agreeing to repair or replace sprayed fire-resistive materials that fail within the specified warranty period.
 - 1. Failures include, but are not limited to, cracking, flaking, eroding in excess of specified requirements; peeling; and delaminating of sprayed fire-resistive materials from substrates due to defective materials and workmanship within the specified warranty period.
 - 2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A. For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated in this Article for material composition and physical properties representative of installed products.
- B. Material Composition:
 - 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.

- C. 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 listed as follows:
 - Dry Density: 15 lb/cu. ft. (240 kg/cu. m) for average and individual densities regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated, per ASTM E605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
 - 2. Thickness: Provide minimum average thickness required for fire-resistive design indicated according to the following criteria, but not less than 0.375 inch (9 mm), per ASTM E605.
 - a. Where the referenced fire-resistive design lists a thickness of 1 inch (25 mm) or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch (6 mm).
 - b. Where the referenced fire-resistive design lists a thickness of less than 1 inch (25 mm) but more than 0.375 inch (9 mm), the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch (9 mm) or 75 percent of the design thickness.
 - c. No reduction in average thickness is permitted for those fire-resistive designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft. (240 kg/cu. m).
 - 3. Bond Strength: 150 lbf/sq. ft. (7.2 kPa) per ASTM E736 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, perform series of bond tests specified in UL's "Fire Resistance Directory" for coating materials.
 - c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch (19 mm).
 - 4. Compressive Strength: 5.21 lbf/sq. in. (35.9 kPa) as determined in the laboratory per ASTM E761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch (19 mm) and minimum dry density shall be as specified, but not less than 15 lb/cu. ft. (240 kg/cu. m).
 - 5. Corrosion Resistance: No evidence of corrosion per ASTM E937.
 - 6. Deflection: No cracking, spalling, delamination, or the like per ASTM E759.
 - 7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E760.
 - 8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.27 g/sq. m) in 24 hours per ASTM E859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch (19 mm), maximum dry density is 15 lb/cu. ft. (240 kg/cu. m), test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.

- D. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Developed: 0.
 - 3. Fungal Resistance: No observed growth on specimens per ASTM G21.
 - a. Each bag shall be labeled "Infection Control Inhibitor Added."
- E. Products containing mineral fibers are not acceptable.
- F. Products: Subject to compliance with requirements, provide one of the following products:
 - 1. Monokote Type MK-6; Construction Products Division, W. R. Grace & Company.
 - 2. Pyrolite 15; Carboline Co., Fireproofing Products Div.
 - 3. Cafco 300; Isolatek International.
 - 4. Type 5GP; Southwest Vermiculite Co., Inc.

2.2 AUXILIARY FIREPROOFING MATERIALS

- A. Provide auxiliary fire-resistive materials that are compatible with sprayed fireresistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fireresistive designs indicated.
- B. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material.
- C. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistive designs indicated and fire-resistive product manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.
- D. Reinforcing Fabric: Glass-fiber fabric of type, weight, and form required to comply with fire-resistive designs indicated, approved by manufacturer of intumescent mastic fire-resistive material.
- E. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistive designs indicated, approved by manufacturer of intumescent mastic fire-resistive material. Include pins and attachment.
- F. Sealer: Type as approved by manufacturer of each sprayed fire-resistive material for applications indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material. A substrate is in satisfactory condition if it complies with the following:
 - 1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
 - 2. 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 material with substrate under conditions of normal use or fire exposure.
 - 3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
 - 5. For metal roof decking substrates, application of roofing has been completed and roof traffic is prohibited during application of fireproofing and until it has dried.
- B. 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.
- C. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
- B. For exposed applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished surface of sprayed fire-resistive material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.
- C. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION

- A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- B. Apply sprayed fire-resistive material that is identical to products tested as specified in Part 1 in "Product Test Reports" in "Submittals" Article, with respect to rate of application, accelerator use, topcoats, tamping, troweling, or other materials and procedures affecting test results.
- C. Install metal lath, as required, to comply with fire-resistance ratings and fireresistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.
- D. Coat substrates with adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by fire-resistive material manufacturer for material and application indicated.
- E. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by fire-resistive material manufacturer, install body of fire-resistive covering in a single course.
- F. 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 manufacturer.
- G. Where sealers are used, apply products that are tinted to differentiate them from the sprayed fire-resistive material over which they are applied.

3.4 INSTALLING CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A. Apply concealed fire-resistive material in thicknesses and densities indicated, but not less than those required to achieve fire-resistance ratings designated for each condition and comply with requirements for thickness specified in Part 2 "Concealed Sprayed Fire-Resistive Materials" Article.
- B. Apply sealer to concealed fireproofing in elevator hoistway and above ceilings.

3.5 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.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing and inspecting of completed applications of sprayed fire-resistive material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.
 - 1. Extent: For each 10,000 sq. ft. (930 sq. m) area, or partial area, on each floor, testing and inspecting agency will evaluate the following characteristics. Tested values must equal or exceed values indicated and values required for approved fire-resistance design.
 - a. Thickness for Floors, Roofs, and Walls: From the average of 10 measurements from a 144 sq. in. (0.093 sq. m) sample area, with sample width of not less than 6 inches (152 mm) per ASTM E605.
 - b. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E605.
 - c. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
 - d. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: Cohesion and adhesion at frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E736.
 - 2. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- C. Remove and replace applications of fire-resistive material where test results indicate that they do not comply with specified requirements for cohesion and adhesion or for density, or both.
- D. Apply additional 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.

3.6 CLEANING, PROTECTING, AND REPAIR

- A. Cleaning: 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.
- B. Cure exposed cementitious sprayed fire-resistive material according to product manufacturer's written recommendations to prevent premature drying.
- C. Protect fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.
- D. Coordinate application of fire-resistive material with other construction to minimize the need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.
- E. Repair or replace work that has not been successfully protected.

3.7 FIRE RESISTANCE RATINGS SCHEDULE

A. Construction Classification Type 1A (per IBC 2015). Refer to Code Drawing G003 for rating.

END OF SECTION

SECTION 07270

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. This section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - a. Floors.
 - b. Roofs.
 - c. Walls and partitions.
 - d. Smoke barriers.
 - e. Construction enclosing compartmentalized areas.
 - 2. Safing insulation.

1.2 RELATED SECTIONS

- A. Division 4 Section Unit Masonry Assemblies: Joint fillers for non-fire-resistiverated masonry construction.
- B. Division 7 Section Building Insulation: Thermal insulation and accessories.
- C. Division 7 Section Joint Sealants: Non-fire-resistive-rated joint sealants.
- D. Division 15 Sections: Specifying ducts and piping penetrations.
- E. Division 16 Sections: Specifying cable and conduit penetrations.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. C612: Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 2. E84: Test Method for Surface Burning Characteristics of Building Materials.
 - 3. E136: Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degs. F.
 - 4. E814: Fire Tests of Through-Penetration Fire Stops.
- B. Factory Mutual (FM) Research:

- 1. FM Approval Standard of Firestop Contractors Class 4991.
- C. Firestop Contractors International Association (F.I.C.A.) 1. M.O.P. Manual of Practice
- D. International Firestop Council (IFC)
 - 1. Reference 1: Recommended IFC Guidelines for Evaluating Firestop Systems Engineering Judgements (April 2001)
 - 2. Reference 2: Inspectors Field Pocket Guide
- E. National Fire Protection Association (NFPA)
- F. Underwriters Laboratories (UL), Inc.

1.4 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 fireprotection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fireprotection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
 - 4. Fire-resistance-rated roof assemblies.
 - 5. Fire-resistance rated smoke barriers with fire protection-rated openings.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1. Penetrations located outside wall cavities.
 - 2. Penetrations located outside fire-resistive shaft enclosures.
 - 3. Penetrations located in construction containing fire-protection-rated openings.
 - 4. Penetrating items larger than 4 inch (100 mm) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.
- D. 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.

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- 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 (100 mm) 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.
- E. 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 E84.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, manufacturer's product data for each type of product specified.
- B. Submit shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
- C. Qualification Data: Submit 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.
- D. Product Certificates: Submit product certificates signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: Submit product test reports from a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- F. For those firestop applications that exist for which no tested system is available through a manufacturer, a manufacturer's engineering judgement derived from similar tested systems designs or other tests shall be submitted to local authorities having jurisdiction for their review and approval prior to installation. Manufacturer's engineering judgement must follow the requirements set forth by the International Firestop Council (09/07/94).

1.6 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. Contractor Qualifications: Acceptable installers shall either be:
 - 1. FM Research approved in accordance with FM Standard 4991 Approval of Firestop Contractors, or
 - 2. meet any 2 of the following requirements:
 - a. Licensed by State or local authority where applicable.
 - b. Approved by the firestop manufacturer with a minimum of 3 years experience on comparable projects.
 - c. Shown to have successfully completed not less than 5 comparable scale projects using this system.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide 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:
 - c. UL in "Fire Resistance Directory."
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- F. Field-Constructed Mockup: Prior to installing firestopping, erect mockups for each different through-penetration firestop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.

- 1. Locate mockups on site in locations indicated or, if not indicated, as directed by Architect.
- 2. Notify Architect 1 week in advance of the dates and times when mockups will be erected.
- 3. Obtain Architect's acceptance of mockups before start of final unit of Work.
- 4. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
 - a. Accepted mockups in an undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

1.7 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.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by throughpenetration 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.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that throughpenetration 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 throughpenetration 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. Provide firestopping products as manufactured by one of the following:
 - 1. Hilti, Inc.
 - 2. Grace Construction Products.
 - 3. RectorSeal Corporation (The).
 - 4. Specified Technologies, Inc.
 - 5. 3M Fire Protection Products; Minnesota Mining and Manufacturing.

2.2 FIRESTOPPING

- 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 referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-inplace concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not reemulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. 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.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.

3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 SAFING INSULATION AND ACCESSORIES

- A. Slag-Wool-Fiber Board Safing Insulation: Semirigid boards designed for use as fire stop at openings between edge of slab and exterior wall panels, produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4 lb/cu. ft. (64 kg/cu. m); passing ASTM E 136 for combustion characteristics; thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
- B. Caulking Compound (Fire Sealant): Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
- C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.5 MIXING

A. For those products requiring mixing before application, comply with throughpenetration 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 throughpenetration 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 INSTALLING SAFING INSULATION

A. Install safing insulation to fill gap between edge of concrete floor slab and back of exterior spandrel panels on safing clips spaced as needed to support insulation, but not further apart than 24 inches (610 mm) o.c. Cut safing insulation wider than gap to be filled to ensure compression fit and seal top of safing insulation with caulking approved by safing insulation manufacturer for this purpose. Leave no voids in completed installation.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will 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 throughpenetration 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.

3.6 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, selfadhesive, 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.

3.7 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 throughpenetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION

SECTION 07275

WEATHER BARRIERS

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. Section Includes:
 - 1. Building paper.
 - 2. Flexible flashing.

B. Related Section:

- 1. Section 06160 "Sheathing" for sheathing joint and penetration treatment.
- 2. Section 07920 "Joint Sealants."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- 2.2 Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
 - 1. Water vapor transmission not less than 35 g/sq. m x 24 hr per ASTM D 779.
 - 2. Water resistance not less than 20 minutes per ASTM F 1249.

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2.3 MISCELLANEOUS MATERIALS

- A. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- B. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 WEATHER BARRIER INSTALLATION

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
- B. Install weather barrier prior to installation of windows and doors.
- C. Start weather barrier installation at a building corner, leaving 6 to 12 inches of weather barrier extended beyond corner to overlap.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3 to 6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- F. Window and Door Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier as follows:
 - 1. Exterior Corners: Minimum 12 inches.
 - 2. Seams: Minimum 6 inches.
- H. Weather Barrier Attachment: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 to 18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
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3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

- A. At Non-Flanged Windows:
 - 1. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
 - 2. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.
- B. At Flanged Windows:
 - 1. Cut weather barrier in a modified "I-cut" pattern.
 - a. Cut weather barrier horizontally along the bottom of the header.
 - b. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
 - c. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
 - d. Fold side and bottom weather barrier flaps into window opening and fasten.
 - 2. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING INSTALLATION

- A. At Non-Flanged Windows:
 - 1. Cut 9-inch wide flexible flashing a minimum of 12 inches longer than width of sill rough opening.
 - 2. Cover horizontal sill by aligning edge of flexible flashing with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
 - 3. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
 - 4. Apply 9-inch wide strips of straight flashing at jambs. Align flashing with interior edge of jamb framing. Start straight flashing at head of opening and lap sill flashing down to the sill.
 - 5. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
 - 6. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
 - 7. Coordinate flashing with window installation.

- 8. On exterior, install backer-rod in joint between window frames and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.
- 9. Position weather barrier head flap across head flashing. Adhere using 4-inch wide straight flashing over the 45-degree seams.
- 10. Tape top of window in accordance with manufacturer recommendations.
- 11. On interior, install backer rod in joint between frames of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.
- B. At Flanged Windows:
 - 1. Cut 9-inch wide flexible flashing a minimum of 12 inches longer than width of sill rough opening.
 - 2. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
 - 3. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
 - 4. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
 - 5. Install window according to manufacturer's instructions.
 - 6. Apply 4-inch wide strips of straight flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1 inch above top of rough opening and below bottom edge of sill flashing.
 - 7. Apply 4-inch wide strip of straight flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
 - 8. Position weather barrier head flap across head flashing. Adhere using 4-inch wide straight flashing over the 45-degree seams.
 - 9. Tape head flap in accordance with manufacturer recommendations.
 - 10. On interior, install backer rod in joint between frames of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.6 FIELD QUALITY CONTROL

A. Notify manufacturer's designated representative to obtain periodic observations of weather barrier assembly installation.

3.7 **PROTECTION**

A. Protect installed weather barrier from damage.

MARYLAND FOOD BANK ADDITION AND RENOVATION

END OF SECTION

WEATHER BARRIERS 07275-5

SECTION 07412

MANUFACTURED WALL PANELS

PART I - GENERAL

1.1 SECTION INCLUDES:

A. Interior and exterior applications of metal lap-seam wall panels with exposed fasteners, including trim and accessories.

1.2 RELATED SECTIONS:

- A. Section 05400 Cold-Formed Metal Framing
- B. Section 06100 Rough Carpentry
- C. Section 06 16 00 Sheathing
- D. Section 07210 Building Insulation
- E. Section 07250 Weather Barrier
- F. Section 07620 Sheet Metal Flashing and Trim
- G. Section 07920 Joint Sealants

1.3 **REFERENCES**

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

3. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

4. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

MANUFACTURED WALL PANELS 07412-1

5. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
6. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 ACTION SUBMITTALS

A. Product Technical Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.

B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of roof and wall panels, specified loads, flashings, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.

C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of panel, trim, clip and fastener required.

D. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

F. Qualifications Statements: For manufacturer and installer.

G. Design Submittal: Comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by a qualified professional engineer.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Warranty: Warranty documents required in this section.

1.7 MAINTENANCE MATERIAL

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals Section.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of advanced installer training.

2. Minimum of ten years of experience in manufacturing metal wall panel systems.

3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. At least five years of experience in the installation of metal wall panels.

2. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the wall panel system.

3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

C. Mock-Ups: Install at Project site a mock-up using required products and manufacturer's approved installation methods. Obtain Owner and Architect approval of finish, color, texture, pattern, trim, fasteners and quality of installation before proceeding with further work.

MANUFACTURED WALL PANELS 07412-3

1. Size: Scope to cover base, window head, jamb, and sill, and trim conditions.

2. Maintenance: Maintain mock-up during construction for quality comparison. Remove and lawfully dispose of mock-up construction when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner approval.

D. Fire Resistance Ratings: Determined by testing identical products and assemblies according to UL 263 and ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

1.9 DELIVERY, STORAGE AND HANDLING

A. General: Comply with manufacturer's current printed product storage recommendations.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

D. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.10 WARRANTY

A. Special Exposed Panel Finish Warranty: Manufacturer's standard form PVDF Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:

a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

MANUFACTURED WALL PANELS 07412-4

c. Cracking, checking, peeling or failure of paint to adhere to bare metal.

2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.

3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

PART 2 PRODUCTS

2.1 METAL WALL PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation.

B. Substitution Limitations: [No substitutions]

- C. Product Selection Interior Verti-Line Series [T10-A] Panel
 - 1. Panel Coverage: 28 inches
 - 2. Rib Height: 1-1/2 inches).

3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 coating designation, structural quality, Grade 50, [0.0236 inch (0.60 mm)] [0.0296 inch (0.75 mm)] [0.0356 inch (0.904 mm)] [0.0466 inch (1.184 mm)] minimum thickness.

- 4. Finish: PVDF (Kynar 500)
- 5. Configuration: 90-degree vertical box ribs.
- 6. Panel Fasteners: Exposed, direct fastened.
- 7. Perforation: Where noted: ¹/₄" Round on 3/8" Stg. Ctrs. 40% Open Area

8. Color: As selected by Architect from manufacturer's standard colors: Black (06) / Red (24)

- C. Product Selection Exterior Deep Rib Series [T2630] Panel
 - 1. Panel Coverage: 30 inches
 - 2. Rib Height: 4-1/2 inches

3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 coating designation, structural quality, Grade 50, [0.0236 inch (0.60 mm)] [0.0296 inch (0.75 mm)] [0.0356 inch (0.904 mm)] [0.0466 inch (1.184 mm)] minimum thickness.

4. Finish: PVDF (Kynar 500)

5. Configuration: 90-degree vertical box ribs.

6. Panel Fasteners: Exposed, direct fastened.

7. Perforation: Where noted: ¹/₄" Round on 3/8" Stg. Ctrs. 40% Open Area

8. Color: As selected by Architect from manufacturer's standard colors: Red (24)

2.2 FIELD-INSTALLED THERMAL INSULATION

A. General: Refer to and coordinate with requirements in Division 07 - Thermal Insulation.

2.3 MISCELLANEOUS METAL FRAMING

A. General: Refer to structural detailing for subsequent misc. metal framing as needed.

B. Products:

1. Material: [ASTM A 1011 Steel, Grade 55, Class 2, 55 ksi minimum yield strength, with red oxide finish] [ASTM A 653 Steel, Grade 55, Class 2, 55 ksi minimum yield strength, with G90 hot-dipped galvanized finish].

2.5 ACCESSORIES

A. General: Custom aluminum window/door frame trims, outside/inside, corners and additional trim details as noted by Architect. Shop drawings to be provided for custom trim accessories.

B. Products:

 Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation.
 Color: To match panel color.

2.6 SOURCE QUALITY CONTROL

A. Source: Obtain metal wall panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain metal wall panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.2 PREPARATION

A. Miscellaneous Framing: Install furring, angles, subpurlins, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's recommendations.

3.4 METAL WALL PANEL INSTALLATION

A. General: Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integration of systems.

B. Fasten metal wall panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.7 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from Project site.

3.8 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

MANUFACTURED WALL PANELS 07412-8

SECTION 07545

TPO THERMOPLASTIC SINGE-PLY MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. TPO Thermoplastic Single-Ply Roofing.
- B. Membrane Flashings.
- C. Metal Flashings.
- D. Roof Insulation.

1.2 RELATED SECTIONS

- A. Section 03300 Cast-in-Place Concrete.
- B. Section 05310 Steel Deck.
- C. Section 06100 Rough Carpentry.
- D. Section 07620 Sheet Metal Flashing and Trim.
- E. Section 07720 Roof Accessories.

1.3 REFERENCES

- A. American Society of Civil Engineers (ASCE) ASCE 7 Minimum Design Loads for Buildings and Other Structures, Current Revision.
- B. ANSI/SPRI WD-1 "Wind Design Standard for Roofing Assemblies".
- C. ASTM International (ASTM):
 - 1. ASTM C 578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - 2. ASTM C 1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 3. ASTM D 41 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
 - 4. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
 - 5. ASTM D 6878 Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
 - 6. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.
- D. Factory Mutual (FM Global):

- 1. Approval Guide.
 - a. Factory Mutual Standard 4470 Approval Standard for Class 1 Roof Covers.
 - b. Loss Prevention Data Sheets 1-28, 1-29.
- E. International Code Council (ICC):1. International Building Code (IBC).
- F. National Roofing Contractors Association (NRCA) Low Slope Roofing and Waterproofing Manual, Current Edition.
- G. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.
- H. Underwriters Laboratories (UL):
 - 1. TGFU R1306 "Roofing Systems and Materials Guide".
 - 2. UL-790 Standard Test Method for Fire Tests of Roof Coverings.
- I. ANSI/ASHRAE/IESNA Standard 9.1 (2007): Energy Standard for Buildings Except Low-Rise Residential Buildings.
- 1.4 DESIGN CRITERIA
 - A. Wind Uplift Performance:
 - 1. Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7.
 - 2. Roof system is designed to achieve the Corner, Perimeter and Field-of Roof wind uplift rating as indicated on Structural drawings.
 - B. Fire Resistance Performance:
 - 1. Roof system will achieve a UL Class A rating when tested in accordance with UL-790.
 - C. Thermal Performance: Roof system will achieve a minimum R value not less than 30.
 - D. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.
 - E. Building Codes:
 - 1. Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:

- 1. Preparation instructions and recommendations.
- 2. Storage and handling requirements and recommendations.
- 3. Installation methods.
- C. Detail Drawings:
 - 1. Submit for approval plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the project.
 - 2. Coordinate submitted drawings with locations found on the Contract Drawings.
- D. Selection Samples: For each finish product specified, two complete sets of chips representing manufacturer's full range of available colors, membranes, and thicknesses.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 inches (100 mm) square representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty (20) years experience.
- B. Installer Qualifications:
 - 1. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
 - 2. Installer must be capable of extending the Manufacturer's Labor and Materials warranty.
 - 3. Installer must be capable of extending the Manufacturer's No Dollar Limit warranty.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation, installation techniques and workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

- C. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.
- D. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

1.8 PROJECT CONDITIONS

- A. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- B. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- C. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
- D. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- E. New roofing shall be complete and weather tight at the end of the work day.
- F. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.9 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's Total System warranty, outlining its terms, conditions, and exclusions from coverage.
 - 1. Duration: 20 Years.
 - 2. Coverage to be extended to include accidental punctures in accordance with terms stated in the Warranty document.
 - 3. Coverage to be extended to include hail damage in accordance with terms stated in the Warranty document.
 - 4. Coverage to be extended to include roof edge metal water tightness in accordance with terms stated in the Warranty document.

B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec Incorporated; Sure-Weld Fully Adhered, or a comparable product by one of the following:
 - 1. Verisco Incorporated.
 - 2. Firestone Building Products.
 - 3. GAF Materials Corporation.
 - 4. Mule-Hide Products Co., Inc.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01631.

2.2 SCOPE / APPLICATION

- A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in the Design Criteria article of this section.
 1. Membrane Attachment: Fully Adhered.
- B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.
- C. Insulation: Provide a roof insulation system beneath the finish membrane.

2.3 INSULATION

- A. Expanded Polystyrene (EPS): Rigid, closed cell foam insulation meeting ASTM C 578. Carlisle Sure-Seal.
 - 1. Density: 1.5 lb min.

2.4 INSULATION ADHESIVE

A. FAST 100 LV or Flexible FAST 100 Adhesive: A spray or extruded applied, twocomponent polyurethane, low-rise expanding foam adhesive used for attaching approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or existing smooth or gravel surfaced BUR, modified bitumen or cap sheets.

MARYLAND FOOD BANK ADDITION AND RENOVATION

2.5 THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE

- A. Sure-Weld Membrane:
 - 1. Color: White.
 - 2. Membrane Thickness: 60 mil nominal.
 - a. Thickness over Scrim: 0.020 inches (0.508mm).
 - b. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
 - c. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
 - d. Elongation (ASTM D 751): 25 percent.
 - 3. Field Sheet Dimensions:
 - a. Width: 12 feet (3.65 m) maximum.
 - b. Length: 100 feet (30.5 m) maximum.

2.6 FLASHING ACCESSORIES

- A. Inside Corners: Pre-molded corner flashing for inside corners. 60 mil thickness. Color to match membrane. Special colors require custom fabrication process.
- B. Outside Corners: Injection molded corner used for flashing outside corners. 60 mil thickness. Color to match membrane. Special colors require custom fabrication process.
- C. TPO T-Joint Covers: Injection molded 60 mil thick TPO formed into a 4.5 inches (114mm) diameter circle used to seal step-offs at splice intersections. Color to match membrane. Special colors require custom fabrication process.
- D. TPO Curb Wrap Corners: Pre-fabricated corner flashings made from 60 mil thick reinforced Sure-Weld membrane. 6 inch (152 mm) wide base flange and a 12 inch (305 mm) overall height. Sizes available to fit curbs up to 6 foot by 6 foot (1828 x 1828 mm) in size. Color to match membrane. Gray, tan and special colors require custom fabrication process.
- E. TPO Universal Corners: a pre-molded flashing for use in a variety of corner details, including inside and outside corners. Available in white, gray and tan and are 60-mil thick.
- F. Molded Pipe Seals: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 0.75 inch to 8 inches (19 203.2 mm) diameter pipes. Color to match membrane. Special colors not available.
- G. TPO Split Pipe Seals: Pre-fabricated flashing consisting of 60 mil thick reinforced Detail Membrane for pipes 1 inch to 6 inch (25.4 - 152.4 mm) in diameter. A split (cut) and overlapped tab is incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration. Gray, tan and special colors require custom order fabrication. Custom sizes available on a special order basis.
- H. TPO Split Square Tubing Wraps: Pre-fabricated flashings made of 60 mil thick

reinforced Detail membrane for square tubing. A split (cut) and overlap tab are incorporated into these parts to allow the seals to be opened and wrapped around a square tubing penetration with an obstruction. Stock sizes include 3- inch, 4-inch, 5- inch and 6 inches (76, 102, 127, 152 mm) diameter square tubing. Gray, tan and special colors require custom order fabrication. Custom sizes available on a special order basis.

- I. TPO Molded Sealant Pockets:
 - 1. A two-piece, interlocking injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Color to match membrane. Special colors not available.
 - 2. Used with Thermoplastic One-Part Pourable Sealer as specified in this section for waterproofing pipe clusters or other odd shaped penetrations. The removable built-in extension legs allow the oval pocket to adjust from 7.5 inches to 11.5 inches (191mm 292 mm) in length while maintaining a 6-inch width (152 mm).
- J. Pre-Fabricated Sealant Pockets: A two-piece, pre-fabricated, custom sized, sealant pocket that utilizes reinforced TPO membrane and coated metal to form a rigid, oversized sealant pocket with a weldable horizontal deck flange. Color White. Gray, tan and special colors require custom order fabrication.
- K. Sealant Pocket Extension Legs: Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10 inches (254 mm). Fabricated from 45 mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Color - White. Gray, tan and special colors require custom order fabrication.
- L. Pressure-Sensitive Cover Strip: A nominal 6 inch (152 mm) wide by 40 mil thick non-reinforced TPO membrane laminated to nominal 35-mil thick cured synthetic rubber pressure-sensitive adhesive. Used in conjunction with TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Color to match membrane. Special colors not available.
- M. TPO Pressure-Sensitive RUSS:
 - 1. 10 inch (254mm) RUSS: A nominal 10 inch (254mm) wide, 45 mil thick reinforced TPO membrane with nominal 3 inch (76mm) wide 35mil thick cured synthetic rubber pressure-sensitive adhesive laminated along both ends. The TPO 10-inch RUSS is used in place of narrow sheets to secure membrane in the perimeter roof area. The use of this product allows field membrane to be utilized over the entire roof area.
- N. Sure-Weld Heat Weldable Walkway Rolls: Superior tear, puncture and weather resistance and designed to protect Sure-Weld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to Sure-Weld membrane using an automated heat welder or hand held heat welder.

Walkway Rolls are 34 inches (864 mm) wide by 50 feet (15.2 m) long and are nominal 180 mils thick. Color - White.

O. Non-Reinforced Flashing: Non-reinforced TPO flashing is a 60-mil thick nonreinforced TPO based membrane used for detail work where the use of pre-molded or pre-fabricated accessories are not feasible. Color - White.

2.7 CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

- A. Sure-Weld Bonding Adhesive: A high-strength solvent-based contact adhesive used for bonding Sure-Weld membrane to various porous and non-porous substrates.
 - 1. Base: Synthetic Rubber.
 - 2. Color: Yellow.
 - 3. Solids: 20.0 percent.
 - 4. VOC: 670 grams/liter.
- B. Cut Edge Sealant: A medium solids content, free flowing polymeric material designed for sealing cut edges (exposed fabric) of Sure-Weld reinforced membrane.
- C. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.
- D. Low VOC Primer: Manufacturer's recommended low VOC primer.
- E. TPO Primer: Solvent-based product designed to prepare TPO membrane for improved adhesion to TPO surfaces prior to the application of pressure-sensitive products and sealant pockets.
- F. Universal Single-Ply Sealant: A 100 percent solids, solvent free, VOC free, one-part polyether sealant that provides a weather tight seal to a variety of building materials. It is used for general caulking such as above termination bars and metal counter flashings and at scupper details. Available in white only.
- G. Thermoplastic One-Part Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with Carlisle's Thermoplastic membranes.
 Provides a flexible, durable and longlasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.
- H. Carlisle Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.
- I. CCW 702 Primer and 702LV Primer (Low VOC) A single component, solvent based, high-tack primer used to provide maximum adhesion between Carlisle 725TR Air and Vapor Barrier and an approved substrate. Applied by spray or long nap roller with a coverage rating ranging from approximately 300 to 350 square feet per gallon on smooth finishes (i.e., concrete) to 75 square feet per gallon on porous surfaces (i.e., Dens-Deck Prime gypsum board). Available in 5-gallon containers.

CCW 702LV Primer contains less than 250g/L VOCs and meets South Coast Air Quality Management District (SCAQMD) and Leadership in Energy and Environmental Design (LEED) Requirements for Volatile Organic Compounds.

J. CCW 702 WB - a high-tack, water-based contact adhesive for promoting adhesion of Carlisle air/vapor barrier membranes and an approved substrate (i.e., concrete, Dens-Deck Prime and Securock). Applied by roller, brush or spray with an application rate of approximately 200 sq. ft. per gallon. Available in 5-gallon containers. CCW 702 WB Primer contains 57g/L VOCs and meets South Coast Air Quality Management District (SCAQMD) and Leadership in Energy and Environmental Design (LEED) Requirements for Volatile Organic Compounds.

2.8 FASTENING COMPONENTS

- A. HP-X Fasteners: Heavy-duty #15 threaded fastener with a Phillips head for standard TPO seam fastening (Mechanically Fastened Roofing Systems) and where increased pullout resistance is necessary for steel and wood decks (Fully Adhered Roofing Systems).
- B. HD 14-10 Concrete Fastener: A #14 threaded fastener used for minimum 3,000 psi concrete decks.
- C. CD-10 Concrete Fastener: A hammer-driven, non-threaded E-Coat fastener for use with structural concrete decks rated 3,000 psi or greater.
- D. InsulFast Fasteners: Threaded, #12 fastener with a #3 Phillips head used with 3 inch (76mm) diameter Insulation Plates. For insulation attachment into steel or wood decks.
- E. Pre-Assembled ASAP Fasteners: InsulFast Fastener and pre-assembled 3 inch (76mm) diameter Plastic Insulation Plate for insulation attachment on adhered and mechanically-fastened roofing systems.
- F. HP-NTB Fastener: A non-penetrating, plastic fastener and plate for cementitious wood fiber and gypsum.
- G. Lite-Deck Fastener: An oversized diameter metal fastener and associated 3 inch diameter Lite-Deck metal plate for use on adhered roofing systems to attach insulation to dense gypsum decks, cementitious wood fiber and lightweight insulating concrete.
- H. HP Term Bar Nail-In: A 1 1/4 inch (32mm) long expansion anchor with threaded drive pin used for fastening Termination Bar or Seam Fastening Plates to concrete, brick or block walls.
- I. Base Sheet Fasteners and Plates:
 - 1. Carlisle Dual-Prong Fastener A factory pre-assembled, 1.8 inch (46mm) long fastener consisting of a precision tube formed from galvanized (G-90) coated

steel, a 2.7 inch (69mm) diameter disk formed from Galvalume (AX-55) coated steel and a locking staple of high tensile steel wire used to secure base sheets to fibrous cement, lightweight concrete and gypsum providing 70 lbs. of pullout resistance is achieved (40 lbs. Min.).

- 2. Base Sheet fasteners and plates by others must be FM approved and the respective manufacturers' published recommendations for proper installation must be followed.
- J. Piranha Plates: A 2 3/8 inch (60mm) diameter metal barbed fastening plate used with Carlisle HP-X, CD-10 or HD 14-10 Fasteners for membrane securement. This plate can be used for insulation securement.
- K. Insulation Fastening Plates: A nominal 3 inch (76mm) diameter metal plate used for insulation attachment in conjunction with the appropriate Carlisle Fastener.

2.9 EDGINGS AND TERMINATIONS

- A. Sure-Seal Drip Edge: A 22 gauge pre-punched 90-degree angle cleat and 12 foot (3658 mm) long fascia sections. Kynar 500 or aluminum finish as noted on the Finish Schedule of the Contract Drawings.
- B. SecurEdge 200 Coping: An anchor cleat with pre-slotted holes, a concealed joint cover, and 10 or 12 foot sections of coping cap. Kynar 500 finish as noted on the Finish Schedule of the Contract Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not commence work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.
- D. A vapor retarder / temporary roof (Carlisle VapAir Seal 725 TR Air and Vapor Barrier/Temporary Roof or Carlisle VapAir Seal MD Air and Vapor Barrier) may be applied to protect the inside of the structure prior to the roof system installation.

3.3 INSULATION - SYSTEM DESIGN

- A. Tapered System:
 - 1. Field Slope: 1/4 inch per foot.
 - 2. Sump Slope: 1/4 inch per foot.
 - 3. Cricket Slope: 1/4 inch per foot.

3.4 INSULATION PLACEMENT

- A. Install insulation or membrane underlayment in multiple layers over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
- B. Secure insulation to the substrate with the required insulation adhesive in accordance with the manufacturer's current application guidelines.
- C. Do not install wet, damaged or warped insulation boards.
- D. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.
- E. Wood nailers must be at least 3 1/2 inches (89 mm) wide or 1 inch (25 mm) wider than adjacent metal flange. Thickness must equal that of insulation but not less than 1 inch (25 mm) thickness.
- F. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
- G. Do not install any more insulation than will be completely waterproofed each day.

3.5 INSULATION ATTACHMENT

- A. Securely attach insulation to the roof deck for Adhered Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.
- B. Enhance the perimeter and corner areas in accordance with the International Building Code (ASCE-7) or ANSI/SPRI WD-1.
- C. Install insulation layers, maximum 4 feet by 4 feet (1220 mm by 1220 mm), applied with FAST adhesive, or a maximum 4 feet by 8 feet (1220 mm by 2438 mm), applied with Flexible FAST Adhesive, coverage rate as necessary to achieve the specified attachment and uplift rating. Press each board firmly into place after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied and roll with a weighted roller. Add temporary weight and use relief

cuts to ensure boards are well adhered. Stagger the joints of additional layers by a minimum of 6 inches (152 mm).

3.6 MEMBRANE PLACEMENT AND ATTACHMENT (Sure-Weld Fully Adhered)

- A. Position Sure-Weld membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.
- B. Apply approved Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
 - 1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
 - 2. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.
- C. Position adjoining sheets to allow a minimum overlap of 2 inches.
- D. APEEL Protective Film should be removed from within areas that are to be heatwelded together. In areas that do not require heat welding, the APEEL Protective Film can be left in place for up to 90 days.
- E. Hot-air weld the Sure-Weld membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures. Provide a test weld sample made from a piece of scrap TPO to eliminate the need to remove a section from a completed seam. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
- F. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.7 SEAM WELDING

- A. APEEL Protective Film should be removed from within areas that are to be heatwelded together. In areas that do not require heat welding, the APEEL Protective Film can be left in place for up to 90 days.
- B. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.

- C. When utilizing membrane greater than 45-mil thickness, overlay all splice intersections with Sure-Weld T-Joint Cover.
- D. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
- E. Repair all seam deficiencies the same day they are discovered.
- F. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.8 FLASHING

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane or prefabricated accessories. Sure-Weld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
- C. APEEL Protective Film should be removed and discarded after the completion of the roof system installation.
- D. Sure-Weld Contour Rib Profiles:
 - 1. The Sure-Weld Contour Rib Profiles should be positioned parallel to the laps of the installed TPO roofing system and parallel with the roof slope where possible.
 - 2. Ensure that all welding surfaces are clean and dry. Inspect all seam areas for proper weld prior to installing Sure-Weld Contour Rib Profile.
 - 3. Contour Rib Profile spacing can be individually determined to achieve the desired appearance.
 - 4. Connecting multiple ribs is achieved by using fiberglass pins. Insert a pin halfway into the end of one profile. Connect the adjoining rib by inserting the exposed end of the pin into the alignment hole. Repeat previous steps for additional TPO Contour Rib profiles.

3.9 WALKWAYS

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings.
- B. Hot-air weld walkway pads to the membrane in accordance with the manufacturer's current application guidelines.
- C. Loose lay concrete pavers over an approved protection sheet in accordance with the

manufacturer's current application guidelines.

- D. G4 Application: Unroll and install to provide a minimum 2 inches (51 mm) side overlap. Butt the end laps next to each other.
- E. Protection Fabric: Unroll directly over the membrane and provide a minimum 2 inches (51mm) side and end overlap.
- F. Insulation: Loose apply insulation directly over the membrane with all joints tightly butted. Extend insulation up walls and curbs to the height of the growth media layer.
- G. Root Barrier:
 - 1. On Extensive garden systems, position root barrier loose-laid over the protection fabric. Overlap adjacent sheets a minimum of 2 inches (51mm) and seam in accordance with manufacturer's current recommendations for the field conditions and membrane specified.
 - 2. On Intensive roof garden assemblies loose-laid root barrier over the extruded polystyrene insulation layer and seam in accordance with manufacturer's current recommendations for the field conditions and membrane specified.
 - 3. Extend root barrier up walls, curbs, etc. to the height of the top of the growth media layer.
- H. Growth Media/Planting
 - 1. Spread engineered soil mixes to the specified depth, plus 15 percent. Dispense to locations in a manner that will not overload the structure.
 - 2. Thoroughly soak soil with water using a sprinkler or hand sprayer.
 - 3. Plant vegetation in accordance with the landscape architect/designer plans and instructions for the intended soil and climate.

3.10 DAILY SEALS

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.11 CLEAN UP

- A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

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3.12 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes sheet metal flashing and trim in the following categories:
 - 1. Exposed trim, gravel stops, and fascia.
 - 2. Copings.
 - 3. Scuppers.
 - 4. Down Spouts
 - 5. Metal flashing.

1.2 RELATED SECTIONS

A. Division 7 Section Joint Sealants: Elastomeric sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. 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 (1.00 to 1.44 kPa).

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300, product data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- B. Submit shop drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.
- C. Submit samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
 - 1. 8 inch (200 mm) square samples of specified sheet materials to be exposed as finished surfaces.

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- 2. 12 inch (300 mm) long samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.
- D. Submit qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. 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.
- B. Mockups: Prior to installing sheet metal flashing and trim, construct mockups indicated to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
 - 1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Construct mockups for the following type of sheet metal flashing and trim:
 - a. Exposed trim, gravel stops, and fascia.
 - b. Copings.
 - 5. Obtain Architect's approval of mockups before start of final unit of Work.
 - 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.6 **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

1.7 METALS

A. Aluminum: Aluminum, 0.024 inch (0.61 mm) thick by one of the following:

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- 1. Cheney Flashing Company.
- 2. Fry Reglet Corporation.
- 3. Heckmann Building Products, Inc.
- 4. Hickman, W. P. Company.
- 5. Hohmann & Barnard, Inc.
- 6. Keystone Flashing Company, Inc.
- 7. National Sheet Metal Systems, Inc.
- 8. Sandell Manufacturing.

1.8 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Burning Rod for Lead: Same composition as lead sheet.
- B. Solder: ASTM B32, Grade Sn50, used with rosin flux.
- C. 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.
- D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15 mil (0.4 mm) dry film thickness per coat.
- E. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- F. 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 Section 07900.
- G. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- H. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- I. Paper Slip Sheet: 5-lb/square (0.244 kg/sq. m) red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.
- J. Polyethylene Underlayment: ASTM D4397, minimum 6 mil (0.15 mm) thick black polyethylene film, resistant to decay when tested according to ASTM E154.
- K. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or

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compatible with material being installed; noncorrosive; size and thickness required for performance.

L. Roofing Cement: ASTM D4586, Type I, asbestos free, asphalt based.

1.9 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. Expansion Provisions: Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) 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 (25 mm) deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. 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.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer. Provide supporting documentation.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

PART 3 - EXECUTION

1.10 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.

1.11 INSTALLATION

- A. 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 (3 m) with no joints allowed within 24 inches (610 mm) 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 (25 mm) deep, filled with mastic sealant (concealed within joints).
- E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except where pretinned surface would show in finished Work.
 - 1. Pretinning is not required for the following metals:
 - a. Lead-coated copper.
 - 2. 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. All non-moving joints shall be soldered with appropriate type solder, including soldering of thimbles to flashing.

- G. 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.
- H. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. 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.
- J. 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.
- K. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
- L. 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.
- M. Splash Pans: Install where downspouts discharge on low-sloped roofs, unless otherwise shown. Set in roof cement or sealant compatible with roofing membrane.

1.12 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.

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END OF SECTION

SHEET METAL FLASHING AND TRIM 07620-7

SECTION 07720

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Roof Curbs and Equipment supports.

1.2 RELATED SECTIONS

- A. Division 5 Section Metal Fabrications: Ladders and miscellaneous metal framing and supports.
- B. Division 6 Section Rough Carpentry: Roof sheathing, wood cants, and wood nailers.
- C. Division 7 Section Sheet Metal Flashing and Trim: Shop and field-fabricated metal flashing and counterflashing, scuppers, gutters and downspouts, fasciae, roof expansion-joint covers, valleys, and miscellaneous sheet metal trim and accessories.
- D. Division 7 Section Manufactured Roof Specialties: Fasciae, copings, gravel stops, and roof expansion-joint covers.
- E. Division 9 Section Painting: Shop primers and field painting.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.
- C. Coordination Drawings: Submit roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.

3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.4 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. Subject to compliance with requirements, provide products by one of the following:
 - 1. Roof Curbs and Equipment Supports:
 - a. Custom Curb, Inc.
 - b. Pate Co. (The).
 - c. ThyCurb, Inc.
 - d. Uni-Curb, Inc.

2.2 MATERIALS, GENERAL

- A. Galvanized Steel Sheet: ASTM A653/A653M with G90 (Z275) coating designation; commercial quality, unless otherwise indicated.
 - 1. Structural Quality: Grade 40 (Grade 275), where indicated or as required for strength.
- B. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.
- Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.
- D. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
 - 1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- F. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4 mm) dry film thickness per coating.
- G. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- H. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to joint substrates indicated, O.
- I. Roofing Cement: ASTM D4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.3 EQUIPMENT SUPPORTS

- A. 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 (1.9 mm) 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. Fabricate units to minimum height of 8 inches (200 mm), unless otherwise indicated.

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. 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.

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2.5 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 A780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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.

3.2 CLEANING AND PROTECTION

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

END OF SECTION

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 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 cast-in-place concrete.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors, windows, and curtain wall.
 - d. Control and expansion joints in ceiling and overhead surfaces.
 - e. 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. Cold-applied joint sealants.
 - c. Hot-applied joint sealants.
 - 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 and where indicated.
 - c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - e. 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.

1.2 RELATED SECTIONS

- A. Division 4 Section Unit Masonry Assemblies: Masonry control and expansion joint fillers and gaskets.
- B. Division 7 Section Building Insulation: SPF-I foam insulation.

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- C. Division 7 Section Firestopping: Fire-resistant building joint-sealant systems.
- D. Division 8 Section Glazing: Glazing sealants.
- E. Division 9 Section Gypsum Board Assemblies: Sealing perimeter joints of gypsum board partitions to reduce sound transmission.
- F. Division 9 Section Acoustical Ceilings: Sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. 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 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each joint-sealant product indicated.
- B. Submit Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Submit Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2 inch (13 mm) wide joints formed between two 6 inch (150 mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Submit Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. Submit 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.
- F. Submit Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

- G. Submit Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.
- H. Submit Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- I. Submit Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- J. Submit Warranties: Special warranties specified in this Section.

1.5 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 Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - a. Perform tests under environmental conditions replicating those that will exist during installation.
 - 2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - 5. Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated, as documented according to ASTM E548.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- E. 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. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 4. Test Method: Test joint sealants by hand-pull method described below:
 - a. Install joint sealants in 60 inch (1500 mm) 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 (50 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch (25 mm) from cross-cut end of 2 inch (50 mm) piece.
 - c. Use fingers to grasp 2 inch (50 mm) piece of sealant between crosscut end and 1 inch (25 mm) 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.
 - 5. 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.
 - 6. 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.

- F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
 - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01200.

1.6 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.

1.7 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 or are below 40 degrees F (4.4 degrees C).
 - 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.

1.8 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. 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: Two 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: 20 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 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C920 classifications for type, grade, class, and uses.
- B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834 and the following:
 - 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

2.6 PREFORMED JOINT SEALANTS

- A. Preformed Silicone-Sealant System: For each product of this description indicated in the Preformed Joint-Sealant Schedule at the end of Part 3, 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 of this description indicated in the Preformed Joint-Sealant Schedule at the end of Part 3, 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:

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- 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.
- 4. Backing: Pressure-sensitive adhesive, factory applied to one side with protective wrapping.

2.7 SPF SEALANT

- A. SPF-S (Sprayed Polyurethane Foam) Sealant: Provide one- or two-component, foamed-in-place, polyurethane foam sealant with the following characteristics:
 - 1. Density: 1.5 to 2.0 PCF.
 - 2. Flame Spread (ASTM E84): 25 or less.
 - 3. Initial R-Value (at 1 inch): Not less than 7.

2.8 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- C. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- D. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- F. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- G. Cylindrical Sealant Backings: ASTM C1330, of Type recommended by the sealant manufacturer for the particular application.
- H. 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.

2.9 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: Non-staining, 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. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.

- 4. 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.
 - d. Metal.
 - e. Glass.
 - f. Glazed surfaces of ceramic tile.
- 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. 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 C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 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 C1193, unless otherwise indicated.
 - 4. Use masking tape to protect adjacent surfaces of recessed tooled joints.
- H. 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.
- I. Installation of SPF Sealant: Using dispenser of appropriate size and type for the project application, install SPF sealant in voids around perimeter of door frames, window frames and curtain wall frames in exterior walls, to prevent the infiltration of outside air. Installation shall be in accordance with the recommendations of the foamed-in-place sealant manufacturer.
 - 1. Depending on sizes of voids to be filled and at Contractor's option, provide both one-component and two-component products specified.

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 (300 m) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
 - 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 (50 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch (25 mm) from cross-cut end of 2 inch (50 mm) piece.
 - b. Use fingers to grasp 2 inch (50 mm) piece of sealant between crosscut end and 1 inch (25 mm) mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of

JOINT SEALANTS 07920-11 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.

3.4 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.

3.5 **PROTECTION**

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time

of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

- A. Low-Modulus Nonacid-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following or equal:
 - a. 790; Dow Corning.
 - b. Silpruf LM SCS2700; GE Silicones.
 - c. 890; Pecora Corporation.
 - d. Spectrem 1; Tremco.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Additional Movement Capability: 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.
 - 5. Use Related to Exposure: NT (nontraffic).
 - 6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.
 - 7. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C1248.
 - 8. Applications: Exterior and interior joints in vertical surfaces of concrete; between metal and concrete, mortar; interior and exterior perimeter joints of metal frames in exterior walls; exterior overhead joints; and where indicated.
- B. 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:
 - 1. Products: Provide one of the following or equal:
 - a. 786 Mildew Resistant; Dow Corning.
 - b. Sanitary SCS1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
 - d. PSI-611; Polymeric Systems, Inc.
 - e. Tremsil 600; Tremco.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

- a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and ceramic tile.
- 6. Applications: Interior joints in vertical surfaces in toilet rooms, showers and kitchens; and where indicated.
- C. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following or equal:
 - a. Chem-Calk 550; Bostik Inc.
 - b. Vulkem 245; Mameco International.
 - c. NR-200 Urexpan; Pecora Corporation.
 - d. Sikaflex 2c SL; Sika Corporation.
 - e. THC-900; Tremco.
 - 2. Type and Grade: M (multicomponent) and P (pourable).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic)
 - 5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.
 - 6. Applications: Exterior and interior joints in horizontal surfaces of concrete; between metal and concrete, mortar, stone and masonry; and where indicated.
- D. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following or equal:
 - a. Vulkem 116; Mameco International.
 - b. Sikaflex 1a; Sika Corporation.
 - c. NP 1; Sonneborn Building Products Div., ChemRex Inc.
- E. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following or equal:
 - a. Chem-Calk 600; Bostik Inc.
 - b. AC-20; Pecora Corporation.
 - c. PSI-701; Polymeric Systems, Inc.
 - d. Tremflex 834; Tremco.
 - 2. Applications: Interior exposed joints in field painted vertical and overhead surfaces; at perimeter of elevator door frames and hollow metal door frames; between stair stringers and walls; in gypsum drywall, plaster, concrete, and concrete masonry; and where indicated.
- F. Acoustical Sealant for Exposed and Concealed Joints: Where joint sealants of this type are indicated, provide products complying with the following:

- 1. Products: Provide one of the following or equal:
 - a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corporation.
 - b. SHEETROCK Acoustical Sealant; USG Corp., United States Gypsum Co.
- 2. Applications: Interior exposed and concealed joints in concrete masonry and where indicated.
- G. Preformed Foam Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products: Provide one of the following or equal:
 - a. Emseal 25V; Emseal Joint Systems, Ltd.
 - b. Polytite Standard; Polytite Manufacturing Corporation.
 - c. Blocoband HF; Salamander Industrial Products Inc.
 - d. Wilseal 600; Sealform, Ltd.
- H. SPF-S System: Where joint sealants of this type are indicated, provide products complying with the following:
 - 1. Products:
 - a. One-Component Polyurethane Foam Sealant by Zero Draft or equal.
 - b. Two-Component Polyurethane Insulating Air Sealant by Zero Draft or equal.
 - 2. Provide one-component foam for gaps/cracks to 2 inches wide; provide two-component foam for gaps over 2 inches wide.
 - 3. Applications: Voids around perimeter of door frames, louver frames, window frames and curtain wall frames in exterior walls; between boards of exterior wall insulation; voids around penetrations in roof deck construction; and where indicated.

3.7 SILICONE FLASHING

A. Silicone Flashing: Extruded, low modulus silicone sheet; SIL-SPAN Preformed Silicone Profiles by Pecora, UltraSpan Weatherstrip by General Electric, 123 Silicone Seal by Dow Corning.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Hollow metal doors.
 - 2. Hollow metal door frames.
 - 3. Sidelight frames
 - 4. Borrowed-light frames.
 - 5. Fire-rated door and frame assemblies.
 - 6. Fire-rated window frames.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

A. Hardware is furnished under Section 08710.

1.3 RELATED SECTIONS

- A. Division 4 Section Unit Masonry Assemblies: For installing anchors and grouting frames in masonry construction.
- B. Division 8 Section Flush Wood Doors: For wood doors installed in steel frames.
- C. Division 8 Section Door Hardware: For door hardware and weather stripping.
- D. Division 8 Section Glazing: For glass in glazed openings in doors and frames.
- E. Division 9 Section Gypsum Board Assemblies: For spot-grouting frames installed in steel-framed gypsum board partitions.
- F. Division 9 Section Painting: For field painting factory-primed doors and frames.

1.4 **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.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints, and connections.
 - 7. Coordination of glazing frames and stops with glass and glazing requirements.
- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.
- D. Oversize Construction Certificates: For door assemblies required to be fireprotection rated and exceeding size limitations of labeled assemblies.

1.6 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. Thermal Pins: The use of thermal pins in lieu of omitting the bottom rod on vertical rod exit devices on fire-rated doors will not be allowed. If a conflict exists between this specification and the door hardware specification regarding the use of these devices, it shall be brought to the attention of the Architect by the Contractor.
- C. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities

STEEL DOORS AND FRAMES 08110-2

having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

1.7 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 (100 mm) 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 (6 mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Doors and Frames:
 - a. Ceco Door Products; an ASSA ABLOY Group Company.
 - b. CURRIES Company; an ASSA ABLOY Group Company.
 - c. Kewanee Corporation (The).
 - d. Pioneer Industries, Inc.
 - e. Republic Builders Products Company.
 - f. Steelcraft; an Ingersoll-Rand Company.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A569/A569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A366/A366M, Commercial Steel (CS), or ASTM A620/A620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A653/A653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcherleveled standard of flatness.

2.3 DOORS

- A. 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 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
 - Doors located in sound isolation walls to meet STC rating of 50-66.
 a. 1st Level Office Doors
- 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 4 and Physical Performance Level A (Maximum 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. Provide steel frames for doors, transoms, sidelights, borrowed lights, 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 minimum 0.053 inch (1.3 mm) thick steel sheet for:
 - 1. Door openings wider than 48 inches (1220 mm).
 - 2. Level 2 steel doors.
- C. Frames of minimum 0.067 inch (1.7 mm) thick steel sheet for: 1. n/a
- D. 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.
- E. Supports and Anchors: Fabricated from not less than 0.042 inch (1.0 mm) thick, electrolytic zinc-coated or metallic-coated steel sheet.

- 1. Wall Anchors in Masonry Construction: 0.177 inch (4.5 mm) diameter, steel wire complying with ASTM A510 (ASTM A510M) may be used in place of steel sheet.
- F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A153/A153M, Class C or D as applicable.

2.5 FABRICATION

- A. 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 (1.3 mm) 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 and rails of nonflush units, 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 Fire-Rated Doors: As required by NFPA 80.
- F. Single-Acting, Door-Edge Profile: Beveled edge, unless square edge is indicated.
- G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- I. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- J. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C236 or ASTM C976 on fully operable door assemblies.

- 1. Provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better.
- K. 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.
- L. Frame Construction: Fabricate frames to shape shown.
 - 1. Fabricate frames with mitered or coped and continuously welded corners, unless otherwise indicated.
 - 2. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
 - 3. Provide welded frames with temporary spreader bars.
- M. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- O. Glazing Stops: Manufacturer's standard, formed from 0.032 inch (0.8 mm) thick steel sheet.
 - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
 - 2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
- P. Astragals: As required by NFPA 80 to provide fire ratings indicated.

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. 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

STEEL DOORS AND FRAMES 08110-6 permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

- 1. Except for frames located in existing walls or partitions, 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 existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
- 4. 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.
- 5. For in-place gypsum board partitions, install knock-down, drywall slip-on frames.
- 6. Install fire-rated frames according to NFPA 80.
- 7. For openings 90 inches (2286 mm) 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.
 - 2. Smoke-Control Doors: Install to comply with NFPA 105.

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

SECTION 08120

INTERIOR ALUMINUM FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum door frames
 - 2. Aluminum borrowed lite frames

1.2 RELATED SECTIONS

- A. Division 6 Section Rough Carpentry.
- B. Division 8 Section Flush Wood Doors.
- C. Division 8 Section Door Hardware.
- D. Division 8 Section Glazing.
- E. Division 9 Section Gypsum Board Assemblies.

1.3 REFERENCES

- A. Publications listed herein are part of this specification to extent referenced.
- B. American Architectural Manufacturers Association:
 - 1. AAMA 605.2 Voluntary Specification for High Performance Organic Coatings
- C. American Society for Testing and Materials:
 1. ASTM B221 Specification for Aluminum-Alloy Extruded Bars, Wire, Shapes and Tubes
- D. Aluminum Association:
 - 1. AA ASD-1 Aluminum Standards and Data
- E. National Fire Protection Association:
 - 1. NFPA 80 Standard for Fire Doors and Windows
 - 2. NFPA 101 Life Safety Code
- F. Underwriters Laboratory, Inc.

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- 1. UL Standard 10(b) Fire Tests of Door Assemblies
- 2. UL Standard 63 Fire Door Frames
- 3. UL Building Materials Directory

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's literature describing products to be provided.
- B. Shop Drawings:
 - 1. Submit shop drawings showing elevation of frames, profile, design construction details, methods of assembling sections, hardware locations, dimensions, anchorage and fastening methods, wall opening construction and finish requirements. Indicate location of each frame in Project.
- C. Samples:
 - 1. Submit four samples of frames showing selected finishes, corner joint, hinge reinforcement and anchors.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Engage experienced Installer who has completed installations of aluminum frames similar in design and extent to those required for project and whose work has resulted in construction with record of successful in-service performance.
- B. Manufacturer's Qualifications:
 - 1. Provide aluminum framing systems produced by firm experienced in manufacturing systems that are similar to those indicated for this project and that have record of successful in-service performance.
- C. Single Source Responsibility:
 - 1. Obtain aluminum framing systems from one source and from single manufacturer.
- D. Design Criteria:
 - 1. Drawings indicate the size, profile and dimensional requirements of aluminum frames required and are based on specific types and models indicated.
 - 2. 60/90 minute rated frames shall be aluminum clad Phoenix Series. Hollow metal not permitted.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:
 - 1. Deliver materials in original unopened packaging with labels intact.
 - 2. Handle frames in a manner to prevent damage to finishes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide aluminum frames as manufactured by the following or equal:
 - 1. Avalon, Phoenix Series for 60 and 90 minute rated wall and Eagle Series for non-rated, 20 and 45 minute rated wall.
 - 2. TGP, Fireframes Aluminum Series.

2.2 MATERIALS

- A. Aluminum Frames: Extruded aluminum
 - 1. Standard alloys shall conform to requirements published in AA ASD-1 and ASTM B221; 6063 T5 alloy.
 - 2. Thickness: 0.062" minimum
 - 3. Finish: Thermal-setting powder coating
 - 4. Products: Avalon Eagle and Phoenix Series (FKA Alumax)
- B. Fire Rated Frames: Meeting requirements of NFPA 252 and UL 10(b).
 - 1. Labeled frames shall be provided for those openings requiring a 20/45/60/90 minute fire protection rating as indicated on Drawings.
 - 2. Frames shall be constructed as tested by an approved laboratory. A nationally recognized testing agency having a periodical factory inspection service may be used subject to approval of authority having jurisdiction.
 - 3. Should any frame indicated to be fire rated not qualify for appropriate labeling because of its design, hardware, or any other reason, notify Architect before fabricating work on that frame is started.
- C. Thermal-Setting Powder Coatings:
 - 1. Coating material shall contain a formulation of hybrid epoxy-polyester.
 - 2. Colors: Manufacturer standard color; White.
- D. Glass and Glazing Materials: Comply with requirements of Section 08800, Glazing.
- E. Fasteners: Provide fasteners of aluminum, non-magnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.

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- 1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 0.125 inches thick, reinforce interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- 2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.

2.3 FABRICATION

A. Frames:

- 1. Frames shall be knock-down units consisting of separate header, strike and hinge jambs with snap-on casing, fabricated to sizes indicated on Drawings.
- 2. Thickness of main frame members shall be increased to 0.130" minimum at frame and hinge anchorage.
- 3. Frames shall be supplied with a notch at top of jamb and corner brackets to provide for correct alignment with header and add strength to joint.
- 4. Stops shall be provided with a continuous nylon backed wool pile sound and light seal around perimeter.
- 5. Finished work shall be strong and rigid, neat in appearance, square, true and free of defects, warp, or buckle. Members shall be clean cut, straight and of uniform profile throughout their lengths.
- 6. Frames shall be pressure fit type that are installed after partition is in place. Frames shall be anchored at bottom of each jamb. Additional anchors shall be furnished per manufacturer's recommendations.
- 7. Glazing frames shall be provided with snap-in type stops with manufacturer's standard neoprene gaskets. Glass installed adjacent to metal without intervening gasket shall not be allowed. Door jambs with integral glazing shall have reinforcement channel. Intermediate mullions shall maintain 1-1/2" profile.
- 8. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.
- 9. Uniformity of Metal Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- 10. Fasteners: Exposed fasteners not permitted.

2.4 FINISHES

- A. Shop Applied Finish:
 - 1. Remove die markings prior to finishing operations. Perform this work in addition to finish specified. Scratches, abrasions, dents and similar defects are not acceptable.
- B. Thermal-Setting Powder Coatings:

1. Aluminum frames shall have shop applied finish with a thermal-setting powder coating applied in compliance with AAMA 605.2. Finish system shall have a minimum dry film thickness of 1.8 mil applied over a seven stage aluminum pre-treatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Frames:

- 1. Prior to installation rough openings shall be checked and corrected for size, squareness, alignment and plumbness.
- 2. Slip header and jambs into rough opening, allowing header to rest on jambs. Align to scheduled opening width and height, achieving equal wall capture at both jambs.
- 3. Check level of header and squareness and plumb of jambs. Measure width at each hinge location.
- 4. Attach flat corner angles at faces of head. Anchor jambs and header in legs of frame at top and bottom of jambs and at approximately 15" on center.
- 5. Install mitered trims by snapping over receiver tabs and lightly tapping with a rubber mallet.

B. Tolerances:

- 1. Squareness: +1/16"
 - a. Measured on a line 90 degrees from one jamb, at upper corner of frame at other jamb.
- 2. Alignment: + 1/16"
 - a. Measured on jambs on a horizontal line parallel to plane of wall.
- 3. Twist: + 1/16"
 - a. Measured at face corners of jambs on parallel line.
- 4. Plumbness: + 1/16"
 - a. Measured on the jamb at floor.

3.2 ADJUSTING

- A. Final Adjustments:
 - 1. Check and re-adjust operating finish hardware just prior to final inspection and after painting hinges.
 - 2. Remove and replace defective work.

3.3 CLEANING

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

- B. Clean glass surfaces after installation complying with requirements contained in the "Glazing" Sections for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.
- C. Touch up as required.

3.4 **PROTECTION**

A. Institute protective measures required throughout remainder of construction period to ensure that aluminum frames will be without damage or deterioration, other than normal wear at time of acceptance.

END OF SECTION.

SECTION 08211

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Factory finishing flush wood doors.
 - 2. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

A. Door hardware is furnished under Section 08710.

1.3 RELATED SECTIONS

- A. Division 6 Section Architectural Woodwork: Wood door frames and other woodwork in juxtaposition to wood doors.
- B. Division 8 Section Steel Doors and Frames.
- C. Division 8 Section Stile and Rail Wood Doors.
- D. Division 8 Section Door Hardware.
- E. Division 8 Section Glazing: Material specification and glazing standards for glass view panels in flush wood doors.
- F. Division 9 Section Painting: Field applied finish.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of wood door, including details of core and edge construction, trim for openings, and louvers.
 - 1. Include factory-finishing specifications.
- B. Shop Drawings: Submit shop drawings that indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in product data; location and extent of hardware blocking; and other pertinent data.

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- 1. Indicate dimensions and locations of mortises and holes for hardware.
- 2. Indicate dimensions and locations of cutouts.
- 3. Indicate requirements for veneer matching.
- 4. Indicate doors to be factory finished and finish requirements.
- 5. Indicate fire ratings for fire doors.
- C. Samples for Initial Selection: Submit samples of color charts consisting of actual materials in small sections for the following:
 - 1. Faces of factory-finished doors with transparent finish. Show the full range of colors available for stained finishes.
 - 2. Faces of factory-finished doors with opaque finish. Show the full range of colors available.
- D. Samples for Verification: Submit samples as follows:
 - 1. Corner sections of doors approximately 8 by 10 inches (200 by 250 mm) with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
 - 2. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
 - 3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with the following standard:
 - 1. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.
- 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. Test Pressure: Test at atmospheric pressure.
 - 2. Oversized, Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide manufacturer's certificate stating that doors comply with all standard construction requirements of tested and labeled fire-door assemblies except for size.
 - 3. Temperature-Rise Rating: At stairwell enclosures, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.
 - 4. Thermal Pins: The use of thermal pins in lieu of omitting the bottom rod on vertical rod exit devices on fire-rated doors will not be allowed. If a

FLUSH WOOD DOORS 08211-2 conflict exists between this specification and the door hardware specification regarding the use of these devices, it shall be brought to the attention of the Architect by the Contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
 - 1. Individually package doors in plastic bags or cardboard cartons.
- B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.8 WARRANTY

- A. General Warranty: Door manufacturer's 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. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42 by 84 inch (1067 by 2134 mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3 inch (0.25 mm in a 75 mm) span, or do not comply with tolerances in referenced quality standard.
 - 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 after the date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide flush faced wood doors as manufactured by the following:
 - 1. Masonite, Inc.; Cendura Series or equal.

2.2 FLUSH WOOD DOORS (Solid and Hollow Core Door)

- A. Flush Faced Doors (Non-Fire-Rated and 20 minutes): 1-3/4 inches thick, Wood based particleboard for Solid Core door and Kraft paper honeycomb with lumber lock blocks for Hollow Core door.
 - 1. Door Panel: Molded panel doors shall be fabricated using loose lay-up assembly that includes hardboard facing, special composite stiles, composite rails and mineral core. Door facings are to be bonded to stiles, rails and core forming a 3-ply structural attachment. Panel styles and locations per the Architect's drawings.
 - 2. Hinge preparations to be machined to accept 4" or 4-1/2" hinges.
 - 3. Face bores for cylindrical lock and deadbolts are to be 2-1/8" diameter at 2-3/8" or 2-3/4" backset and optional mortise or card lock.
 - 4. Vertical edge of door to be square, beveled both sides or lock side only.
 - 5. Edge preparations should be clearly noted when the product is ordered.
 - 6. Finish: Factory finishing paint. Color to be selected by the Architect.
 - 7. WDMA Performance Duty Level: Extra Heavy Duty
- B. Flush Faced Wood Doors (Fire-Rated): 1-3/4 inches thick, Fire Resistant Composite for 45, 60, and 90 Minute where applicable. Provide fire rated doors bearing appropriate UL Label.
 - 1. Door Panel: Molded panel doors shall be fabricated using loose lay-up assembly that includes hardboard facing, special composite stiles, composite rails and mineral core. Door facings are to be bonded to stiles, rails and core forming a 3-ply structural attachment. Panel styles and locations per Architect's drawings. Door panel construction may vary per fire endurance duration.
 - 2. Hinge preparations to be machined to accept 4" or 4-1/2" hinges.
 - 3. Face bores for cylindrical lock and deadbolts are to be 2-1/8" diameter at 2-3/8" or 2-3/4" backset and optional mortise or card lock.
 - 4. Vertical edge of door to be square, beveled both sides or lock side only.
 - 5. Edge preparations should be clearly noted when the product is ordered.
 - 6. Finish: Factory finishing paint. Color to be selected by the Architect.
 - 7. WDMA Performance Duty Level: Extra Heavy Duty

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

FLUSH WOOD DOORS 08211-4

- 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold.
- 2. Comply with requirements of NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, 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. Pairs of Fire-Rated Doors: Provide fire rated pairs of doors with manufacturer's fire rated non-metal edges for applications using listed hardware in rated openings without using steel edges and astragals.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
- D. Glazing:
 - 1. For factory-finished wood doors, factory install all glass after finishing. Provide glass size and type indicated on the Drawings and conforming to the quality requirements specified in Section 08800.

2.4 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. Transparent Finish (field applied): Shop seal faces and edges of doors for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in the following:
 1 Section 09900 "Painting "
 - 1. Section 09900, "Painting."

2.5 FACTORY FINISHING

- A. Comply with referenced AWI quality standard including Section 1500 "Factory Finishing."
- B. Finish wood doors at factory that are indicated to receive opaque finish.
 - 1. Color: Manufactory standard color.
 - 2. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine 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 plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 08710, "Door Hardware."
- B. Manufacturer's Written Instructions: Install wood 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-Fit 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 with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) 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 (3-1/2 degrees) at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on 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. Section 09900, "Painting."

3.3 ADJUSTING AND PROTECTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08311

ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following types of access doors:
 - 1. Wall access doors.
 - 2. Fire-rated wall access doors.
 - 3. Ceiling access doors.
 - 4. Fire-rated ceiling access doors.
- B. Provide access doors where indicated, scheduled, or directed.

1.2 RELATED SECTIONS

- A. Division 4 Section Unit Masonry: Building-in anchors and grouting frames set in masonry construction.
- B. Division 9 Section Gypsum Board Assemblies: Gypsum board walls and ceilings
- C. Division 15 Section "Duct Accessories" for duct access doors.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of access door assembly specified, including details of construction relative to materials, individual components, profiles, finishes, and fire-protection ratings (if required).
 - 1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, latching or locking provisions, and other data pertinent to installation.
- B. Submit shop drawings showing fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage, and accessory items.
- C. Submit samples, 3 inch (75 mm) by 5 inch (125 mm) minimum size, of each panel face material showing factory-finished color and texture.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors for entire Project from one source and by a single manufacturer.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per test method as indicated below, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Test Method for Vertical Installations: ASTM E152.
 - 2. Test Method for Horizontal Installations: ASTM E119.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment and indicate on schedule specified under "Submittals" Article.
- B. Provide access doors that are indicated or required to access to filters, coils, sound attenuators, fire dampers, smoke dampers, control devices, and concealed mechanical and electrical devices which may require future inspection, repair or adjustment; and elsewhere as required by applicable codes.
- C. Using ceiling element as access door in suspended metal pan, lay-in ceiling, and accessible tile ceilings.
- D. Attached a ¼ inch diameter color-coded aluminum tag to exposed grid tees or ceiling elements used as access doors and recessed pan doors. Coordinate identification with Article titled "Identification".
- E. Acoustic Panel Ceiling: Fit frame with anchoring devices for suspension system. Recessed pan type door with acoustic panel facing.
- F. Provide UL-listed/rated access doors where doors are required for access to equipment located within floor-ceiling or roof-ceiling assembly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following or equal:

ACCESS DOORS 08311-2

- 1. Acudor Products, Inc.
- 2. Bar-Co, Inc. Div., Alfab, Inc.
- 3. Karp Associates, Inc.
- 4. Milcor, Inc.
- 5. Nystrom, Inc.
- 6. The Williams Bros. Corporation of America.

2.2 MATERIALS

A. Steel Sheet: ASTM A366/A366M commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.

2.3 ACCESS DOORS

- A. Insulated, Fire-Rated Access Doors: Self-latching units consisting of frame, trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:
 - 1. Trimless Frame: Perimeter frame complying with the following requirements:
 - a. Metal: 0.0598 inch (1.52 mm) thick steel sheet.
 - 2. Frame Configuration: Flange integral with frame and overlapping face of adjoining gypsum board, with surface formed to receive joint compound.
 - 3. Door: 0.0359 inch (0.91 mm) thick steel sheet, welded pan type.
 - 4. Hinges: Continuous type.
 - 5. Latches: Bolt type, operated by either a ring turn or flush key device (keyed alike).
 - 6. Insulation: 2 inch (50.8 mm) thick mineral-fiber insulation.
 - 7. Fire-Protection Rating: Match wall and ceiling rating.
- B. Trimless, Flush Access Doors for Gypsum Board: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:
 - 1. Frame: 0.0598 inch (1.52 mm) thick steel sheet.
 - 2. Door: 0.0747 inch (1.90 mm) thick steel sheet.
 - 3. Concealed, Gypsum Board Edge Trim: 0.0299 inch (0.76 mm) zinc-coated or galvanized-steel sheet with face flange formed to receive joint compound.
 - 4. Hinge: Concealed spring pin or continuous type.
 - 5. Locks: Screwdriver-operated cam.

2.4 FABRICATION

A. Manufacture each access door assembly as an integral unit ready for installation.

- B. Steel Access Doors and Frames: Continuous welded construction. Grind 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 Flange: Nominal 1 to 1-1/2 inches (25.4 to 38.1 mm) wide around perimeter of frame.
 - 2. For gypsum board assemblies or gypsum veneer plaster, furnish frames with edge trim for gypsum board or gypsum base.
 - 3. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Advise Installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions for installing access doors.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces.
- C. Install concealed-frame access doors flush with adjacent finish surfaces.

3.3 ADJUST AND CLEAN

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

END OF SECTION

SECTION 08331

OVERHEAD COILING DOORS AND GRILLES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Advanced Performance Overhead Coiling Grille.
- 1.2 RELATED SECTIONS
 - A. Section 05500 Metal Fabrications: Support framing and framed opening.
 - B. Section 06200 Finish Carpentry: Wood jamb and head trim.
 - C. Section 08710 Door Hardware: Product Requirements for cylinder core and keys.
 - D. Section 16130 Raceway and Boxes: Conduit from electric circuit to grille operator and from grille operator to control station.
 - E. Section 16150 Wiring Connections: Power to disconnect.

1.3 REFERENCES

- A. ASTM A 666 Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- B. ASTM A 924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- C. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NEMA ICS 2 Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
- G. NEMA MG 1 Motors and Generators.
- 1.4 SUBMITTALS
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.
 - D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.
 - F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Install in areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship and installation is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.
- 1.7 COORDINATION
 - A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.8 WARRANTY

A. Motor 5 year limited warranty; other components 2 year or 300,000 cycle limited warranty.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
 - A. WalkThru Garage Doors, Inc. 11610 County Road 42, Tecumseh, ON N8N 2MI. Toll Free: 1 (888) 239-3416. <u>www.walkthrugaragedoors.com</u> Email: <u>walkthru@primus.ca</u>
 - B. Roll-Up Garage door to provide egress door with panic bar installed.
 - C. Requests for substitutions will be considered in accordance with provisions of Section 01600.
 - 1. Guides:
 - a. Extruded aluminum shapes with retainer grooves and continuous silicone treated wool-pile strips or PVC inserts to reduce noise and assist operation.
 - b. Guides face mounted on adjacent construction.
 - c. Guides free standing with tubular steel support frames supplied with grilles.
 - 2. Brackets: Minimum 3/16 inch (4.8 mm) steel to support barrel, counterbalance and hood as applicable.
 - 3. Counterbalance: Per manufacturer installation.
 - 4. Hood:

- a. Aluminum, black anodized with intermediate supports as required.
- 5. Electric Motor with Emergency Egress: Provide code compliant emergency egress operator system with self-locking mechanism that automatically unlocks, automatically releases, and opens grille fully to permit passage if power is not available. Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
- 6. Mounting:
 - a. Front of hood.
 - b. Mounting Left Hand or Right Hand.
- 7. Release: Push/Pull Emergency Release Button.
 - a. Surface mount.
- 8. Entrapment Protection:
 - a. 2 wire electric sensing edge
 - b. Photo cell operation.
- 9. Control accessories: Control Panel is to be supplied at same voltage as operator selected.
- 10. Locking: Model 670 egress grille self-locking mechanism to prevent forced opening of a closed grille that does not interfere with normal electric operation but fail safe for emergency operation.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify opening sizes, tolerances and conditions are acceptable.
 - B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
 - C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.2 PREPARATION
 - A. Clean surfaces thoroughly prior to installation.
 - B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.3 INSTALLATION
 - A. Install in accordance with manufacturer's instructions.
 - B. Install perimeter trim and closures.
- 3.4 ADJUSTING
 - A. Test security grilles for proper operation and adjust as necessary to provide proper operation without binding or distortion.

- B. Adjust hardware and operating assemblies for smooth and noiseless operation.
- 3.5 CLEANING
 - A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
 - B. Remove labels and visible markings.
 - C. Touch-up, repair or replace damaged products before Substantial Completion.
- 3.6 **PROTECTION**
 - A. Protect installed products until completion of project.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Exterior entrance systems.
 - 2. Exterior storefront systems.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Door hardware is furnished under Section 08710.
- 1.3 RELATED SECTIONS
 - A. Division 7 Section Joint Sealants: Joint sealants installed as part of aluminum entrance systems.
 - B. Division 8 Section Door Hardware.
 - C. Division 8 Section Glazing: Glazing requirements.

1.4 SYSTEM DESCRIPTION

- A. Provide aluminum entrance systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- D. Wind Loads: Provide entrance systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of

ALUMINUM ENTRANCES AND STOREFRONTS 08410-1

authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

- 1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.
- 2. Static-Pressure Test Performance: Provide entrance systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E330.
 - a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
 - b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.
- E. Seismic Loads: Provide entrance systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.
- F. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
 - 1. Provide a minimum 1/8 inch (3.18 mm) clearance between members and top of glazing or other fixed part immediately below.
 - 2. Provide a minimum 1/16 inch (1.59 mm) clearance between members and operable windows and doors.
- G. Live Loads: Provide entrance systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- H. Air Infiltration: Provide entrance systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).
- I. Water Penetration: Provide entrance systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa). Water leakage is defined as follows:
 - 1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water

controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

- J. Thermal Movements: Provide entrance systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- K. Structural-Support Movement: Provide entrance systems that accommodate structural movements including, but not limited to, sway and deflection.
- L. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
- M. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.
- N. Dimensional Tolerances: Provide entrance systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: Submit shop drawings for entrance systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
- D. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- E. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6 inch (150 mm) lengths of full-size components and showing details of the following:

- 1. Joinery.
- 2. Anchorage.
- 3. Expansion provisions.
- 4. Glazing.
- 5. Flashing and drainage.
- F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- G. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- H. Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.
- I. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance systems with requirements based on comprehensive testing of current systems.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance systems similar to those required for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Prepare data for entrance systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Source Limitations: Obtain each type of entrance system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

- 1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. All entrances shall be labeled or certified in order to show compliance with the following:
 - 1. Product samples used for determining performance shall be production line units or representative of units as purchased by the consumer or contractor.
 - a. U-factors shall be determined in accordance with AAMA 1503 or NFRC 100. U-factor shall be determined by an independent laboratory accredited by a nationally recognized accreditation organization and shall be certified by the manufacturer.
 - b. Solar heat gain coefficient (SHGC) for the overall area shall be determined in accordance with NFRC 200. Solar heat gain coefficient shall be determined by an independent laboratory accredited by a nationally recognized accreditation organization and shall be certified by the manufacturer.
 - c. Visible light transmittance shall be determined in accordance with NFRC 200. Visible light transmittance shall be determined by an independent laboratory accredited by a nationally recognized accreditation organization and shall be certified by the manufacturer.
- F. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.7 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.

1.8 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 entrance systems that fail 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. Failure of operating components to function normally.
- 5. Water leakage through fixed glazing and frame areas.
- C. Warranty Period: 2 years from date of Substantial Completion.

PRODUCTS

1.9 MANUFACTURERS

- A. Provide the following:
 - 1. Framing System: Trifab VG 451T of Kawneer Company, Inc. or equal.
 - 2. Doors: 350 Standard Entrance Medium Stile of Kawneer Company, Inc. or equal.

1.10 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B209 (ASTM B209M).
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221 (ASTM B221M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B429.
 - 4. Bars, Rods, and Wire: ASTM B211 (ASTM B211M).
 - 5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with ASTM A36 (ASTM A36M) for structural shapes, plates, and bars; ASTM A611 for cold-rolled sheet and strip; or ASTM A570 (ASTM A570M) for hot-rolled sheet and strip.
- C. Glazing as specified in Section 08800.
- D. 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.
- E. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

- F. Sealants and joint fillers for joints at perimeter of entrance systems as specified in Section 07900.
- G. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762 mm) thickness per coat.

1.11 COMPONENTS

- A. Doors: Provide manufacturer's standard 1-3/4 inch thick glazed doors with minimum 0.250 inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
 - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
 - 2. Stile Design: Medium stile; 3-1/2 inch (88.9 mm) nominal width.
- B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.
- C. 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.
 - 2. 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.
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123 or ASTM A153 requirements.
- E. Concealed Flashing: Dead-soft, 0.018 inch (0.457 mm) thick stainless steel, complying with ASTM A666, of type selected by manufacturer for compatibility with system.
- F. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
 - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D2000 requirements or molded PVC complying with ASTM D2287 requirements.
 - 2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

1.12 FABRICATION

- A. 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 and 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. 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.
- H. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
 - 1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

1.13 ALUMINUM FINISHES

A. 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. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: Manufacturer standard color selected by the Architect.

1.14 STEEL PRIMING

- A. 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.

EXECUTION

1.15 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

1.16 INSTALLATION

A. Comply with manufacturer's written instructions for protecting, handling, and installing entrance systems. 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 Section 07900.
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- G. Install glazing to comply with requirements of Section 08800, unless otherwise indicated.
- H. Install perimeter sealant to comply with requirements of Section 07900, unless otherwise indicated.
- I. Erection Tolerances: Install entrance systems 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 (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

1.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field quality-control testing indicated.

- B. Water Spray Test: After completing the installation of test areas indicated, test storefront system for water penetration according to AAMA 501.2 requirements.
- C. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

1.18 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

1.19 **PROTECTION**

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 08540

COMPOSITE WINDOWS

PART 1 - GENERAL

- 1.1 SUMMARY
- A. Section Includes: Composite-framed windows of the following types: Awning Window, Picture Window, Sliding Patio Door and Fixed Patio Door.
- B. Related Sections: Section(s) related to this section include:
 - 1. Division 4 Section Unit Masonry Assemblies.
 - 2. Division 7 Section Joint Sealants: Spray foam sealant.
 - 3. Division 8 Section Glazing.

1.2 REFERENCES

- A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 502 Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 - 2. AAMA 615 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Plastic Profiles.
 - 3. NAFS North American Fenestration Standard/Specification for windows, doors and skylights.
- C. Andersen Unit Installation Guide.
- D. ASTM International (ASTM):
 - 1. ASTM C1036 Standard Specification for Flat Glass.
 - 2. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

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- 3. ASTM D2244 Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
- 4. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 5. ASTM E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls.
- 6. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
- 7. ASTM F2090 Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms.
- E. Insulating Glass Certification Council (IGCC):
 - 1. Insulating Glass Unit Certification.
- F. Insulating Glass Manufacturers Alliance of Canada (IGMAC) and Canadian General Standards Board (CGSB):
 - 1. Insulating Glass Units Standard CAN/CGSB 12.8-97.
- G. International Standards Organization (ISO):
 - 1. ISO 14021 Environmental Labels and Declarations -- Self-Declared Environmental Claims (Type II Environmental Labeling).
- H. National Fenestration Rating Council (NFRC):
 - 1. NFRC 100 Procedure for Determining Fenestration Product U-factors.
 - 2. NFRC 200 Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- I. U.S. Environmental Protection Agency (EPA):
 - 1. ENERGY STAR.
- J. Window and Door Manufacturers Association (WDMA):
 - 1. WDMA Hallmark Certification Program for Manufacturers

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Conduct pre-installation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.
- 1.4 PERFORMANCE REQUIREMENTS
- A. Structural Performance Requirements:
 - 1. Comply with requirements of NAFS.

- B. Environmental Performance Requirements: N/A
- 1.5 SUBMITTALS
 - A. Product Data: For each type of product required.
 - B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of walls, specified loads, flashings, vents, sealants, and interfaces with all materials not supplied by the window manufacturer, and identification of proposed component parts and finishes.
- C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.
- D. Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- F. Manufacturer's Instructions: Manufacturer installation, storage, and other instructions.
- G. Sustainable Design Submittals in Compliance with ISO 14021.
- H. Qualification Statements: For manufacturer and installer.
- 1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications:
 - 1. Member in good standing of The Insulating Glass Certification Council (IGCC).
 - 2. Hallmark Certified Manufacturer and member in good standing of the Window and Door Manufacturers Association (WDMA).
 - 3. U.S. ENERGY STAR Partner.
 - 4. Capable of demonstrating an extended history of window and door design, production and innovation.
- B. Installer Qualifications:
 - 1. Minimum five years' experience in the commercial installation of products required for the Project.
 - 2. Experience on at least five projects of similar size, type and complexity as the Project.
 - 3. An entity utilizing workers competent in techniques required by manufacturer for product types and applications indicated.

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- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver materials to Project in manufacturer's original unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials and accessories protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer off ground, under cover and not exposed to weather and construction activities.
- 1.8 WARRANTY
- A. Special Warranty: Manufacturer's transferrable, non-prorated limited warranty.
 - 1. Warranty Period, Glass: 20 years.
 - 2. Warranty Period, Non-Glass Parts: 10 years.
 - 3. Warranty Period, Color Fade: 5 years.
- B. Special Warranty: Installer's standard form in which installer agrees to repair or replace composite windows that fail due to poor workmanship or faulty installation within the specified warranty period.
 - 1. Warranty Period: 1 years from date of Substantial Completion.

PART 2 - PRODUCT

2.1 COMPOSITE WINDOWS

- A. General: Provide composite windows complying with the performance requirements indicated and tested according to NAFS.
- B. Product: MI Window.
 - 1 Sliding Window 1280 Series.
 - 2 Picture Window 4300 Series.
- C. Substitution Limitations: Substitutions accepts with submittal approval by Architect.

2.2 MATERIALS

- A. Material Composition: Multi-hollow rigid extrusions of polyvinylchloride (PVC) with the manufacturer's standard wall thickness.
- B. Interior Color: Manufacturer standard color, White.

- C. Exterior Color: Manufacturer standard color, White at all (White and Black sidings) sidings and Black at brick only.
- D. Exterior Color Retention: Resist fading with a change of no more than 5 Delta E units over 10 years in compliance with color retention provisions of AAMA 615 and ASTM D2244.
- 2.3 WINDOWS
- A. Window Type: Awning, Picture & Patio door as indicated on Drawings and Window Schedule.
- B. Performance Requirements: Comply with NAFS.
 - 1. Picture, Performance Class and Grade: LC-PG40 (95-1/2 inches by 71-1/2 inches).
 - 2. Sliding Window, Performance Class and Grade: LC-PG30 (95-1/3 inches by 95-1/2 inches).
- C. Air Infiltration Requirements:1. Air Infiltration Rate: <0.2 cfm/sf².
- D. Environmental Qualifications:
 - 1. ENERGY STAR performance.
 - 2. Indoor air quality performance.
- E. Weatherstrip Type and Material: Manufacturer's standard.
- F. Weatherstrip Type and Material: Manufacturer's standard.
- G. Overall Depth: 3-1/4 inches (82.6 mm) for Awning Window, 2-7/8" (73.03mm) for Picture Window and 4-3/4" (120.65 mm) for Sliding Patio Door and Fixed Patio Door.
- H. Attachment Flange: Manufacturer's standard or per drawing details.
- I. Hardware:
 - 1. Hardware Type and Material: Mortise type latch and outside pull with integral color.
 - 2. Rollers and Guides Type and Material: Adjustable tandem roller with corrosion resistant steel ball bearing with extruded glide track.
 - 3. Vent Limitation Hardware: Provide fixed vent limiters to limit sash travel to less than 4 inches maximum clear opening.

- 2.4 GLAZING Low-E glass with Argon gas.
- A. Thermal Transmission (U-Factor), NFRC 100:
 - 1. Picture Window 0.28 without grids.
 - 2. Sliding Window 0.28 without grids.
- B. Solar Heat Gain Coefficient (SHGC), NFRC 200:
 - 1. Picture Window 0.31 without grids.
 - 2. Sliding Window -0.32 without grids.
- C. Visible Light Transmittance (VLT), NFRC 200:
 - 1. Picture Window 0.59 without grids.
 - 2. Sliding Window 0.57 without grids.
- D. Sound Transmission Class (STC), ASTM E90:
 - 1. Picture Window 28
 - 2. Sliding Window 28
- E. Glass Units: Provide ³/₄" thick insulated glass units certified through Insulating Glass Certification Council as conforming to the requirements of IGCC and ASTM E2190.
 - 1. Manufacturer Designation: Low-E insulated w/Argon.
 - 2. Seal and Spacer Type: Manufacturer's standard.
 - 3. Glass Type: Flat glass, ASTM C1036 or Heat strengthened tempered glass where applicable, ASTM C1048.
 - 4. Glass Pattern: None.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all substrate conditions are suitable for installation in compliance with manufacturer's recommendations.
- B. Do not begin installation until substrates have been properly prepared and any conditions not in compliance with manufacturer's recommendations have been corrected.
- 3.2 INSTALLATION

- A. General: Comply with manufacturer's product recommendations, including but not limited to the Andersen Unit Installation Guide, and installation information in product literature and on product packaging. Comply with Drawings and Shop Drawings for installing windows, hardware, accessories, and other components.
- B. Install windows plumb, level and square. Anchor windows securely to structure in correct orientation to flashing and adjacent construction as indicated. Comply with installation instructions for proper flashing integration of window into wall system. Install windows to drain water penetration to the exterior.
- C. Adjust sashes, insect screens, ventilators, hardware and accessories as applicable for correct fit. Adjust weatherstrip for smooth operation and weather-tight closure.
- 3.3 FIELD QUALITY CONTROL
- A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for observation of product installation in accordance with manufacturer's recommendations.

1. Site Visits: 3 (1-preconstruction, 1 – construction & 1- post construction).

- B. Field Testing: Provide field testing of installed units.
 - 1. Test units in compliance with AAMA 502.
 - 2. Use test equipment calibrated according to ASTM E1105.
- 3.4 CLEANING
- A. Remove protective films and non-permanent labels prior to 90 days after installation.
- B. Remove excess sealant, soiling, dirt and other substances. Clean window frame and glass surfaces. Avoid damaging coatings and finishes.
- C. Touch-up, repair or replace glass or other window components broken, scratched or damaged during construction prior to Substantial Completion.
- D. Remove and lawfully dispose of construction debris from Project site.
- 3.5 **PROTECTION**
- A. Protect installed windows and finish surfaces from damage during construction until completion of Project and acceptance by Owner.

END OF SECTION

COMPOSITE WINDOWS 08540-8

SECTION 08710 DOOR HARDWARE

PART 1 - GENERAL

1.01 GENERAL REFERENCE

A. The work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.

- 1.02 DESCRIPTION OF WORK
- A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.
- B. The principle work of this Section includes, but may not be limited to, the following:
 - 1. Furnish and deliver to the job site all finish hard ware required for the work under this Contract, as hereinafter specified and scheduled.
 - 2. Furnish all required templates and schedules.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Installation of Door Hardware.
- B. Steel Doors & Frames.
- C. Flush Wood Doors.
- D. Stile and Rail Wood Doors.
- E. Aluminum Entrances and Storefronts.
- F. Electrical: Wiring for electrified hardware.

1.04 SAMPLES AND PRODUCT DATA

- A. Samples: Submit samples as requested by the Architect of any materials specified herein. Samples shall be clearly marked with the manufacturer's name and number and with the schedule number. Samples shall be returned to the supplier after being reviewed.
- B. Product Data: Include with the Door Hardware Submittal for approval a complete set of manufacturer's product data, consisting of catalogue cuts as descriptive data, UL listings, and other pertinent technical data required for complete product and product use information.

1.05 SCHEDULES AND TEMPLATES

- A. Hardware Schedules: Submit to the Architect/Specifier for approval a complete Electronic Hardware Schedule. The Schedule shall be in DHI vertical format and shall include the manufacturers' numbers, types, sizes, and installation location of all hardware required to complete the job. The Hardware Schedule shall list the Specification Hardware Set Number next to the Schedule Heading Number and shall include a Door Index listing the Schedule Heading Number.
- B. Provide Bill of Materials index consisting of all hardware, manufacturers and quantities of submitted items.
- C. Catalogue Cuts: Include with the Schedule two sets of catalogue cuts, together with product data sheets, of all hardware items.
- D. Templates: Furnish templates to door and frame manufacturers sufficiently in advance so as not to impede the progress of the work. However, no templates shall be issued or materials ordered until the Hardware Schedule has been approved.
- E. Samples: Submit samples as requested by the Architect of any materials Specified herein. Samples shall be clearly marked with the manufacturer's

name and number and with the schedule number. Samples shall be returned to the supplier after being reviewed.

- F. Shop Drawings: Details of electrified door hardware, indicating the following:
 - 1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. System schematic.
 - b. Point-to-point wiring diagram.
 - c. Riser diagram.
 - d. Elevation of each door.
 - 2. Detail interface between electrified door hardware and fire alarm access control and building control and security systems.
- 1.06 PACKING AND MARKING
- A. All hardware shall be delivered to the site in packages which are legibly marked with labels indicating the manufacturers' numbers, types and sizes, and with the Hardware Schedule reference number.
- B. Each hardware item shall be wrapped together with all screws, bolts, and fastenings necessary for its proper installation.
- 1.07 DELIVERY AND STORAGE
- A. The Contractor shall receive, check against invoices, and store all hardware at the job.
- B. Delivery of hardware to the job shall be made in accordance with the Contractor's instructions.
- C. The Contractor shall provide adequate locked storage space with shelving, and shall be responsible for all items of hardware after receipt from the supplier. He shall replace all lost or damaged hardware at his own expense.

1.08 SUPPLIER'S QUALIFICATIONS AND RESPONSIBILITIES

- A. In order to qualify for work under this Section, hardware supplier must employ on a full time basis a regular member of the Society of Architectural Hardware Consultants or equal, to prepare detailed schedules, check shop drawings and supervise installation.
- B. Hardware Supplier shall be responsible for the accuracy of the quantities, sizes, finish and proper hardware to be furnished, whether specifically listed or not, and shall be responsible for determining all details, such as hand of doors, bevel of locks, etc.
- C. Hardware Supplier shall furnish all Door Hardware required for the building and not furnished under another Section. Hardware not specifically listed for a particular opening shall be furnished under this Section and shall be same as hardware for similar openings elsewhere in the building.

1.09 SPECIAL REQUIREMENTS

- A. Hardware Supplier shall determine conditions and materials of all doors and frames for proper application of hardware.
- B. The Hardware Schedule shall list the actual product series numbers. Supplier is required to follow manufacturer's catalogue requirements for the actual size of door closers, brackets, and door holders. All door sizes are to be noted on the Door Schedule and all hardware shall be in strict accordance with requirements of height, width and thickness.
- C. Tools for Maintenance: All special tools packed with hardware items shall be saved and turned over to the Owner upon completion of the Work.
- D. All trim for door locks to hazardous areas such as Mechanical Rooms, Electrical Rooms, etc., shall have a tactile surface to comply with requirements of the Authority Having Jurisdiction.
- E. Lock fronts, flush bolt faces, and strikes shall be beveled in accordance with manufacturer's standards.
- F. Interface all electrified hardware with Building Fire Alarm and/or Security System.

- G. Handing shall be verified by Supplier.
- H. Hardware not specifically listed for a particular opening shall be the same as hardware scheduled for similar openings.
- 1.10 KEYS AND KEYING
 - A. Grand Masterkey and Construction Masterkey all locks and cylinders to a new Interchangeable Core System as directed by the Owner.
 - B. The hardware supplier shall prepare an internal Keying Legend for the purpose of discussion in establishing the Permanent Keying Hierarchy. General Contractor shall arrange for a meeting with the Owner to finalize keying for this job. Owner shall approve the final Keying Legend Submittal.
 - C. Furnish the following quantities of keys:

Four	(4) Grand Masterkeys
Twelve	(12) Masterkeys each set
Three	(3) Change Keys each lock or cylinder.
Four	(4) Construction Masterkeys.
Two	(2) Control Keys

- D. Keys shall be Stamped "Do Not Duplicate".
- E. Furnish one Key Cabinet, including envelopes, labels, tags with self-locking clips, receipt forms, three-way index, temporary markers, permanent markers, and standard metal hinged- type panel type cabinet for wall mounting. Key Cabinet shall have a capacity of 150 percent more than the number of cylinders under this Contract.

1.11 WARRANTIES

- A. Attention is directed to provisions of the GENERAL CONDITIONS regarding guarantees and warranties for work under this Contract.
- B. Manufacturers shall provide their warranties for work under this Section. However, such warranties shall be in addition to, and not in lieu of, all other liabilities which the

manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS AND WORKMANSHIP

- A. All hardware shall be of the best grade of solid metal, entirely free from imperfection. Hardware shall be furnished as specified herein.
- B. It is the responsibility of the Hardware Supplier to furnish the specified size and weight of hardware and fastenings, and the proper function of hardware in each case. If doors are labeled, proper UL-approved hardware shall be supplied.

2.02 ACCEPTABLE MANUFACTURERS

A. The numbers used below to set a standard of quality for the major products for this project are taken from the catalogs of those manufacturers whose names appear in parentheses. Equivalent products of the other manufacturers are acceptable provided said products are equal to the items specified in quality, weight, design and function, and approved by the Architect/Specifier.

ITEM	MANUFACTURERS
Butts	(McKinney) PDQ, Inox, Stanley
Locksets	(PDQ) Dorma, Inox, Yale
Cylindrical Sets	(PDQ) Dorma, Inox, Yale
Safloks	(Kaba)
Exit Devices	(PDQ) Dorma, Yale
Door Closers	(PDG) Dorma, Yale
Door Pulls	(Rockwood) Hager, Inox, Trimco
Protection Plates (R	ockwood) Hager, Inox, Trimco Floor
& Wall Stops (Rockwood) Hage	er, Inox, Trimco OH Stops & Stays
(ABH) GJ, Rixson	
Flush Bolts	(Rockwood) Hager, Inox, Trimco
Gasketing/Thresholds	(NGP) Pemko, Zero

ADA Power Operators

(Motion Access) Horton, LCN

2.03 HINGES

- A. Number of hinges per door: Two hinges or pivots are to be provided for doors up to and including five feet in height, and an additional hinge for each two-and-one- half feet (2-1/2'), or fraction thereof, of the height of the door.
- B. Continuous Hinges shall be stainless steel, ABH A500. Prep for Electric Power Transfers, where required.
- C. Hinges for exterior doors shall be stainless steel, McKinney TA386 5" x 4.5" x NRP.
- D. Hinges for interior doors shall be steel, McKinney "TA" Series, sized as follows (unless otherwise noted):

Door		Hinge	Hinge
Thickness	Door Width	Weight	<u>Height</u>
1-3/8 in (if not by door manufacturer)	Any	Regular Weight	3-1/2"
1-3/4 in.	Under 39 in.	Regular Weight	4-1/2"
1-3/4 in.	39-in. and over	Extra Heavy Wt.	5"

Width of hinges shall be determined by trim conditions.

- E. Hinges are to be of Three knuckle concealed bearing design, equipped with full radial thrust and lateral bearing assemblies. The bearing assemblies are to be permanently lubricated and sealed. All hinges are to have positive non-rising pins and a hole in the bottom tip for easy pin removal.
- F. Furnish "NRP" Butts for all reverse bevel lockable doors.
- 2.04 LOCKSETS
- A. All Locksets shall be Heavy Duty Mortise type, PDQ "MR-Miami" in functions as noted in the HW Sets below.
- B. All locks shall be furnished with 2-3/4 in. backset and wrought box strikes.

- C. Tubular Sets shall be PDQ "SM-Miami" Series in functions as noted in the HW Sets below. Furnish with "T" Strikes & Adjustable Strikes.
- D. Furnish cylinders for all locking devices on this job.

2.05 SAFLOKS

A. Safloks shall be heavy-duty mortise type, "Quantum IV" Series and shall be provided with the following options/features:

ANSI Lockcase Deadbolt Toggle Feature Gala Lever ASA Strike MT Escutcheon (3) FOBS

B. 1 System Software. Includes software package, database configuration and lock programming unit.
1 Software Training. Onsite installation and Training of Software. 250 FOBS.
5 Additional Locks for Owner's Attic Stock.

2.06 EXIT DEVICES

- A. Exit Devices shall be PDQ "6200" Series in functions as noted in the sets below.
- B. Furnish Cylinder Dogging for all non fire rated Exit Devices.
- C. Lever Trim shall match that of Locksets.
- D. Mullions shall be PDQ 9200MF-11.
- 2.07 CLOSERS
- A. Overhead surface closers shall be PDQ, non sized, ADA approved, as follows:

Exterior Doors	7100-EDAHO-BP
Interior Doors	7100 Series. Furnish Arm functions as noted in
	the HW Sets below
Unit Entries	5300 Series

- B. Unless specified otherwise, closers shall be mounted on that side of the opening least objectionable to public view. Provide parallel arm type at reverse bevel conditions.
- C. The Hardware Schedule shall note the degrees of opening for all doors with closers.
- 2.08 PROTECTION PLATES
 - A. Kick Plates shall be Rockwood K1050-8", unless noted otherwise; width of plate shall be determined by the width of the door: plates shall be 2" LWOD on single doors, and 1" LWOD on pairs of doors. Armor Plates shall be K1062-34" High.
- 2.09 DOOR PULLS
- A. Offset Pulls shall be Rockwood BF158 x Type 12XHD.
- B. Straight Pulls shall be Rockwood 112 x Type 12XHD.
- C. Flush Pulls shall be Rockwood 94.
- D. Special Pulls shall be Rockwood RM3950-MP-79" x Type 12XHD. Posts and Thru Bolts shall be Black.
- 2.10 STOPS
- A. Wall Stops shall be provided at 90-degree openings. Wall Stops shall be equal to Rockwood 405.

- B. Floor Stops shall be provided where applicable and where conditions allow. Floor Stops shall be equal to Rockwood 446.
- C. Post Stops shall be ABH RM250.
- D. Where neither a wall stop nor a floor stop can be used, furnish an Overhead Stop equal to ABH 4400 Series.
- E. Overhead Stops for exterior doors shall be ABH N9020. Special Template for Top Jamb Mount Closers.
- 2.11 GASKETING/THRESHOLDS
- A. Gasketing shall be NGP 5020C x full perimeter.
- B. Sweeps shall be NGP 200SA.
- C. Automatic Door Bottoms shall be NGP 320/423. If mortise type conflicts with fire rating, door construction or other hardware, furnish NGP 520 surface type.
- D. Overlapping Astragals shall be NGP 139SP. Refer to ASA Strike dimension: Astragals shall not be notched.
- E. Sets Astragals shall be NGP 600A (2 pieces).
- F. Thresholds shall be NGP 896S.
- G. Flat Thresholds shall be NGP 513.
- H. All Thresholds shall be cut-in around mullions, frame members, stops (not butted up against) and shall provide a continuous surface across the full width of the opening from jamb to jamb. All Thresholds shall be properly sealed, grouted and/or caulked.

2.12 ADA POWER OPERATORS

A. ADA Power Operators shall be Motion Access Condor Series x (2) BEA 10MS08 (Weatherproof Housing at exterior). Locate as directed. Operators shall be furnished and installed by factory trained, AAADM Certified technicians. Provide necessary interface modules/relays for integration with Electric Hardware and Access Control System.

- 2.13 MISCELLANEOUS
- A. Door Silencers for hollow metal frames shall be equal to Rockwood 608. Furnish (3) for Single Doors, (2) for Pairs of Doors.
- B. Catches shall be ABH RM11.
- C. Viewers shall be Rockwood 627.
- D. Manual Flush Bolts shall be Rockwood 555-12". Furnish 570 Dustproof Strike.
- E. Electric Power Transfers shall be ABH PT1000-EZ.

2.14 FINISHES

- A. Unless otherwise noted, finish shall be as follows:
 - 1. Butts (interior), Safloks, Cylinders, Wall/Floor Stops, Flush Bolts, shall be satin nickel chrome (US26D).
 - Butts (exterior), Locksets, Tubular Sets, Exit Devices, Pulls, Protection Plates, Catches, Post Stops etc. shall be satin stainless steel (US32D). Plates shall be B.S. .062 ga. Furnish Antimicrobial finish for all Levers, Exit Devices, Pushbars, Pulls and Push Plates, where available.
 - 3. Thresholds shall be Aluminum.
 - 4. Closers shall be powder coated aluminum (689).
 - 5. Adhesive Gasketing shall be Black.

PART 3 - EXECUTION

3.01 MOUNTING POSITIONS

- A. Heights given are center line heights from finished floor.
- B. Comply with recommendations of Builders' Hardware Manufacturers Association (BHMA), subject to approval, for heights of items not indicated; height is to center line unless otherwise indicated.
 - 1. Top Hinge: To jamb manufacturer's standard, but not greater than 10 in. from head of frame to center line of hinge.
 - 2. Bottom Hinge: To jamb manufacturer's standard, but not greater than 12-1/2 in. from floor to center line of hinge.
 - 3. Intermediate Hinge: Equally spaced between top and bottom hinges.
 - 4. Locksets/Exit Devices: 40 in. to center of lever/bar or per door manufacturers standards.
 - 5. Viewers: 60" above finish floor. Additional Viewer at ADA Units: 43".

C. Set hardware plumb, level, and in exact alignment and location. Conceal and countersink fasteners wherever possible.

3.02 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust hardware items to work smoothly, easily and correctly.
- B. Clean exposed surfaces using non-abrasive materials and methods recommended by the manufacturer of the hardware being cleaned. Remove and replace work which cannot be successfully cleaned, as judged solely by the Architect.
- C. Provide temporary protection to ensure work being done without damage or deterioration at time of final acceptance. Levers shall be kept covered and other hardware shall be protected against damage until Substantial Completion

of the Project. Remove protections and reclean as necessary immediately prior to final acceptance.

3.03 COMPLETION AND CONTINUED MAINTENANCE

A. Before completion of work of this Section, inspect work with Architect and adjust and correct work to leave operating parts in perfect operating condition, jointing to adjacent material tight, surfaces without blemishes or stains, and defects or damaged work replaced or corrected.

3.04 HARDWARE SETS

- A. Each Hardware Set listed below represents the complete hardware requirements for one opening (single door or pair of doors). Furnish the quantities required of each set for the work.
- B. The numbers used opposite locksets/exit devices to identify the function are PDQ numbers. Where "KN" is indicated, furnish outside lever with Knurling.
- C. HW Sets that do not appear on the Door Schedule shall be considered "Not Used" and/or saved for future use.
- D. Security items are listed below the individual Hardware Sets for Hardware Set coordination and templating for doors and frames only. Refer to Security Section for details.

HW-U1 - Typical Office Door

Saflok
 Closer
 Kick Plate
 Stop
 Post, as required
 Set Gasketing
 Automatic Door Bottom

<u>HW-1</u> – Stair Egress Butts Heav

Heavy Weight

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1 Exit Device 6200-R-F-FEC-6-EW-14 (Passage)
1 Closer
1 Kick Plate
1 Stop
1 Set Gasketing
1 Automatic Door Bottom

Prepare Door/Frame for Future Electrification

<u>HW-2</u> - Storage Rooms and Utility Closets
Butts
1 Lockset
1 Closer
1 Kick Plate
1 Stop
1 Set Gasketing

HW-3 – Exterior Storage

Butts	HW
1 Electric Lockset	199A-REX (Fail Secure)
1 Electric Power Transfer	
1 Closer	
1 Kick Plate	
1 Stop	
1 Set Gasketing	
CR, DC & PS	By Security
24V	

<u>HW- 4</u> – Stair Egress Exit	
Butts	Heavy Weight
1 Exit Device	6200-R-F-FEC-6-EW-14 (Passage)

Magnetic Lock DynaLock 3101C-VOP (15 Sec Delay)
 Closer
 Kick Plate
 Stop
 Set Gasketing
 Automatic Door Bottom
 Interface with Building Fire Alarm System
 By Security

Heavy Weight

276 (Indicator)

HW-5 – Office Bathroom Doors

Butts 1 Privacy Set 1 Closer 1 Kickplate 1 Stop 1 Set Gasketing

<u>HW- 6 – Egress Storefront</u> 1 Continuous Hinge

Electric Exit Device
 Electric Power Transfer
 Power Supply

1 Pull 1ADA Power Operator 1 OH Stop Gasketing 1 Threshold CR & DC 120V 6202-R-FEC-6GP03 (less pull)-MLR-SS Special

By Door Manufacturer By Security

<u>HW- 7</u> All Hardware by OH Door and Folding Partition Manufacturer:

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1 Cylinder

As required

HW- 8 Butts 1 Push/Pull Bar Assembly 1 Closer 1 Stop Gasketing By D

By Door Manufacturer

- END OF SECTION -

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 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. Interior borrowed lites.
 - 5. Storefront framing.

1.2 RELATED SECTIONS

- A. Division 7 Section Joint Sealants.
- B. Division 8 Section Steel Doors And Frames.
- C. Division 8 Section Flush Wood Doors.
- D. Division 8 Section Aluminum Windows.
- E. Division 10 Section Toilet And Bath Accessories: Framed glass mirrors.

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 Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

- D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
- E. 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. 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 E1300, 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 (meters per second) at 33 feet (10 m) 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.
 - Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project, required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7, "Snow Loads."
 - c. 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.
 - d. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.
 1) Load Duration: 30 days.
 - e. 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 (25 mm), whichever is less.

- 1) For monolithic-glass lites heat treated to resist wind loads.
- 2) For insulating glass.
- 3) For laminated-glass lites.
- f. 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 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), 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 monolithic-glass lites, properties are based on units with lites 6 mm thick.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2 inch (13 mm) wide interspace.
 - Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x degrees F (W/sq. m x K).
 - 5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
 - 6. Solar Optical Properties: NFRC 300.
- E. Acoustical Requirements : Provide Sound Isolation glazing comprised of ³/₄" laminated glazing (Saflex TR-16-137 or equal), minimum of 2" air space, and 3/8" standard float glass at all window locations demising existing warehouse and new office / conference space as determined by Acoustical Engineer.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each glass product and glazing material indicated.
- B. Submit Samples: For the following products, in the form of 12 inch (300 mm) square samples for glass and of 12 inch (300 mm) long samples for sealants. Install sealant samples between two strips of material representative in color of the adjoining framing system.

- C. Submit Samples: For the following products, in the form of 12 inch (300 mm) square samples for glass.
 - 1. Each type of interior glass.
 - 2. Insulating glass for exterior window.
 - 3. For each color (except black) of exposed glazing sealant indicated.
- D. Submit Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- E. Submit Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- F. Submit 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.
- G. Submit Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- H. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
 - 1. Tinted float glass.
 - 2. Coated float glass.
 - 3. Insulating glass.
 - 4. Glazing sealants.
 - 5. Glazing gaskets.
- I. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.
- J. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

- B. 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.
- C. Source Limitations for Clear Glass: Obtain clear float glass from one primaryglass manufacturer.
- D. 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.
- E. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- F. 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 E548.
- G. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated, as documented according to ASTM E548.
 - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test elastomeric glazing sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesionin-peel, and indentation hardness.
- H. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.
 - 1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - a. Perform tests under normal environmental conditions replicating those that will exist during installation.

- 2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).
- 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
- 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
- 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- I. 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.
- J. 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.
- K. 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 Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - 3. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."
- L. 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.
- M. Mockups: Before glazing, build mockups for selected glass product requested by the Architect to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

- 1. Build mockups in the typical window at brick wall assembly mockup location and of the size indicated or, if not indicated, as directed by the Architect.
- 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
- 3. Obtain Architect's approval of mockups before starting fabrication.
- 4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- N. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01200.

1.7 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 that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 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 degrees F (4.4 degrees C).

1.9 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.
- C. Installer's Warranty: All glass installed under the work of this section shall be guaranteed by the glazing subcontractor against leakage or water penetration, caused by poor workmanship, caulking or sealant failure, for a period of two years subsequent to final acceptance by the Owner.

PART 2 - PRODUCTS

2.1 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.2 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

2.3 INSULATING GLASS

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace and complying with ASTM E774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
 - 1. Provide Kind HS (heat-strengthened) 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. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:1. Polyisobutylene and polysulfide.

D. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.4 ELASTOMERIC GLAZING SEALANTS

- A. 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 C920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C920 classifications for type, grade, class, and uses.
 - 1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C920 for uses indicated.
- C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

- 1. Type 1, for glazing applications in which tape acts as the primary sealant.
- 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- C. Polyurethane Foam Tape: An open cell, high density polyurethane foam tape with micro-cellular structure; SGT-900 Series by Tremco or equal.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. 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).

2.7 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. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

- 1. Manufacturing and installation tolerances, including those for size, squareness, 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. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.
- B. 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.
- C. 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.
- D. 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.
- E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- F. 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.
- G. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- H. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) 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 and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8 inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

- I. 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.
- J. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.3 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.4 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a

weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- D. Interior glazing seal shall be polyurethane foam tape with silicone sealant.

3.6 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 days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.
- 3.7 INSULATING GLASS PRODUCT DATA SHEET

- A. Insulating Glass Unit -
 - 1. Vertical insulating glass units at exterior storefront framing system and window framing system, where indicated.
- B. Classification of Units: Class CBA. per ASTM E774.
- C. Air Space Width: Nominal 1/2 inch measured perpendicularly from surfaces of glass lites at unit's edge.
- D. Glass Specifications:
 - 1. Unit Thickness: 25.40 mm (1 inch nominal).
 - 2. Thickness of Each Light: 6.0 mm (0.23 inch).
 - 3. Uncoated Indoor Light: Kind HS (heat strengthened), Class 1 (clear).
 - 4. Coated Outdoor Light: Kind HS (heat strengthened), Condition C (other coated glass), class as specified below:
 - a. Class of Glass: Class 1 (clear).
 - b. Low-Emissivity Coating: Sputter coat on No. 2 surface.
 - 5. Nominal Performance Characteristics:
 - a. Visible Light Transmittance: Minimum 69 percent.
 - b. Solar Energy Transmittance: 32 percent.
 - c. Summer Daytime U-Value: Maximum 0.29.
 - d. Winter Nighttime U-Value: Maximum 0.29.
 - e. Shading Coefficient: Maximum 0.44.
 - f. Outdoor Visible Reflectance: Maximum12 percent.
- E. Product: Solarscreen VE1-2M by Viracon, Inc., Owatonna, MN; Solarban 60 by PPG, or equal.

3.8 INTERIOR GLASS SCHEDULE

A. Provide Type A interior glass unless noted:

Type A: 1/4 " Heat Treated (Tempered) / Clear Float Glass.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Interior gypsum wallboard.
 - 2. Cementitious (tile) backing units.
 - 3. Non-load-bearing steel framing.

1.2 RELATED SECTIONS

- A. Division 6 Section Rough Carpentry: For wood nailers, blocking, and furring.
- B. Division 7 Section Building Insulation: For insulation installed in gypsum board assemblies.
- C. Division 7 Section Firestopping: Firestopping systems and fire-resistance-rated joint sealants.
- D. Division 7 Section Joint Sealants: Building sealants except as specified in this section.

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 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product indicated.
 - 1. Submit manufacturer's limiting heights tables for non-load bearing studs indicating height limitations for all interior studs.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size sample in 12 inch (300 mm) long length for each trim accessory indicated.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fireresistance 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."
- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
 - 1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."
- C. Gypsum Board Finish Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Install mockups for the following applications:
 - a. Surfaces indicated to receive nontextured paint finishes.
 - 2. Simulate finished lighting conditions for review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 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.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Room Temperatures: Maintain not less than 40 degrees F (4 degrees C). Do not exceed 95 degrees F (35 degrees C) when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of the following:
 - 1. Steel Framing and Furring:
 - a. Clark Steel Framing Systems.
 - b. Dale Industries, Inc.; Dale/Incor.
 - c. Dietrich Industries, Inc.
 - d. MarinoWare; Division of Ware Ind.
 - e. National Gypsum Company.
 - f. Unimast, Inc.
 - 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 CEILING AND SOFFIT FRAMING

- A. Components: 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 (1.59 mm) diameter wire, or double strand of 0.0475 inch (1.21 mm) diameter wire.
- C. Hanger Attachments to Concrete: As follows:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
- D. Hangers: As follows:
 - 1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162 inch (4.12 mm) diameter.
 - Rod Hangers: ASTM A 510 (ASTM A 510M), mild carbon steel.
 a. Diameter: 1/4 inch (6.34 mm).
 - b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.

- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2 inch (12.7 mm) wide flange, with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 1. Depth: 2-1/2 inches (63.5 mm).
- F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 - 1. Cold Rolled Channels: 0.0538 inch (1.37 mm) bare steel thickness, with minimum 1/2 inch (12.7 mm) wide flange, 3/4 inch (19.1 mm) deep.
 - 2. Steel Studs: ASTM C 645.
 - a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
 - b. Depth: As indicated.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
 - a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
- G. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
 - b. Chicago Metallic Corporation System.
 - c. USG Interiors, Inc.; Drywall Suspension System.

2.3 STEEL PARTITION AND SOFFIT FRAMING

- A. Components: As follows:
 - 1. Comply with ASTM C 754 for conditions indicated.
 - 2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with manufacturer's standard corrosion-resistant zinc coating.
- B. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
 - 2. Depth: 7/8 inch (22.2 mm).
- C. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare metal thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.
- D. 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 36.
 - 1. Regular Type:
 - a. Thickness: 5/8 inch thick, unless noted otherwise.
 - b. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
 - c. Location: As indicated.
 - 2. Type X:
 - a. Thickness: 5/8 inch thick, unless noted otherwise.
 - b. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
 - c. Location: Where required for fire-resistance-rated assembly.
- C. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M.
 - 1. Core: As indicated.

2.5 CEMENTITIOUS BACKING UNITS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Cementitious Backer Units: ANSI A118.9 and C1288 or C1325.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. United States Gypsum Co.; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch (15.875 mm).

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners, unless otherwise indicated.
 - b. LC-Bead (J-Bead): Use at exposed panel edges.
 - c. Expansion (Control) Joint: Use where indicated and/or required.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. MM Systems Corporation.

- d. Pittcon Industries.
- 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), alloy 6063-T5.
- 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

- A. Comply with ASTM C 475.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 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, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat:
 - a. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - b. Level 2: Panels that are substrate for tile and where indicated on Drawings.
 - c. Level 3: Where indicated on Drawings.
 - d. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - e. Level 5: Not used in project.
- D. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping and setting-type, sandable topping compounds.
- E. Joint Compound for Cementitious Backer Units :
 - 1. Cementitious Backer Units: As recommended by manufacturer.

2.8 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:
 1. Acoustical Sealant for Exposed and Concealed Joints:

- a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
- b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- 2. Acoustical Sealant for Concealed Joints:
 - a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
 - b. Pecora Corp.; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.9 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Isolation Strip at Exterior Walls:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

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 concrete inserts and other devises indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLING 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.
- 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 rod 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 castin-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 (3 mm in 3.6 m) 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: maximum 48 inches (1219 mm) o.c.
 - 2. Carrying Channels (Main Runners): maximum 48 inches (1219 mm) o.c.
 - 3. Furring Channels (Furring Members): maximum 16 inches (406 mm) o.c.
- G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- 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 asphalt-felt or foam-gasket isolation strip between studs and wall.
 - 2. Where top track (runner) is parallel to metal deck flutes and is not completely covered by bottom flute, provide continuous 20 gage steel plate to span between flutes above track. Fasten plate to underside of metal deck.
 - 3. Where top runner (track) is indicated to be fastened to underside of a structural steel member, attach 20 gage steel Z-clips at 24 inches on center to bottom flange of structural steel member. If partition is offset from structural steel member, provide a continuous 14 gage steel plate attached at 24 inches on center, to bottom flange of structural steel member. Install clips and plates prior to application of sprayed-on fireproofing.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch (3 mm) 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 (13 mm) short of full height to provide perimeter relief.
 - 2. For fire-resistance-rated and STC-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.

- D. Install steel studs and furring at the following spacings:
 - 1. Single-Layer Construction: maximum 16 inches (406 mm) o.c., unless otherwise indicated.
 - 2. Multilayer Construction: maximum 16 inches (406 mm) o.c., unless otherwise indicated.
 - 3. Cementitious Backer Units: maximum 16 inches (406 mm) 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.
 - 2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2 inch (13 mm) 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.
 - 4. Over frames and through stud knock-outs, and within 12" above openings, install 1-1/2" cold rolled channel horizontal stiffener which extends at least one full 16" stud space beyond each jamb stud. Lock in place by rolling channel in knock-outs, then secure in place with tie wire.
- 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.
- H. Z-Furring Members:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced maximum 24 inches (610 mm) o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (600 mm) o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screwattach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (300 mm) from corner and cut insulation to fit.
 - 4. Until gypsum board is installed, hold insulation in place with 10 inch (250 mm) staples fabricated from 0.0625 inch (1.59 mm) diameter, tie wire and inserted through slot in web of member.

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 (1.5 mm) 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. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
- I. Form control and expansion joints with space between edges of adjoining gypsum panels.
- J. 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. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4 to 3/8 inch (6.4 to 9.5 mm) wide joints to install sealant.
- K. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4 to 1/2 inch (6.4 to 12.7 mm) 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. Provide 5/8 inch wide gap between sheathing panels at deflection joints, at exterior walls.

- L. STC-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.
- M. 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 (304.8 mm) o.c. for vertical applications.
- N. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) 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.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- 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 (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
- C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or

required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

- 1. Z-Furring Members: Apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
- D. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- E. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- F. Exterior Soffits and Ceilings: Apply exterior gypsum soffit board panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Install with 1/4 inch (6.4 mm) open space where panels abut other construction or structural penetrations.
 - 2. Fasten with corrosion-resistant screws.
- G. Cementitious Backer Units:
 - 1. Cementitious Backer Units: ANSI A108.11. Provide metal stud back-up at all horizontal and vertical joints in cementitious backer board units.
 - a. Change to water-resistant gypsum backing board beyond the "area subject to wetting" at an inside or outside corner only.
- H. Substrates for Epoxy Paint: For substrates indicated to receive epoxy paint finish, install water-resistant gypsum backing board panels with tapered edges taped and finished to produce a flat surface.

3.8 INSTALLING TRIM ACCESSORIES

- A. 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.
 - 1. In addition to the control joints required above, provide an additional 10 percent control joints for layout reasons, locations to be determined by the Architect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. 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, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
 - 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.
 - 3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
 - 4. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface. Provide Level 5 finish at the following areas:
 - a. Wall surfaces with a light cove at the ceiling level.
 - b. Wall surfaces that are lit with raking light or washed with lights.
 - c. Walls that are perpendicular to an exterior wall that have a window coming right up to the intersection of the interior and exterior walls.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.10 FIRE AND SMOKE RATED PARTITION IDENTIFICATION

- A. Provide painted stenciled lettering and numerals on each side of a fire and smoke rated wall to indicate the wall's hourly rating. (eg.: 2HR-FIRE, 1HR-SMOKE, etc.)
- B. Stenciled letters and numerals shall be 3 inches high, applied 12 inches above the scheduled accessible ceiling system and spaced 6 feet on center.

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 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

SECTION 09265

GYPSUM BOARD SHAFT-WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Shaft enclosures.
 - 2. Chase enclosures.

1.2 RELATED SECTIONS

A. Division 9 Section Gypsum Board Assemblies: Applying and finishing panels in gypsum board shaft-wall assemblies.

1.3 **DEFINITIONS**

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board construction not defined in this Section or in other referenced standards.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Provide gypsum board shaft-wall assemblies capable of withstanding the full air-pressure loads indicated for maximum heights of partitions without failing and while maintaining an airtight and smoke-tight seal. Evidence of failure includes deflections exceeding limits indicated, bending stresses causing studs to break or to distort, and end-reaction shear causing track (runners) to bend or to shear and studs to become crippled.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each gypsum board shaft-wall assembly indicated.
- B. Fire-Test-Response Reports: From a qualified independent testing and inspecting agency substantiating each gypsum board shaft-wall assembly's required fire-resistance rating.

- 1. Include data substantiating that elevator entrances and other items that penetrate each gypsum board shaft-wall assembly do not negate fire-resistance rating.
- C. Research/Evaluation Reports: Evidence of compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction that substantiate required fire-resistance rating for each gypsum board shaft-wall assembly.
- D. Acoustical-Test-Response Reports: From a qualified independent testing agency substantiating required STC rating for each gypsum board shaft-wall assembly.

1.6 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: 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."
- B. STC-Rated Assemblies: For gypsum board shaft-wall assemblies indicated to have STC ratings, provide assembly materials and construction complying with requirements of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination." Review methods and procedures for installing work related to gypsum board shaft-wall assemblies including, but not limited to, the following:
 - 1. Fasteners proposed for anchoring steel framing to building structure.
 - 2. Sprayed fire-resistive materials applied to structural framing.
 - 3. Elevator equipment, including hoistway doors, elevator call buttons, and elevator floor indicators.
 - 4. Wiring devices in shaft-wall assemblies.
 - 5. Doors and other items penetrating shaft-wall assemblies.
 - 6. Items supported by shaft-wall-assembly framing.
 - 7. Mechanical work enclosed within shaft-wall assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, and 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 on leveled supports off the ground to prevent sagging.

1.8 PROJECT CONDITIONS

A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 9 Section "Gypsum Board Assemblies."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following, modified as indicated Equivalent products of the other manufacturers are acceptable provided said products are equal to the item/ items specified in quality, weight, design and function, and approved by the Architect.
 - 1. American Gypsum Co.
 - 2. G-P Gypsum Corp.
 - 3. National Gypsum Company.
 - 4. United States Gypsum Co.

2.2 ASSEMBLY MATERIALS

- A. General: Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize endto-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
- B. Steel Framing: ASTM C 645.
 - 1. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized coating.
 - 2. Minimum Base Metal Thickness: 0.032 inch (20 gauge).
 - 3. Depth: As indicated.
- C. Gypsum Liner Panels: Manufacturer's proprietary liner panels in 1 inch (25.4 mm) thickness and with moisture-resistant paper faces.
- D. Gypsum Wallboard: ASTM C 36, core type as required by fire-resistance-rated assembly indicated.
 - 1. Edges: Tapered.

- E. Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- F. Gypsum Wallboard Joint-Treatment Materials: ASTM C 475 and as specified in Division 9 Section "Gypsum Board Assemblies."
- G. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- H. Track (Runner) Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. Postinstalled Expansion Anchors: Where indicated, provide expansion anchors with capability to sustain, without failure, a load equal to 5 times that imposed by shaft-wall assemblies, as determined by testing conducted by a qualified independent testing agency according to ASTM E 488.
- I. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."
- J. Sound Attenuation Blankets: ASTM C 665 for Type I, unfaced mineral-fiberblanket insulation produced by combining thermosetting resins with mineral fibers manufactured from slag or rock wool.

2.3 GYPSUM BOARD SHAFT WALL

- A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing and inspecting agency.
- B. Sustained Air-Pressure Loads: 5 lbf/sq. ft. (0.24 kPa).
- C. Deflection Limit: L/360.
- D. Studs: Manufacturer's standard profile for repetitive members and corner and end members and for fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated.
 - 2. Minimum Base Metal Thickness: 20 gauge minimum.
- E. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (51 mm), in depth matching studs.
 - 1. Minimum Base Metal Thickness: 20 gauge minimum.

- F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76.2 mm), in depth matching studs, and not less than 0.0329 (0.84 mm) thick.
- G. Room-Side Finish: As indicated.
- H. Shaft-Side Finish: As indicated.
- I. Cavity Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine 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. Sprayed Fire-Resistive Materials: Coordinate with gypsum shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to comply with requirements specified in Division 7 Section "Sprayed Fire-Resistive Materials."
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:

- 1. ASTM C 754 for installing steel framing.
- 2. Division 9 Section "Gypsum Board Assemblies" for applying and finishing panels.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - 1. At elevator hoistway door frames, provide jamb struts on each side of door frame.
- D. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate gypsum finish panels from building structure to prevent cracking of finish panels while maintaining continuity of fire-rated construction.
- F. Install control joints to maintain fire-resistance rating of assemblies.
- G. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C 919, whichever is more stringent.
- H. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 2 inches (51 mm) of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2 or 5/8 inch (12.7 or 15.9 mm) thick, gypsum board cants covering tops of projections.
 - 1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft-wall framing.
 - 2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to the shaft-wall framing.

END OF SECTION

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Ceramic mosaic tile.
 - 2. Glazed wall tile.
 - 3. Stone thresholds installed as part of tile installations.

1.2 RELATED SECTIONS

- A. Division 3 Section Cast-In-Place Concrete: Monolithic slab finishes specified for tile substrates.
- B. Division 3 Section Unit Masonry Assemblies: Concrete block specified for tile substrates.
- C. Division 7 Section Joint Sealants: Sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- D. Division 9 Section Gypsum Board Assemblies: Cementitious and gypsum backer units specified for tile substrates.
- E. Division 10 Section Toilet and Bath Accessories.
- F. Division 15 Section Plumbing: Plumbing fixtures.

1.3 **REFERENCES**

A.	ANSI A108.4	Ceramic Tile Installed with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive.
B.	ANSI A108.5	Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
C.	ANSI A108.10	Installation of Grout in Tilework.
D.	ANSI A118.4	Specifications for Latex Portland Cement Mortar.

E.	ANSI A118.6	Specifications for Ceramic Tile Grouts.
F.	ANSI A118.10	Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations.
G.	ANSI A136.1	Specifications for Organic Adhesives For Installation of Ceramic Tile.
H.	ANSI A137.1	Specifications for Ceramic Tile.

1.4 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C499) plus joint width indicated.
- B. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.5 SYSTEM DESCRIPTION

- A. Ceramic wall tile, installed over gypsum backer board using organic adhesive and over concrete block or cementitious backer units using Latex-Portland cement mortar, with Latex-Portland cement grouted joints.
- B. Ceramic mosaic floor tile, installed over concrete floor slabs using Latex-Portland cement mortar, with Latex-Portland cement grouted joints.

1.6 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C1028:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Step Treads: Minimum 0.6.
 - 3. Ramp Surfaces: Minimum 0.8.
- B. Load-Bearing Performance: For ceramic tile installed on walkway surfaces, provide installations rated for the following load-bearing performance level based on testing assemblies according to ASTM C627 that are representative of those indicated for this Project:
 - 1. Extra Heavy: Passes cycles 1 through 14.
 - 2. Heavy: Passes cycles 1 through 12.
 - 3. Moderate: Passes cycles 1 through 10.
 - 4. Light: Passes cycles 1 through 6.

1.7 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of tile, mortar, grout, and other products specified.
- B. Shop Drawings: Submit shop drawings for the following:
 - 1. Tile patterns and locations.
 - 2. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Tile Samples for Initial Selection: Submit manufacturer's color charts consisting of actual tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include samples of accessories involving color selection.
- D. Grout Samples for Initial Selection: Submit manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.
- E. Samples for Verification: Submit each item listed below, prepared on samples of size and construction indicated. Where products involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. Each type and composition of tile and for each color and texture required, at least 12 inches (300 mm) square, mounted on braced cementitious backer units, and with grouted joints using product complying with specified requirements and approved for completed work in color or colors selected by Architect.
 - 2. Full-size units of each type of trim and accessory for each color required.
 - 3. Stone thresholds in 6 inch (150 mm) lengths.
 - 4. Metal edge strips in 6 inch (150 mm) lengths.
- F. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- G. Product Certificates: Signed by manufacturers certifying that the products furnished comply with requirements.
- H. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.
- I. Tile Test Reports: Indicate and interpret test results for compliance of specialpurpose tile with specified requirements.
- J. Setting Material Test Reports: Indicate and interpret test results for compliance of tile-setting and grouting products with specified requirements.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations 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 Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each product:
 - 1. Stone thresholds.
 - 2. Waterproofing.
- E. Mockups: Before installing tile, construct mockups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
 - 1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before proceeding with final unit of Work.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Section 01200.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.
- C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.11 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following or equal:
 - 1. Tile:
 - a. Nemo Tile and Stone.
 - b. Architectural Ceramics
 - c. Olympia Tile
 - d. Daltile.
 - 2. Tile-Setting and Grouting Materials:
 - a. Merkrete
 - b. MAPEI Corporation.
 - c. LATICRETE International Inc.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
 - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated.
 - 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- E. Mounting: Where factory-mounted tile is required, provide back- or edgemounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.
 - 1. Where tile is indicated for installation in swimming pools, on exteriors, or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for these kinds of installations and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. WT1 Glazed Subway Tile (TBD; Material: Ceramic; Color: Off-White; Finish: Matte) complying with the following requirements:
 - 1. Module Size: 3 by 12 inches
 - 2. Thickness: 3/8 inch
 - 3. Joint Size: Maximum 1/8"
 - 4. Grout 01: Unsanded; Merkrete 00038 Gray Locker Room Location
 - 5. Grout 02: Unsanded; Merkrete 00030 Silver 2nd Floor Office Location

- 6. Face: Pattern of design indicated, with cushion edges.
- 7. Provide matching coved base.
- B. WT2 Mosaic Tile (Nemo Tile and Stone; Material: Ceramic; Series: Seta; Color: Carbon; Finish: Matte) complying with the following requirements:
 - 1. Module Size: 12 by 12 inch sheet of .5 x .5 mosaic tiles.
 - 2. Thickness: 5/16 inch (8 mm).
 - 3. Joint Size: Maximum 1/8"
 - 4. Grout: Unsanded: Merkrete 00030 Silver
 - 5. Face: Pattern of design indicated, with cushion edges.
- C. WT3 Mosaic Tile (Nemo Tile and Stone; Material: Ceramic; Series: Seta; Color: Fuoco; Finish: Matte) complying with the following requirements:
 - 1. Module Size: 12 by 12 inch sheet of .5 x .5 mosaic tiles.
 - 2. Thickness: 5/16 inch (8 mm).
 - 3. Joint Size: Maximum 1/8"
 - 4. Grout: Unsanded: Merkrete 00030 Silver
 - 5. Face: Pattern of design indicated, with cushion edges.
- D. T1 Floor Tile (Nemo Tile and stone; Material: Porcelain; Collection: Build; Color: Grey; Finish: Matte) complying with the following requirements:
 - 1. Module Size: 36 by 36 inches
 - 2. Thickness: 13/32 inch (10.3 mm).
 - 3. Joint Size: Maximum 1/8".
 - 4. Grout: Unsanded; Merkrete 00038 Gray
 - 5. Face: Pattern of design indicated, with cushion edges.
- E. TB1 Glazed Subway Tile (TBD; Material: Ceramic; Color: Off-White; Finish: Matte) complying with the following requirements:
 - 1. Module Size: 4 by 12 inches
 - 2. Thickness: 3/8 inch
 - 3. Joint Size: Maximum 1/8"
 - 4. Grout: Unsanded; Merkrete 00038 Gray
 - 5. Face: Pattern of design indicated, with cusion edges.
- F. Trim Units: Provide straight-edge profile trim unit for the top edge and outside corners of tiled surfaces on walls tile to match characteristics of adjoining flat tile and to comply with the following requirements:
 - 1. Product: Schluter System
 - 2. Material: Anodized Aluminum
 - 3. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
 - 4. Color: ACG Polished Chrome.
 - 5. Shapes: As noted in the following tile locations, selected from manufacturer's standard shapes:
 - a. Base for Thin-Set Mortar Installations: Schluter-Dilex-AHK

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- b. Wainscot Cap for Thin-Set Mortar Installations: Schluter-Jolly
- c. Wainscot Cap for Flush Conditions: Schluter-Jolly
- d. External Corners for Thin-Set Mortar Installations: Schluter-Jolly
- e. Internal Corners: Field-butted square corners, except with coved base and cap angle pieces designed to member with stretcher shapes.

2.4 THRESHOLDS

- A. Provide thresholds that are uniform in color and finish, fabricated to sizes and profiles indicated to provide transition between tile surfaces and adjoining finished floor surfaces.
 - 1. Install thresholds to heights not more than 1/2 inch (12.7 mm) above adjoining finished floor surfaces, with transition edges beveled on a slope of no greater than 1:2.
 - 2. Threshold width to be equal to width of door frame.
- B. Product: Schluter System. Profile for floor between various floor finishes and as follows:
 - 1. Ceramic Tile Flooring to Concrete Floor Aluminum Threshold; Model: Schluter Reno-Ramp-K. Finish: AE Satin.
 - 2. Ceramic Tile Flooring to Resilient Flooring Anodized Aluminum Threshold; Model: Schluter Reno-U. Finish: AE Satin.
 - 3. Ceramic Tile Flooring to Seamless Flooring Anodized Aluminum Threshold; Model: Schluter Reno-V. Finish: AE Satin.

2.5 SETTING MATERIALS

- A. Latex-Portland Cement Mortar: ANSI A118.4. Provide one of the following:
 - 1. Laticrete 4237 with 211 Crete Filler Powder; Laticrete International.
 - 2. Keralastic/Kerabond; Mapei Corporation.
 - 3. Super Flex Latex Mortar; TEC Incorporated.
- B. Water-Cleanable, Tile-Setting Epoxy Adhesive: 100 percent solids, epoxy mortar, ANSI A118.3. Provide one of the following:
 - 1. Latapoxy 2000 Epoxy Adhesive; Laticrete International.
 - 2. Kerapoxy; Mapei Corporation.
 - 3. 100% Solids Epoxy Mortar and Grout; TEC Incorporated.
- C. Organic Adhesive: ANSI A136.1, Type I. Provide one of the following:
 - 1. Laticrete 15 Mastic; Laticrete International.
 - 2. Ultra/Mastic 1; Mapei Corporation.
 - 3. Double Duty Adhesive; TEC Incorporated.

2.6 GROUTING MATERIALS

- A. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section 2.3, composed as follows:
 - 1. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factoryprepared, dry-grout mix and latex additive complying with the following requirements:
 - a. Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch (3.2 mm) and narrower.
 - b. Sanded Dry-Grout Mix: Commercial portland cement grout complying with ANSI A118.6 for materials described in Section H-2.1, for joints 1/8 inch (3.2 mm) and wider.
 - c. Latex Additive: Styrene butadiene rubber.
 - 2. Provide one of the following or equal:
 - a. Plastijoints with Keracolor; by Mapei Corporation.
 - b. Hydroment Ceramic Tile Grout with Hydroment 425 Flexible Grout Admixture; by Bostik Construction Products Division.
 - c. Laticrete Sanded (500 Series) or Unsanded (600 Series) Grout and Joint Filler with Laticrete 1776 Grout Admix Plus; by Laticrete International.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portlandcement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.
- B. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
 - 1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
 - 1. Petroleum paraffin wax or grout release.

3.3 INSTALLATION

A. Thinset Methods:

- 1. Install ceramic floor tile over the following floor substrates in accordance with ANSI A108.5 using Latex Portland cement mortar.
 - a. Concrete: TCA Method F113.
 - b. Concrete (Waterproof Membrane): TCA Method F122.
- 2. Install ceramic wall tile over the following wall substrates in accordance with ANSI A108.5 using Latex Portland cement mortar.
 - a. Concrete Block: TCA Method W202.
 - b. Cementitious Backer Board: TCA Method W244.
 - 1) Treat joints of cementitious backer board units to comply with manufacturer's instructions.
- 3. Install ceramic wall tile over gypsum board in accordance with ANSI A108.4 (TCA Method W223) using water-resistant organic adhesives.
- 4. Mix and proportion bond coat and grout materials in accordance with manufacturer's recommendations.
- B. Waterproofing for Ceramic Tile Applications:
 - 1. Install waterproofing in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
 - 2. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile.
- D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood or other flooring which finishes flush with top of tile.
- E. Center and balance areas of tile, if possible.
 - 1. An excessive amount of cuts shall not be made. Usually, no cuts smaller than half size should be made. Make all cuts on the outer edges of the field.
 - 2. Smooth cut edges. Install tile without jagged or flaked edges.
 - 3. Fit tile closely where edges will be covered by trim, escutcheons or other similar devices.
 - 4. The splitting of tile is expressly prohibited except where no alternative is possible.
- F. Maintain the heights of tile work in full courses to the nearest obtainable dimension where the heights are given in feet and inches and are not required to fill vertical spaces exactly.
- G. Make corners of all tile flush and level with corners of adjacent tile, with due allowance to tolerances for tile. Form internal wall corners square and external corners bullnosed. Keep all joint lines straight and of even width, including miters.

- H. Thoroughly back-up with thin-set bonding material all thin-set trim units, molded or shaped pieces and secure firmly in place.
- I. Finish floor and wall areas level and plumb with no variations exceeding 1/8 inch in 8 feet from the required plane.
 - 1. Sound tile after setting. Remove and replace hollow sounding units.
- J. Allow tile to set for a minimum of 48 hours prior to grouting.
 - 1. Grout ceramic tiles and ceramic mosaic tiles with Latex-Portland grout in accordance with grout manufacturer's instructions and ANSI A108.10.

3.4 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during

installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

- 1. Locate joints in tile surfaces directly above joints in concrete substrates.
- 2. Prepare joints and apply sealants to comply with requirements of Section 07900.
- H. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
 - 2. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
 - 3. For chemical-resistant furan grouts, comply with ANSI A108.8.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 FLOOR TILE INSTALLATION

- A. Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
- B. Joint Widths: Install tile on floors with the following joint widths:1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
- C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
 - 1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.
- D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.7 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:1. Wall Tile: 1/16 inch (1.6 mm).

3.8 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 19510

CEILINGS

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

A. Section 09510 Ceiling Assemblies and Acoustical Ceiling Assemblies

1.2 RELATED SECTIONS

- B. Section 07920 Coordination for proper acoustical sealants.
- C. Section 09260 Gypsum Board Assemblies: Coordination with gypsum board assemblies for junction detailing.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers recommendations for maintenance and cleaning shall be included.
- B. Drawings and Diagrams: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.
- C. Sample: Responsible contracting officer or agent shall supply one sample shade of each type specified in this contract for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

1.4 QUALITY ASSURANCE

- A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.
- B. Installer: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.
- C. Uniformity: Provide 1" Mini Horizontal Aluminum Blinds of only one manufacturer for entire project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Product shall be delivered to site in manufacturer's original packaging.

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B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

1.7 JOB CONDITIONS

- A. Prior to shade installation, building shall be enclosed.
- B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.8 WARRANTY

A. Lifetime Limited Warranty. Specific product warranties available from manufacturer or its authorized agent.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Armstrong Ceiling and Wall Solutions.
- B. Product substitutions must be approved by the Architect minimum of 30 days prior to close of bid.

2.2 CEILING TYPES

- A. CT1: Sound Isolation GWB Ceiling as detailed in drawings; per Acoustician requirements.
- B. CT2: 2'x2' Lay-in grid ceiling
 - 1. Armstrong Ultima Tegular; Details: 9/16" Suspension System; Finish: Fine Texture
- C. CT3: 2'x4' Lay-in grid ceiling
 - 1. Armstrong Optima Vector; Details: Bevelled Edge; Finish: Fine Texture
- D. CT4: 2'x4' Lay-in grid ceiling to meet kitchen code requirements.
 - 1. Armstrong Kitchen Zone; Details: Lay-in on 15/16" suspension system; Finish: Smooth Texture

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Subcontractor shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.
- 3.2 INSTALLATION:
 - A. Installation shall comply with manufacturer's specifications, standards and procedures as detailed on contract drawings.
 - B. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.

END OF SECTION

SECTION 09651

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Vinyl floor tile.
 - 2. Resilient wall base, thresholds and accessories.

1.2 RELATED SECTIONS

- A. Division 3 Section Concrete: Finishing of concrete floor surfaces to receive resilient flooring.
- B. Division 9 Section Ceramic Tile: Ceramic tile and ceramic base.
- C. Division 9 Sections Carpet and Carpet Tile.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product specified.
- B. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.
- C. Samples for Verification: Submit full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.
 - 1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.
- D. Product Certificates: Submit product certificates signed by manufacturers of resilient products certifying that each product furnished complies with requirements.
 - 1. Submit certification by tile manufacturer that products supplied for tile installation comply with local regulations controlling use of volatile organic compounds (VOC's).

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- 2. Certification that flooring material falls within ATBCB guidelines for slipresistance (static coefficient of friction greater than 0.6 for level surfaces, greater than 0.8 for ramps.)
- E. Maintenance Data: Submit maintenance data for resilient floor tile to include in the maintenance manuals specified in Division 1.

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-testresponse 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 E648.
 - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E662.

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 degrees F (10 and 32 degrees C).
- 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 degrees F (21 degrees C) or more than 95 degrees F (35 degrees C) 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 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).

- 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. Where items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.
- F. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. VINYL FLOOR TILE

Vinyl Composition Floor Tile: Provide products complying with ASTM F1066, Composition 1 (nonasbestos formulated) with the following product:

- 1. Type: VF1
 - a. Shaw Contract
 - b. Collection Compound + Cast, Item Number: 4074V.
 - c. Design Compound 2.5 mm
 - d. Color Threshold 77515
 - e. Size -24" x 24" inches.
 - f. Thickness -02.5 mm.
 - g. Shape Tile.
 - h. Finish Wear layer thickness 20 mil.
 - i. Style Provide standard top-set cove base for use with resilient flooring or where sealed concrete is scheduled. Provide straight base without cove where carpet floor finish is scheduled.

B. RESILIENT WALL BASE & ACCESSORIES

Resilient Wall Base: Provide resilient base complying with rubber and vinyl formulation designed specifically to meet the performance and dimensional requirements of ASTM F-1861, Type TV (Thermoplastic Vinyl) and TP (Thermoplastic Rubber), Group 1 (solid), Style A and B, Standard Specification for Resilient Wall Base, and as follows:

- 1. Type: RB1
 - a. Manufacturer Tarkett
 - b. Model Johnsonite Traditional Vinyl VT
 - c. Style Toeless.
 - d. Height: 4" inches
 - e. Thickness: 1/8 inch gage.
 - f. Color: 29 Moon Rock WG.

C. RESILIENT FLOOR THRESHOLDSS

Provide resilient thresholds between various floor finishes and as follows:

- 1. Resilient Flooring to Resilient Flooring Vinyl Threshold; Model: Johnsonite CTA-XX-N.
- 2. Resilient Flooring to Carpet Tile Vinyl Threshold; Model: Johnsonite CTA-XX-P.
- 3. Resilient Flooring to Floor Tile- Anodized Aluminum Threshold; Model: Schluter Reno-U; Finish: AE Satin

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portlandcement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 - 1. Use epoxy adhesive for solid vinyl tile.
- C. Preformed Sanitary Base:
 - 1. Used in conjunction with Nora Rubber Flooring Grano, to be comprised of straight and corner angles.
 - 2. Color to be selected by Architect from manufacturer's full range of colors.

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 F710 and the following:
 - 1. Slab substrates are dry, moisture vapor emissions are within manufacturer's accepted limits, and slab substrates are free of curing compounds, sealers, hardeners and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and water vapor emission characteristics by performing the following tests:
 - a. Bond test recommended by flooring manufacturer.
 - b. Moisture Test Unit (calcium chloride test) developed by the Rubber Manufacturers Association, Inc.
 - 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. 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. 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 with grain running in one direction.
- 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.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Install resilient accessories according to manufacturer's written installation instructions.
- B. Place resilient accessories 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.

3.5 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.

END OF SECTION

SECTION 09671

RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Decorative epoxy-resin flooring.
 - 2. General-use epoxy-resin flooring.
 - 3. High-performance resinous flooring.
 - 4. Integral base of resinous flooring.

1.2 RELATED SECTIONS

- A. Division 3 Section Cast-in-Place Concrete: Concrete substrates to receive resinous flooring.
- B. Division 7 Section Joint Sealers: Joint-sealant materials and installation of sealant materials at joints in resinous flooring systems.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Submit Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each resinous flooring system indicated.
- C. Submit Samples for Verification: Of each resinous flooring system required, 6 inches (150 mm) square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Submit Product Schedule: Use designations indicated in the Resinous Flooring Schedule and room designations indicated on Drawings in product schedule.
- E. Submit Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

- F. Submit Material Test Reports: From a qualified independent testing agency indicating and interpreting test results of the resinous flooring's reaction to chemicals and other reagents and substantiating compliance with requirements.
- G. Submit Material Certificates: In lieu of material test reports, when permitted by Architect, signed by manufacturers certifying that materials furnished comply with requirements.
- H. Submit Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 1.
- I. Submit the following for information only:
 - 1. Plans showing the proposed moisture test and bond test locations, approved by the resinous flooring manufacturer. Identify each location by a unique designation.
 - 2. Test results for all moisture and bond tests.
 - 3. Certification that all concrete substrate surfaces have been inspected and are free of coatings, curing agents, alkali, have the required texture and are in conformance with ASTM F710 and the resinous flooring manufacturers' requirements

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer.
 - 1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for installing resinous flooring systems specified.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Field Samples: On floor area selected by Architect, provide full-thickness resinous flooring system samples that are at least 48 inches (1200 mm) square to demonstrate texture, color, thickness, chemical resistance, cleanability, and other features of each resinous flooring system required. Simulate finished lighting conditions for review of in-place field samples.
 - 1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.
 - 2. After field samples are approved, these surfaces will be used to evaluate resinous flooring.

- 3. Obtain Architect's approval of field samples before applying resinous flooring.
- 4. Final approval of colors will be from field samples, not samples submitted for verification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Resinous Flooring: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s). Comply with requirements indicated in the Resinous Flooring Schedule.
 - 1. Waterproofing Membrane: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
 - 2. Reinforcing Membrane: Manufacturer's flexible resin recommended for crack isolation to help prevent substrate cracks from reflecting through resinous flooring.
 - a. General Resinous Flooring: Ceramic Carpet by General Polymers; a Sherwin-Williams company.

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- b. Freezer/Cooler Flooring: FasTop S by General Polymers; a Sherwin-Williams company.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.
- D. Moisture Vapor Dispersant System: Provide a three-part moisture vapor dispersant system consisting of a fibermat with a laminating coat and a finish coat, both of polymers and resins. Provide the moisture vapor dispersant system under all heat-welded seamless sheet vinyl flooring and heat-welded seamless rubber flooring.
 - 1. Product: Provide "Sealflex" by Sealflex Industries, Costa Mesa, CA. (no substitutions.)
- E. Color: To be indicated in submittal document.

2.2 MATERIALS – ALTERNATES TO RESINOUS EPOXY

- A. Resinous Flooring Alternates:
 - 1. Durex DX-9522 Cementight Flooring System
 - 2. Durex Pharmafloor System

General Resinous Flooring

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminates incompatible with resinous flooring.
 - 1. Comply with ASTM C811 requirements, unless manufacturer's written instructions are more stringent.
 - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 - a. Test concrete in accordance with ASTM Standard F-2170-02. Perform three (3) tests for each area under 2000 sq. ft., with one additional test for every additional 1000 sq. ft. Test locations shall be

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selected less than 5 feet from building perimeter, near window and door openings wherever possible. Pass threshold: less than 85% ERH (Equilibrium Relative Humidity).

- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.2 INSTALLATION OF MOISTURE VAPOR DISPERSANT SYSTEM

- A. Apply moisture vapor dispersant underlayment system to the subfloor under resinous flooring. Install all materials, quantities and methods, in accordance with the manufacturer's instructions and recommendations.
- B. Roll out the fibermat onto the concrete substrate. Apply laminate coat with a roller, to penetrate the fibermat a creat a laminating bond to the substrate. Allow to dry, 4 to 8 hours. Apply the finish sealer coat with a roller. Allow to dry, 2 to 4 hours.

3.3 APPLICATION

- A. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply waterproofing membrane, where indicated, in manufacturer's recommended thickness.

- 1. Apply waterproofing membrane to integral cove base substrates.
- D. Apply reinforcing membrane to substrate cracks.
- E. Apply self-leveling slurry body coat(s) in thickness indicated.
 - 1. Broadcast aggregates and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- F. Apply troweled or screeded body coat(s) in thickness indicated. Hand or power trowel and grout to fill voids. When cured, sand to remove trowel marks and roughness.
- G. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.
- H. Apply sealing or finish coat(s), including grout coat, if any, of type recommended by resinous flooring manufacturer to produce finish indicated. Apply in number of coats and at spreading rates recommended in writing by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Core Sampling: At the direction of Owner and at locations designated by Owner, take 1 core sample per 1000 sq. ft. (93 sq. m) of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take 2 additional samples. Repair damage caused by coring and correct deficiencies at no additional cost to Owner.
- B. Material Sampling: Owner may at any time and any number of times during flooring application require material samples for testing for compliance with requirements.
 - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's Product Data.
 - 3. If test results show installed materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.5 CLEANING AND PROTECTING

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION

SECTION 09680

CARPET

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:1. Carpet tile.

1.2 RELATED SECTIONS

- A. Division 1 Section Allowances.
- B. Division 9 Section Resilient Tile Flooring: Resilient wall base and accessories installed with carpet.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data for each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Existing flooring materials to be removed.
 - 3. Existing flooring materials to remain.
 - 4. Carpet type, color, and dye lot.
 - 5. Locations where dye lot changes occur.
 - 6. Seam locations, types, and methods.
 - 7. Type of subfloor.
 - 8. Type of installation.
 - 9. Pattern type, repeat size, location, direction, and starting point.
 - 10. Pile direction.
 - 11. Type, color, and location of edge, transition, and other accessory strips.
 - 12. Transition details to other flooring materials.
- C. Samples: Submit samples for each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

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- 1. Carpet: 18 inch by 36 inch (450 mm by 700 mm) sample of each type of carpet material required.
- 2. Exposed Edge Stripping and Accessory: 12 inch (300 mm) long Samples.
- 3. Carpet Seam: 6 inch (150 mm) sample.
- D. Product Schedule: Submit schedule; use same room and product designations indicated on Drawings and in schedules.
- E. Certification: Submit manufacturer's certification stating that carpet materials furnished comply with specified requirements.
 - 1. Include listing of mill register numbers for carpet furnished.
 - 2. Include supporting certified laboratory test data indicating that carpet meets or exceeds specified test requirements.
 - 3. Certification that flooring material falls within ATBCB guidelines for slipresistance (static coefficient of friction greater than 0.6 for level surfaces, greater than 0.8 for ramps.)
- F. Maintenance Data: Submit maintenance data for carpet to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.
- G. Submit the following for information only:
 - 1. Plans showing the proposed moisture test and bond test locations, approved by the carpet manufacturer. Identify each location by a unique designation.
 - 2. Carpet flooring manufacturer's and underlayment manufacturer's moisture and bond test procedures.
 - 3. Test results for all moisture and bond tests.
 - 4. Certification that all concrete substrate surfaces have been inspected and are free of coatings, curing agents, alkali, have the required texture and are in conformance with ASTM F710 and the sheet resilient flooring and underlayment manufacturers' requirements

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.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

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- C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Division 1 Section "Substitutions."
- D. Single-Source Responsibility: Obtain each type of carpet from one source and by a single manufacturer.
 - 1. Dye Lot: Provide each carpet type beginning from the start of a full dye lot.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling."
- B. Remove wrapping from carpet 24 hours prior to installation to allow "off-gassing" of carpet.
- C. Do not store carpet near products that can off gas harmful substances which may be absorbed by carpet.

1.6 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 6: "Site Conditions."
- B. Environmental Limitations: Do not install carpet 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 over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.
 - 1. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours (14.6 kg/1000 sq. m/24 hours) when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 degrees F (12.7 degrees C).
 - 2. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydrion paper is applied.
- D. Where items are indicated for installation on top of carpet, install carpet 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 Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet 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.

PART 2 - PRODUCTS

- 2.1 CARPET Distribution of carpet type as shown on drawings.
 - A. CT1:
 - 1. Product: Shaw Contract; Overlay Tile.
 - 2. Pattern: Overlay
 - 3. Color: Fluid.
 - 4. Type: Tile.
 - 5. Content: Eco Solution Q Nylon.
 - 6. Backing: EcoWorx Tile
 - 7. Face Weight: 24.0 oz. per sq. yd. (813.7 g/m2)
 - 8. Size: 18"x36".
 - B. CT2:
 - 1. Product: Shaw Contract; Overlay Tile
 - 2. Pattern: Overlay
 - 3. Color: Shaded w/ Ochre Accent .
 - 4. Type: Tile.
 - 5. Content: Eco Solution Q Nylon.
 - 6. Backing: Worx Tile
 - 7. Face Weight: 24.0 oz. per sq. yd. (813.7 g/m2)
 - 8. Size: 18"x36".
 - C. Concrete-Slab Primer: Nonstaining type as recommended by the carpet manufacturer.
 - D. Trowelable Leveling and Patching Compounds: Latex-modified, hydrauliccement-based formulation provided by or recommended by the carpet manufacturer.

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- E. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the carpet manufacturer.
 - 1. Use zero VOC adhesives if available. Maximum VOC levels shall not exceed 50 g/l.
- F. Seaming Cement: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- G. Carpet Edge Guard, Nonmetallic: Extruded or molded heavy-duty rubber carpet edge guard of size and profile indicated and with minimum 2 inch wide anchorage flange; colors selected by Architect from among standard colors available within the industry.

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 performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 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 the carpet manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 4. Test concrete in accordance with ASTM Standard F-2170-02. Perform three (3) tests for each area under 2000 sq. ft., with one additional test for every additional 1000 sq. ft. Test locations shall be selected less than 5 feet from building perimeter, near window and door openings wherever possible. Pass threshold: less than 85% ERH (Equilibrium Relative Humidity).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet 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 the carpet manufacturer.
- D. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by the carpet manufacturer.
 - 1. Slab substrates are dry, moisture vapor emissions are within manufacturer's accepted limits, and slab substrates are free of curing compounds, sealers, hardeners and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and water vapor emission characteristics by performing the following tests:
 - a. Moisture Test Unit (calcium chloride test) developed by the Rubber Manufacturers Association, Inc.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF MOISTURE CONTROL SYSTEM

- A. Apply moisture vapor dispersant underlayment system to the subfloor. Install all materials, quantities and methods, in accordance with the manufacturer's instructions and recommendations.
- B. Roll out the fibermat onto the concrete substrate. Apply laminate coat with a roller, to penetrate the fibermat a creat a laminating bond to the substrate. Allow to dry, 4 to 8 hours. Apply the finish sealer coat with a roller. Allow to dry, 2 to 4 hours.

3.4 INSTALLATION

- A. Direct-Glue-Down Installation using HealthBond 1000 Multipurpose Adhesive: Comply with CRI 104, Section 8, "Direct Glue-Down Installation."
- B. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position.

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- 1. For each carpet type, install only carpet from the same dye lot within each space.
- 2. Join seams in recommended manner and so as not to detract from the appearance of the carpet installation and decrease its life expectancy. Ensure seams are straight, not overlapped or peaked and free of gaps. Architect to review carpet seaming drawings.
 - a. All salvage edges must be removed. All cuts must be made of a 15 degree angle with surface yarns extending outward over backing material.
 - b. A bead of non-flammable latex carpet seam adhesive, HealthBond 3000 Seam Sealer, shall be applied to all cut edges before seams are made.
- 3. Level adjoining border edges.
- C. Do not bridge building expansion joints with carpet.
- Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and builtin furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, 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 nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Carpet installation shall be laid tight and flat, well fastened at edges, and shall present a uniform appearance. Ensure monolithic color, pattern and texture match within any one area. Roll carpet areas with a 30 lb. carpet roller to insure proper contact of carpet to substrate and to remove bubbles and buckles.
- I. Install carpet edge guard where edge of carpet is exposed; anchor guards to substrate. Use full length pieces only. Butt tight to vertical surfaces. Where splicing cannot be avoided, butt ends tight and flush.

3.5 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using HealthBond 4200 Cleaner.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
 - a. Clean carpet thoroughly with a high-efficiency particulate air (HEPA) filtration vacuum.

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- B. Remove and dispose of debris and unusable scraps.
- C. Usable Scraps: Deliver specified usable scraps of carpet to Owner's designated storage space, properly packaged (paper wrapped) and identified.
 - 1. Usable scraps are defined to include roll ends of less than 9 foot lengths, and pieces of more than 3 square feet area and more than 8 inches wide. Dispose of smaller pieces as "unusable scraps" or construction waste.
- D. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."
- E. Protect carpet 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 manufacturer.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 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 whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from colors or finishes available.
 - 1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
 - 2. Painting does not include field painting exposed surfaces at the following locations:
 - a. Elevator shafts
 - b. Pipe in mechanical rooms
- C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts and labels.
 - 1. Prefinished items not to be painted include the following factory-finished components.
 - a. Expansion joint cover assemblies.
 - b. Architectural woodwork and casework.
 - c. Acoustical materials, except where indicated otherwise.
 - d. Toilet enclosures.
 - e. Operable partitions.
 - f. Toilet and bath accessories.
 - g. Elevator entrance doors and frames.
 - h. Elevator equipment.
 - i. Finished mechanical and electrical equipment.
 - j. Light fixtures.
 - k. Switchgear.
 - l. Distribution cabinets.
 - 2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

- a. Foundation spaces.
- b. Furred areas.
- c. Pipe spaces.
- d. Duct shafts.
- e. Elevator shafts.
- 3. Finished metal surfaces not to be painted include:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper.
 - e. Bronze.
- 4. Operating parts not to be painted include moving parts of operating equipment such as the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
- 5. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating or nomenclature plates.

1.2 RELATED SECTIONS

- A. Division 5 Section Metal Fabrications:
 - 1. Shop primed metal fabrications.
- B. Division 6 Section Architectural Woodwork: Shop finished architectural woodwork.
- C. Division 8 Section Steel Doors And Frames: Shop primed metal doors and frames.
- D. Division 9 Section Gypsum Board Assemblies: Preparation of joints, fasteners, trim, and accessories for painting.

1.3 SUBMITTALS

- A. Make submittals in accordance with the requirements of Section 01300.
- B. Product Data: Submit product data for each paint system specified, including block fillers and primers.
 - 1. Provide manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.

- 2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
- 3. Submit certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- C. Submit samples of manufacturers' latest color chips for selection by the Architect. Colors shall be selected by Architect prior to commencement of the painting work.
- D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
 - 2. Submit samples on the following substrates for the Architect's review of color and texture only.
 - a. Gypsum Board: Provide two 18 by 18 inch samples of each color on gypsum board.
 - b. Wood, Opaque Finish: Provide two 12 by 12 inch samples of each color on hardboard.
 - c. Ferrous Metal: Provide two 4 inch square samples of flat metal and two 8 inch long samples of solid metal for each color and finish.
 - d. Concrete Masonry: Provide two 8 by 16 inch samples of masonry, with mortar joint in the center, for each finish and color.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommended limits.
- C. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect of problems anticipated using the materials specified.

- D. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- E. Provide products that comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the 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.
- B. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F (7 degrees C). 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.

1.6 PROJECT CONDITIONS

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following maximums:
 - 1. Wood (interior): 7 percent.
 - 2. Concrete block: 12 percent.
- B. Apply water based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C).
- C. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 95 degrees F (35 degrees C).

- D. Apply urethane paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 60 degrees F and 95 degrees F.
- E. Do not apply paint in snow, rain, fog or mist, when the relative humidity exceeds 85 percent, at temperatures not less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.
- F. Provide minimum 40 foot candles of lighting on surfaces to be painted. Simulate finished lighting conditions for the installation of wall tile.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Architectural Coating Products: Subject to compliance with requirements, provide architectural coating products as scheduled and where indicated, as manufactured by one of the following:
 - 1. Benjamin Moore & Company (Moore)
 - 2. Duron, Inc. (Duron)
 - 3. Pittsburgh Paints, PPG Architectural Finishes, Inc. (PPG)
 - 4. Pratt & Lambert, Inc. (P&L)
 - 5. Sherwin-Williams (S-W)
- B. Industrial Coating Products: Subject to compliance with requirements, provide industrial coating products as scheduled and where indicated, as manufactured by the following:
 - 1. Carboline Company (Carboline)
 - 2. Porter International (Porter)
 - 3. Sherwin-Williams.
 - 4. Tnemec Company Inc. (Tnemec)

2.2 MATERIALS

- A. Provide paint products listed in schedules at end of this section for the various paint systems and substrates indicated.
- B. Sealers and primers: As recommended by the finish paint manufacturer.
- C. Spackle: An approved plaster filler.
- D. Gypsum board joint compound finish system shall be as approved by gypsum board manufacturer.

- E. Wood filler: Paste type.
- F. Tinting material shall be of the best quality, universal colorants ground in propylene glycol, alkali proof, non-fading, lead-free colorants.
 - 1. Tint all primers and undercoats to the approximate shade (lighter or darker, depending on color selected) of the finish coat. Where the color schedule calls for the use of "deeptones" (interior or exterior), it is the responsibility of the painting subcontractor to utilize the appropriate deep base primers for use on the surfaces for which they are intended.
- G. Linseed oil shall be pure, settled, clear and raw or boiled as required to produce best results.
- H. Thinner shall be the best grade, pure grain spirits of turpentine distilled from the sap of live trees.

2.3 COLORS

- A. Colors as indicated on the drawings:
 - 1. PT1: General White; Color: SW 7627 White Heron
 - 2. PT2: Light Gray; Color: SW 7029 Agreeable Gray
 - 3. PT3: Accent Color Red; Color: SW 6600 Enticing Red
 - 4. PT4: Accent Color Yellow; Color: SW 6676 Butterfield
 - 5. PT5: Accent Color Dark Gray Color: SW 7048 Urbane Bronze
- B. All paints to be EG = Eggshell unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.
 - 1. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

- 1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish coat material with substrates primed by others.
 - 2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, and rinse; allow to dry and vacuum before painting.
 - 3. 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 application of 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 upon delivery. Prime edges, ends, faces, undersides and backsides of wood, including cabinets, counters, cases and paneling.
 - c. When transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 - e. Seal tops, bottoms and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.
 - 4. Ferrous Metals: Clean non-galvanized 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 recommendations of the Steel Structures Painting Council.

- a. Blast steel surfaces clean as recommended by the paint system manufacturer and in accordance with requirements of SSPC specification SSPS-SP 10.
- b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
- 5. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surfaces is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.
 - 1. Maintain containers used in mixing and application of 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. Remove film and, if necessary, strain material before using.
 - 3. Use thinners approved by the paint manufacturer, and within recommended limits.

3.3 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
- C. Paint colors, surface treatments, and finishes are indicated in "schedules."
- D. Provide finish coats that are compatible with primers used.
- E. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
- F. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
- G. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar

components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.

- H. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
- I. Paint interior surfaces or cuts, where visible through registers or grilles, with a flat, non-specular black paint.
- J. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
- K. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
- L. Sand lightly between each succeeding enamel or varnish coat.
- M. Omit primer on metal surfaces that have been shop-primed and touch up painted.
- N. 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. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- O. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
- P. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.
 - 1. Mechanical items to be painted include but are not limited to:
 - a. Piping, pipe hangers, and supports.
 - b. Heat exchangers.
 - c. Tanks
 - d. Ductwork.
 - e. Insulation.
 - f. Supports.

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- g. Motors and mechanical equipment.
- h. Accessory items.
- Electrical items to be painted include but are not limited to:
- a. Conduit and fittings.
- b. Switchgear.

- Q. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- R. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to materials that are required to be painted or finished and have not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.
- S. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth 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.
- T. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- U. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
 - 1. The Owner will engage the services of an independent testing laboratory to sample the paint material being used. Samples of material delivered to the project will be taken, identified, sealed and certified in the presence of the Contractor.
 - 2. The testing laboratory will perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative materials analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.

- l. Color retention.
- m. Alkali and mildew resistance.
- 3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are noncompatible.

3.5 CLEANING AND PROTECTION

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
- B. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Ferrous Metals (not shop-primed)
 - 1. First Coat (primer):
 - a. Duron Dura Clad Universal Acrylic Metal Primer, 33-105
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt-Tech DTM 90-712 or 90-709.
 - e. S-W DTM Primer/Finish, B66W1.
 - 2. Second and Third Coats (gloss finish):
 - a. Duron Dura Clad DTM Acrylic Gloss, 95-3XX Series
 - b. Moore Acrylic Gloss Enamel M28.
 - c. P&L Accolade Exterior Gloss Enamel, Z4300.
 - d. PPG Pitt-Tech DTM 90-374 Series.
 - e. S-W DTM Acrylic Gloss Coating, B66 Series.
- B. Galvanized Metals (not shop-primed)
 - 1. First Coat (primer):
 - a. Duron Dura Clad Galvanized Metal Primer, 33-100.
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt Tech DTM 90-712 or 90-709.
 - e. S-W DTM Primer/Finish, B66W1.
 - 2. Second and Third Coats (gloss finish):
 - a. Duron Dura Clad DTM Acrylic Gloss, 95-3XX Series.
 - b. Moore Acrylic Gloss Enamel M28.
 - c. P&L Accolade Exterior Gloss Enamel, Z4300.
 - d. PPG Pitt Tech DTM 90-374.
 - e. S-W DTM Acrylic Gloss Coating, B66 Series.
- C. Ferrous Metals (shop-primed)
 - 1. First and Second Coats (gloss finish):
 - a. Duron Dura Clad DTM Acrylic Gloss, 95-05X.
 - b. Moore Acrylic Gloss Enamel M28.
 - c. P&L Accolade Exterior Gloss Enamel, Z4300.
 - d. PPG Pitt Tech DTM 90-374.
 - e. S-W DTM Acrylic Gloss Coating, B66 Series.
- D. Industrial Coating (over shop primed ferrous metals subject to abrasion; i.e. railings, handrails and ladders)
 - 1. One Coat (at 2.5 to 3.0 mils DFT):
 - a. Carboline 193 Hi-Build Urethane.
 - b. Porter 4600 Hythane.
 - c. Tnemec 73 Endura-Shield.
- E. Cast-In-Place Concrete (smooth surface)
 - 1. First and Second Coats (flat finish):

- a. Duron Weathershield Acrylic Flat House Paint, 34-Series.
- b. Moore MoorLife Latex House Paint 105.
- c. P&L Vapex Flat House Paint, Z1900.
- d. PPG Sun-Proof Latex House Paint 72 Series.
- e. S-W A-100 Latex House & Trim, A6 Series

3.7 INTERIOR PAINTING SCHEDULE

- A. Cast-In-Place Concrete
 - 1. First Coat (primer):
 - a. Duron Interior Acrylic Enamel Undercoater 04-123.
 - b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
 - c. P&L Suprime 1 Primer, Z1001.
 - d. PPG Speedhide Alkali Resistant Primer 6-603.
 - e. S-W Loxon Interior Acrylic Masonry Primer, B28W300.
 - 2. Second and Third Coats (eggshell finish):
 - a. Duron Ultra Deluxe Int. Acrylic Latex Eggshell Enamel, 36-Series.
 - b. Moore Moorcraft Super Spec Latex Eggshell Enamel 274.
 - c. P&L Prohide Latex Eggshell, Z8200.
 - d. PPG Speedhide Latex Eggshell Enamel, Series 6-411.
 - e. S-W ProMar 200 Latex Eg-Shel Enamel, B20W200 Series.
- B. Concrete Masonry Units
 - 1. First Coat (block filler):
 - a. Duron Block Kote Latex Block Filler 08-128.
 - b. Moore Moorcraft Super Craft Latex Block Filler No. 285.
 - c. P&L Prohide Plus Block Filler, Z98.
 - d. PPG Latex Masonry Block Filler, Series 6-7.
 - e. S-W PrepRite Interior/Exterior Block Filler, B25W25.
 - 2. Second and Third Coats (eggshell finish):
 - a. Duron Ultra Deluxe Int. Acrylic Latex Eggshell Enamel, 36-Series.
 - b. Moore Moorcraft Super Spec Latex Eggshell Enamel 274.
 - c. P&L Prohide Latex Eggshell, Z8200.
 - d. PPG Speedhide Latex Eggshell Enamel, Series 6-411.
 - e. S-W ProMar 200 Latex Eg-Shel Enamel, B20W200 Series.
- C. Gypsum Board
 - 1. First Coat (primer):
 - a. Duron Interior Acrylic Latex Drywall Primer Sealer 04-124.
 - b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
 - c. P&L Suprime 1 Primer, Z1001.
 - d. PPG Quick Drying Interior Latex Primer, Series 6-2.
 - e. S-W PrepRite 200 Latex Wall Primer, B28W200.

- 2. Second and Third Coats (eggshell finish):
 - a. Duron Ultra Deluxe Int. Acrylic Latex Eggshell Enamel, 36-Series.
 - b. Moore Moorcraft Super Spec Latex Eggshell Enamel 274.
 - c. P&L Prohide Latex Eggshell, Z8200.
 - d. PPG Speedhide Latex Eggshell Enamel, Series 6-411.
 - e. S-W ProMar 200 Latex Eg-Shel Enamel, B20W200 Series.
- D. Gypsum Board Ceilings
 - 1. First Coat (primer):
 - a. Duron Interior Acrylic Latex Drywall Primer Sealer 04-124.
 - b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
 - c. P&L Suprime 1 Primer, Z1001.
 - d. PPG Quick Drying Interior Latex Primer, Series 6-2.
 - e. S-W PrepRite 200 Latex Wall Primer, B28W200.
 - 2. Second and Third Coats (flat finish):
 - a. Duron Ultra Deluxe Interior Acrylic Latex Flat, 44-Series.
 - b. Moore Moorcraft Super Spec Vinyl Latex Flat 275.
 - c. P&L Prohide Latex Flat, Z8100.
 - d. PPG Speedhide Interior Flat Wall Paint, Series 6-70.
 - e. S-W ProMar 200 Latex Flat Paint, B30W200.
- E. Concrete Masonry Units (epoxy finish)
 - 1. First Coat (block filler):
 - a. Duron Dura Crete High Performance Acrylic Block Filler, 16-110.
 - b. Moore Moorcraft Super Craft Latex Block Filler No. 285.
 - c. P&L Prohide Silver Heavy Duty Latex Block Filler, Z8465.
 - d. PPG High Performance Acrylic Latex Block Filler, Series 16-90.
 - e. S-W Heavy-Duty Block Filler, B42W46.
 - 2. Second Coat (primer):
 - a. Duron: none requires (apply two finish coats).
 - b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
 - c. P&L Suprime 1 Primer, Z1001.
 - d. PPG Pitt-Glaze Acrylic-Epoxy Water Based, Series 16-551.
 - e. S-W PrepRite 200 Latex Wall Primer, B28W200.
 - 3. Third Coat (2.0 to 2.5 mils DFT):
 - a. Duron Dura Clad Acylic Epoxy Gloss 95-2003X, or SG 95-20053X.
 - b. Moore Acrylic Epoxy Gloss Coating M43/M44
 - c. P&L Tech-Gard Water-Borne Epoxy, Z5300.
 - d. PPG Aquapon Water Borne Polyamide Epoxy 98 Series.
 - e. S-W Water Based Catalyzed Epoxy, B70/B60V25.
- F. Gypsum Board (Epoxy Finish)
 - 1. First Coat (primer):
 - a. Duron Acrylic Enamel Undercoater, 04-123.

- b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
- c. P&L Suprime 1 Primer, Z1001.
- d. PPG Quick Drying Interior Latex Primer, Series 6-2.
- e. S-W PrepRite 200 Latex Wall Primer, B28W200.
- 2. Second Coat (2.0 to 2.5 mils DFT, semi-gloss finish):
 - a. Duron Dura Clad Acrylic Epoxy Gloss 95-2003X, or S/G 95-20053X.
 - b. Moore Acrylic Epoxy Gloss Coating M43/M44
 - c. P&L Tech-Gard Water-Borne Epoxy, Z5300.
 - d. PPG Pitt-Glaze Acrylic-Epoxy Water Based, Series 16-551.
 - e. S-W Water Based Catalyzed Epoxy, B70/B60V25.
- G. Ferrous Metal (not shop-primed)
 - 1. First Coat (primer):
 - a. Duron Dura Clad Universal Acrylic Metal Primer, 33-105.
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt-Tech High Performance Primer/Finish, Series 90-709/712.
 - e. S-W DTM Primer/Finish B66W1.
 - 2. Second and Third Coats (semi-gloss finish):
 - a. Duron Dura Clad DTM Acrylic Semi-Gloss, 95-4XX Series.
 - b. Moore DTM Acrylic Semi-Gloss M29.
 - c. P&L Prohide Latex Semi-Gloss, Z8300.
 - d. PPG Pitt-Tech Satin DTM Enamel, Series 90-474.
 - e. S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series.
- H. Metal (shop-primed)
 - 1. First and Second Coats (semi-gloss finish):
 - a. Duron Dura Clad DTM Acrylic Semi-Gloss, 95-4XX Series.
 - b. Moore DTM Acrylic Semi-Gloss M29.
 - c. P&L Prohide Latex Semi-Gloss, Z8300.
 - d. PPG Pitt-Tech Satin DTM Enamel, Series 90-474.
 - e. S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series.
- I. Galvanized Metal
 - 1. First Coat (primer):
 - a. Duron Dura Clad Galvanized Metal Primer, 33-100.
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt-Tech High Performance Primer/Finish, Series 90-709/712.
 - e. S-W DTM Primer/Finish, B66W1.
 - 2. Second and Third Coats (semi-gloss finish):
 - a. Duron Dura Clad DTM Acrylic Semi-Gloss, 95-4XX Series.
 - b. Moore DTM Acrylic Semi-Gloss M29.
 - c. P&L Prohide Latex Semi-Gloss, Z8300.
 - d. PPG Pitt-Tech Satin DTM Enamel, Series 90-474.
 - e. S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series.

- J. Grilles, Uncovered Runout, Housings and Accessories of Mechanical Equipment and Apparatus
 - 1. First Coat (primer):
 - a. Duron Dura Clad Universal Acrylic Metal Primer, 33-105.
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt-Tech High Performance Primer/Finish, Series 90-709/712.
 - e. S-W PrepRite Classic Interior Latex Primer, B28W101.
 - 2. Second and Third Coats (semi-gloss finish):
 - a. Duron Dura Clad DTM Acrylic Semi-Gloss, 95-4XX Series.
 - b. Moore DTM Acrylic Semi-Gloss M29.
 - c. P&L Enducryl Acrylic Maintenance Enamel, Z2900.
 - d. PPG Pitt-Tech Satin DTM Enamel, Series 90-474.
 - e. S-W DTM Acrylic Semi-Gloss Coating, B66-200 Series.
- K. Wood Painted (opaque finish)
 - 1. First Coat (primer):
 - a. Duron Acrylic Enamel Undercoater, 04-123.
 - b. Moore Moorcraft Super Spec Latex Undercoater & Primer Sealer 253.
 - c. P&L Suprime 1 Primer, Z1001.
 - d. PPG Speedhide Quick-Drying Enamel Undercoater, Series 6-6.
 - e. S-W Wall & Wood Primer, B49WZ2.
 - 2. Second And Third Coats (semi-gloss finish):
 - a. Duron Ultra Deluxe Int. Acrylic Latex Semi-Gloss Enamel, 35-Series
 - b. Moore Moorcraft Super Spec Latex Semi-Gloss Enamel 276.
 - c. P&L Prohide Latex Semi-Gloss, Z8300.
 - d. PPG Speedhide Acrylic Latex Semi-Gloss Enamel, Series 6-510.
 - e. S-W ProMar 200 Interior Latex Semi-Gloss Enamel, B31W200 Series.
- L. Wood Natural Finish

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- 1. First Coat: Paste Wood Filler.
- 2. Second Coat: Stain.
- 3. Third And Fourth Coats (transparent finish):
 - a. Duron Polyurethane Interior Clear Semi-Gloss Finish, 15-018.
 - b. Moore Benwood Stays Clear 423 Low Luster.
 - c. P&L Acrylic Latex Varnish, Z24, Satin.
 - d. PPG Interior Acrylic Polyurethane 77-49 (Satin).
- M. Piping, Electric Conduits, Fittings, Hangers, Brackets, Sleeves, Plates
 - First Coat (primer):
 - a. Duron Dura Clad Universal Acrylic Metal Primer, 33-105.
 - b. Moore Acrylic Metal Primer M04.
 - c. P&L Tech-Gard Acrylic Metal Primer, Z190.
 - d. PPG Pitt-Tech High Performance Primer/Finish, Series 90-709/712.
 - e. S-W DTM Primer/Finish B66W1.

- 2. Second and Third Coats (eggshell finish):
 - a. Duron Ultra Deluxe Int. Acrylic Latex Eggshell Enamel, 36-Series.
 - b. Moore Moorcraft Super Spec Latex Eggshell Enamel 274.
 - c. P&L Prohide Latex Eggshell, Z8200.
 - d. PPG Speedhide Latex Eggshell Enamel, Series 6-411.
 - e. S-W ProMar 200 Latex Eg-Shel Enamel, B20W200.

END OF SECTION

SECTION 10520

FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Portable fire extinguishers.
 - Fire-protection cabinets for the following:
 a. Portable fire extinguishers.
 - 3. Fire-protection accessories.

1.2 RELATED SECTIONS

- A. Division 7 Section Firestopping: Firestopping sealants at fire-rated cabinets.
- B. Division 9 Section Painting: Field-painting fire-protection cabinets.
- C. Division 16 Section "Interior Lighting" for fire extinguisher location lights.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of cabinet finish indicated.
- C. Samples for Verification: For each type of exposed cabinet finish required, prepared on samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - 1. Size: 6 by 6 inch (150 by 150 mm) square samples.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and cabinets 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.
 - 2. Fire extinguishers shall comply with NFPA Standard 10 (2002).

1.5 COORDINATION

A. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated and provided by Owner under separate Contract are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Portable Fire Extinguishers:
 - a. Ansul.
 - b. J.L. Industries, Inc.
 - c. Larsen's Manufacturing Company.
 - d. Potter-Roemer; Div. of Smith Industries, Inc.
 - 2. Fire-Protection Cabinets:
 - a. J.L. Industries, Inc.
 - b. Larsen's Manufacturing Company.
 - c. Potter-Roemer; Div. of Smith Industries, Inc.

2.2 MATERIALS

A. Interior Cabinets and Doors: Cold-Rolled Steel Sheet; Carbon steel, complying with ASTM A366/A366M, commercial quality, stretcher leveled, temper rolled.

2.3 PORTABLE FIRE EXTINGUISHERS

A. Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.

- B. Interior Fire Extinguishers:
 - 1. Multipurpose Dry-Chemical Type: UL-rated 2-A:10:B:C, 5-lb (2.3-kg) nominal capacity, in enameled-steel container.

2.4 FIRE-PROTECTION CABINETS

- A. Product: Subject to compliance with requirements, provide the following product or equal:
 - 1. Interior Cabinets:
 - a. Semi-Recessed Cabinets: Larsen's Model Number FS2409-5R where fire rating is required.
 - b. Recessed Cabinet: Larsen's Model Number FS2409-R1 where fire rating is required.
 - c. Types: Horizontal Duo face panel.
- B. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
 - 1. Interior Cabinet Metal: Enameled-steel sheet.
 - 2. Shelf: Same metal and finish as cabinet.
- C. Cabinet Type: Suitable for the following:
 - 1. Fire extinguisher.
- D. Cabinet Mounting: Suitable for the following mounting conditions:
 - 1. Recessed: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
- E. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
 - 1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - a. Flat Trim: 1 1/4 backbend depth.
- F. Cabinet Trim Material: Manufacturer's standard, as follows:
 - 1. Same metal and finish as door.
- G. Door Material: Manufacturer's standard, as follows:1. Steel sheet.
- H. Door Glazing (Interior cabinets only): Manufacturer's standard, as follows:
 - 1. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, as follows:
 - a. Class 1 (clear).

- I. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
 - 1. Provide minimum 1/2 inch (13 mm) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.
 - 2. Provide door with pull and roller catch.
- J. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.5 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.
- B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
 - a. Application Process: Vinyl letters.
 - b. Lettering Color: Red.
 - c. Orientation: Vertical.

2.6 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.
- D. Cabinet and Door Finishes (Interior cabinets):
 - 1. Provide manufacturer's standard baked-enamel paint for the interior of cabinets.
 - 2. Provide factory priming for field-applied paint finish for doors and frames.

2.7 STEEL FINISHES

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- B. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
 - 1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets are to be installed.
- C. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged units.
- D. 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. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
 - 2. Fasten mounting brackets to structure, square and plumb.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.

FIRE-PROTECTION SPECIALTIES 10520-5

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 10801

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Toilet and bath accessories.
 - 2. Attachment hardware.
 - 3. Rough-in frames supplied to other sections.
- B. Refer to the schedule at end of this section.

1.2 RELATED SECTIONS

- A. Division 6 Section Rough Carpentry: Wood blocking for attachment of accessories in wood stud partitions.
- B. Division 6 Section Architectural Woodwork: Lavatory counters.
- C. Division 9 Section Gypsum Board Assemblies: Metal stud partitions.
- D. Division 15 Section Plumbing: Plumbing fixtures.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, product data including construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Submit Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Submit Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- D. Submit Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.
1.4 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. 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.
 - 2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

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 set into concrete or masonry as required to prevent delaying the Work.

1.6 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. 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. Toilet and Bath Accessories: Subject to compliance with requirements, provide toilet accessories by one of the following:
 - 1. Delta Faucet Company.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. American Specialties, Inc.
 - 4. AJ Washroom Accessories, Inc.
 - 5. General Accessory Manufacturing Co. (GAMCO).
 - 6. McKinney/Parker Washroom Accessories.

2.2 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304, with No. 4 finish (matt black), in 0.0312 inch (0.8 mm) minimum nominal thickness, unless otherwise indicated.
- B. Mirror Glass: ASTM C1036, 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.
- C. Galvanized Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- D. 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. One, maximum 1-1/2 inch (38 mm) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. 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.
- C. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

- D. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.
- E. 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 (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- F. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamperand 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.
- G. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before starting work, notify Architect in writing of any conflicts detrimental to installation or operation of units.
- B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this section.
- C. Verify with Architect exact location of accessories.

3.2 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 (1112 N), when tested according to method in ASTM F446.

3.3 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.

3.4 TOILET AND BATH ACCESSORY SCHEDULE

A. All items are CFCI (Contractor Furnished Contractor Install) except hand sanitizer and air freshener.

Type BA01A	Two-Wall Compartment Grab Bar 42x54 – 1 1/2" Diameter, 42" and 54" long, Satin finish with peened gripping surface, Model: Bobrick B-6897.99
Type BA03A	Surface Mounted Multi-Roll Toilet Tissue Dispenser - Stainless Steel with Satin Finish, Model: Bobrick B-4288
Type BA04	Surface Mounted Sanitary Napkin Disposal – Stainless Steel with Stain Finish, Model: Bobrick B-270
Type BA05	Two (2) Coat Hooks – Stainless Steel with Stain Finish, Model: Bobrick B-542
Type BA07	Wall-Mounted Liquid Soap Dispenser – Black and Stainless Steel Finish. Model: GOJO LTX-12
Type BA08	ADA complaint undersink protection – Molded Vinyl. Color: White, Model: Truebro IPS Corporation Lav Guard 2E-Z Series with all required accessories.
Type BA09	Tilt Mirror with Stainless Steel Frame – 36"x48", Model: Bobrick B-293 3648
Type BA10	Stainless Steel Hook Strip – Model: Bobrick B-232 x 24; Color: Stainless Steel
Type BA11	Towel Dispenser / Waste Receptacle Combo - Recessed, Stainless Steel with Satin Finish, Model: Bobrick B-3944
Type BA12	Hand Towel Dispenser – Tork Matic 5510282; Color; Black

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Type BA15	Toilet Stall Partition HPL with Stainless	n – Bobrick 2031 Series – Floor Anchored; Finish: Steel edging.
Type BA16	Changing Curtain R Stainless Steel Satir	od – Bobrick B-6107, 48" Length; Finish:

END OF SECTION

SECTION 10990

MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this section includes:
 - 1. Locker Room Benches
 - 2. Locker Room Lockers
 - 3. Parking Stops
 - 4. Safety Bollards

1.2 RELATED SECTIONS.

- A. Division 5 Section Metal Fabrications.
- B. Division 6 Section Rough Carpentry.
- C. Division 9 Section Gypsum Board Assemblies.
- D. Division 9 Section Acoustical Ceilings.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01300, manufacturer's product data and installation instructions for each item specified in this section.
- B. Submit color samples of finish materials where a color choice is specified, for Architect's color selection.

PART 2 - PRODUCTS

2.1 PARKING STOPS

- A. Pre-manufactured plastic parking block.
 - a) Mounting method: Surface mounted.
 - b) Unit dimensions: 70.5"Lx 5.75"W x4"HT.
 - c) Color: Manufacturer standard color selected by the Architect.

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B. Product: The Safety Store, Item #PBCYS <u>www.trafficsafetystore.com</u>

2.2 SAFETY BOLLARD

- A. Pre-manufactured Round Safety Bollard constructed of 6" diameter steel tubing with TGIC Electrostatic powder coated application oven cured.
 - a) Mounting method: Surface mounted with 3/8" x 3-1/2" concrete expansion anchor bolts.
 - b) Unit dimensions: 6" Diameter x36"HT
 - c) Configuration: No Loop.
 - d) Color: Manufacturer standard color: Black.
- B. Product: Park Warehouse, LLC. Style: Newport; Model: 622BO1-7 www.parkwarehouse.com
- 2.3 EXTRERIOR PLANTER
 - A. Pre-manufactured Polystone Planter.
 - a) Mounting method: Freestanding.
 - b) Unit dimensions: Interior dimensions 41" x 12" x 18" tall; Exterior dimensions - 46" x 17" x 19" tall, 28 lbs.
 - c) Includes drainage holes and exit channels.
 - d) High-density insulated core.
 - e) Color: Black.
 - B. Product: Milan Tall Trough Planter by Polystone Planters www.polystoneplanters.com

2.4 LOCKER ROOM BENCHES

- A. Product: 15" Wide Locker Room Benches, Dimensions 48" x 15" x 17-1/2" in Gray.
- 2.5 LOCKER ROOM LOCKERS
 - A. Product: ULINE Lockers (1) Wide H-6743 Double Tier and (3) Wide H-4290 Double Tier in Gray.

MISCELLANEOUS SPECIALTIES 10990-2 Accessories: Provide Industrual Locker Sloping Top H-5992GR in Gray and Industrial Locker Base Plate – Front, 12" Wide H-2923GR in Gray

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items specified in this section, where indicated or scheduled or if quantities are given, where indicated or directed by Architect. Install items in strict accordance with the manufacturer's installation instructions.

END OF SECTION

SECTION 114000

FOODSERVICE EQUIPMENT

PART1 - GENERAL

1.1 DESCRIPTION

- A. Scope: Furnish all labor, materials, services, equipment and appliances required to provide and deliver all foodservice equipment hereinafter specified into the building, uncrate, assemble, hang, set-in-place, level, and completely install, exclusive of final utility connections.
- B. Related Work Specified Elsewhere:
 - 1. All plumbing, electrical and ventilating work required in conjunction with commercial foodservice equipment including rough-in to points indicated on mechanical drawings, and final connections from rough-in points, electrical service to points of connection and final connections shall be by Divisions 22, 23 and 26.
 - 2. Refrigeration work will be done by the Kitchen Equipment Contractor except for electrical and plumbing connections to and between compressors, blower coils, controls, etc. These final connections shall be by Divisions 22 and 26.
 - 3. All traps, steam traps, grease traps, line strainers, tail pieces, valves, stops, shut-offs, and fittings necessary for equipment specified will be furnished and installed under mechanical contract by Division 22 unless specifically called for otherwise under each item.
 - 4. All line and disconnect switches, safety cut-offs and fittings, convenience boxes or other electrical controls, fittings and connections will be furnished and installed under electrical contract by Division 26, unless specifically indicated otherwise in the item specifications. Starting switches for certain specified pieces of foodservice equipment are to be provided by Kitchen Equipment Contractor. Those starting switches, if furnished loose as standardized by Foodservice Manufacturers (other than fabricated items), shall be mounted and wired complete under Division 26.
 - 5. Any sleeves or conduit required for refrigeration, syrup tubing, or carbonation tubing will be furnished and installed under Division 22.
 - 6. Unless specifically called for in the Item Specifications, ventilating fans and all duct work between same and ceiling rough-in openings, and from same to discharge opening in building will be furnished and installed by Division 22.

1.2 **DEFINITIONS**

- A. All references to the terms "Contractor", "Kitchen Equipment Contractor", or "K.E.C." in the specifications and/or on the drawings shall be defined to mean the Kitchen Equipment Contractor.
- B. All references to the term "Owner" in the specifications and/or on the drawings shall be defined to mean the Owner or Owner's designated representative and the Foodservice Equipment Consultant.
- C. All references to the term "Consultant" or "Foodservice Equipment Consultant" in the specifications and/or on the drawings shall be defined to mean NYIKOS GARCIA FOODSERVICE DESIGN, INC. its employees, and authorized representatives and is referred to throughout the contract documents as if singular in number and masculine in gender.
- D. The phrase "The K.E.C. shall" or "by the K.E.C.", as applicable, is understood to be included as a part of each sentence, paragraph or article of these specifications unless otherwise indicated or specified.

1.3 QUALITY ASSURANCE

- A. Qualification of Suppliers:
 - 1. Commercial foodservice equipment suppliers shall submit satisfactory evidence of compliance with the following qualifications and conditions to be approved.
 - a. Successful completion of jobs of comparable scope.
 - b. Have manufacturer's authorization to distribute and install specified factory items of equipment.
 - c. Maintain a permanent staff experienced in the installation of foodservice equipment and preparation of professional style rough-in drawings and brochures.
 - d. Maintain or have access to fabrication shop meeting N.S.F. requirements. If other than foodservice equipment suppliers own fabrication shop, obtain Consultant approval of fabrication shop desired to be used.
 - e. Maintain or have access to a readily available stock of repair and replacement parts, together with authorized service personnel.
- B. Qualification of Fabricators:
 - 1. Fabricators shall be an N.S.F. approved organization with trained personnel and facilities to properly design, detail and fabricate equipment in accordance with the specifications and standard details contained herein.
 - 2. Custom fabricated equipment shall bear the National Sanitation Foundation seal of approval and listed as such under N.S.F. Standards No. 2 and No. 33.

- 3. Only one (1) fabricator shall be used for this project, and all equipment will be fabricated at the same shop. When units cannot be fully shop-fabricated, complete fabrication at project site.
- 4. Acceptable fabricators are:
 - a. Pro Stainless, Inc.; Keyser, WV
 - b. Commercial Stainless, Inc.; Bloomsburg, PA
 - c. Keystone Custom Fabricators, Inc.; Elizabeth, PA
 - d. Southern Equipment Fabricators, Inc.; Columbia, SC
 - e. Stainless Unlimited, Inc.; Waldorf, MD
 - f. Other fabricators, as approved by Consultant.
- C. Qualification of Manufacturers:
 - 1. Manufacturers shall be regularly engaged in the production of items furnished and shall have demonstrated the capability to furnish similar equipment that performs the functions specified or indicated herein.
- D. Standard Products:
 - 1. Materials, products, and equipment furnished under this contract shall be the standard items of manufacturers regularly engaged in the production of such materials, products, and equipment and shall be of the manufacturer's latest design that complies with the specifications which have been produced and used successfully on other projects and in similar applications.
 - 2. Discrepancies within contract documents should immediately be brought to the attention of the Consultant in writing for clarification prior to fabrication or ordering of standard items.

1.4 PLANS & SPECIFICATIONS

A. Specifications and drawings have been prepared to form the basis for procurement, erection, start-up and adjustment of all equipment in this contract. Plans and specifications shall be considered as mutually explanatory and work required by one, but not the other, shall be performed as though required by both. Items required by one, but not by the other shall be provided as though required by both. Work shall be accomplished as called for in specifications and shown on drawings, so that all items of equipment shall be completely functional for purpose for which they were designed. When there is any discrepancy between drawings and specifications, drawings shall govern. Bidders should seek clarification of any discrepancies from the Consultant prior to bidding.

1.5 SUBMITTALS

- A. General Requirements:
 - 1. Assemble and submit all shop drawings, rough-in drawings, brochures, color samples, etc. as a complete package. There will be no review of partial submittals.

- 2. Any and all costs, to all trades and parties involved, arising from delay of project due to non-submittal of the complete package by the K.E.C. within a reasonable time period shall be borne solely by the K.E.C.
- 3. Identify each submittal by project name, date, contractor, submittal name, and any other necessary information to distinguish it from other submittals.
- B. Shop Drawings:
 - 1. Submit shop drawings electronically in PDF format, drawn on sheets equal in size to Contract Documents of equipment specified for custom fabrication including all accessories attached to each item.
 - 2. Drawings shall be detailed and fully dimensioned to a minimum scale of 3/4"=1'-0" for plan and elevation views, and 1-1/2"=1'-0" for sections, based on the floor plan(s) and following item specifications. Drawings will be checked for thoroughness, accuracy, completeness, neatness, and returned for corrections, if necessary.
- C. Rough-in Drawings:
 - 1. Submit rough-in drawings electronically in PDF format, drawn on sheets equal in size to Contract Documents of detailed arrangement plans professionally prepared from architects dimensioned plans (not traced from Contract Documents) at a minimum scale of 1/4"=1'-0".
 - 2. Equipment Layout Plan showing arrangement of all items specified and identified on schedule of equipment listing item number, description, quantity, manufacturer, model number, and remarks.
 - 3. Ventilation Plan showing dimensioned locations of all duct openings for ventilators and dishmachines identifying size, c.f.m. required (exhaust and supply), static pressures, and connection heights.
 - 4. Plumbing/Electrical Plans showing dimensioned locations, sizes, elevations and capacities of all utility services required for each item of equipment in relation to finished walls, columns, and heights above finished floor.
 - 5. Special Conditions Plan showing exact dimensions and details of all masonry bases, floor depressions, critical partition locations/heights, wall openings, reinforcing for wall and/or ceiling mounted equipment, and conduit locations for soda and compressed gas lines.
- D. Equipment Brochures:
 - 1. Submit electronic files in PDF format of manufacturer's illustrations and technical data for approval prior to procurement. All items of Standard Manufacture shall be submitted, including items purchased to be built into fabricated equipment. Each illustration shall be marked to accurately describe the item to be furnished as specified. Include all deviations from standard information (i.e., voltage, phase, load, etc.).
 - 2. Include a separate information sheet ahead of each illustration sheet showing all service connection sizes, electrical requirements, loads, consumptions, and all accessories specified.

- 3. Manufacturer's suggested schematic drawings for connection of mechanical and electrical services for such items as booster heaters, disposers, or any other item of equipment that may require the same.
- E. Miscellaneous Shop Drawings:
 - 1. Submit electronic files in PDF format of manufactured equipment specified requiring clarification and approval such as, walk-in cooler/freezer drawings, ventilator drawings, utility raceway drawings, and refrigeration system drawings.
- F. Operation and Maintenance Manuals:
 - 1. Submit electronic files in PDF format for all mechanically operated equipment of standard manufacture. Include operating and cleaning/maintenance instructions, parts listing, recommended parts inventory listing and purchase source, copy of warranties, and similar applicable information.
 - 2. Brochure covers shall bear the job name, date, and name of contractor.
- G. Manufacturer's List:
 - 1. The K.E.C. shall submit electronic files in PDF format a list of all manufacturer's representatives of the food service equipment such as convection ovens, ranges, etc., and their authorized service agencies' addresses and telephone numbers; to be presented after submission of manufacture data
- H. Samples:
 - 1. Samples of materials, products, and fabrication methods, shall be submitted for approval upon request at no additional cost, before proceeding with work.
- I. Re-submission Requirements:
 - 1. Shop Drawings:
 - a. Revise initial drawings as required and resubmit in accordance with submittal procedures.
 - b. Indicate on drawings all changes which have been made in addition to those requested by Consultant.
 - 2. Product Data and Samples:
 - a. Submit new data and samples as required for initial submittal.
 - b. Make all re-submittals within fourteen (14) working days from date of Consultants previous action.
- J. Approvals:
 - 1. After approval of the submittals listed above, furnish as many prints and copies as are required for the various trades, the Owner, the Architect, and the Consultant.
 - 2. The approval of the shop drawings will be general and shall not relieve the K.E.C. of responsibility for proper fitting, finishing, quantities, and erection of work in strict accordance with the contract requirements, nor does it relieve

him of the responsibility of furnishing material and workmanship not indicated on approved shop drawings but required for the completion of his work.

3. Approval by the Consultant and/or Owner of the manufacturer's data submitted by the K.E.C. does not waive the responsibility of K.E.C. to furnish each item of equipment in complete compliance with the specifications and drawings. Discrepancies between Contract Documents and furnished equipment shall be corrected even after approval and installation of this equipment at no additional cost to the Owner.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Equipment shall be delivered to the job site only after the building is weathersafe and vandal-safe.
- B. Storage:
 - 1. Store equipment in an area convenient to the point of installation in such a way that it is protected from the weather and job hazards.
- C. Protection:
 - 1. Wrapping and protective coatings shall remain on all items until ready for use and in the case of stainless steel items, until installation is complete and the job is ready for cleaning.
- D. Damage:
 - 1. All responsibility shall rest with the K.E.C. for any damage or loss incurred prior to final acceptance. Such items as may be lost or damaged shall immediately be replaced or repaired to a new condition to the complete satisfaction of and at no additional cost to the Owner.

1.7 JURISDICTION TRADE AGREEMENTS AND RESTRICTIONS

A. Include the work specified, shown or reasonably inferable as part of foodservice equipment. Portions of this work may be subcontracted to those qualified to do such work, as may be necessary because of jurisdictional trade agreements and restrictions.

1.8 REGULATIONS AND CODES

A. Except as otherwise indicated, each item of equipment shall comply with the latest current edition of the following standards as applicable to the manufacture, fabrication, and installation of the work in this section.

- 1. N.S.F. Standards: Comply with National Sanitation Foundation Standards and criteria, and provide N.S.F. "Seal of Approval" on each manufactured item and major items of custom-fabricated work.
- 2. U.L. Standards: For electrical components and assemblies, provide either U.L. labeled products or, where no labeling service is available, provide a complete index of the components used as selected from the U.L. "Recognized Component Index".
- 3. A.N.S.I. Standards: For gas-burning equipment, comply with A.N.S.I. Z21-Series standards. Comply with A.N.S.I. B57.1 for compressed gas cylinder connections and with applicable standards of the Compressed Gas Association for water connection air gaps and vacuum breakers.
- 4. A.G.A.: All gas-fired equipment shall be A.G.A. Approved, equipped to operate on the type gas available at the job site and shall contain 100% automatic safety shut-off devices.
- 5. N.F.P.A. Standards: Comply with N.F.P.A. Bulletin 96 for exhaust systems and with N.F.P.A. Bulletins 17 & 96, and U.L. 300 for fire extinguishing systems.
- 6. A.S.M.E. Code: Comply with A.S.M.E. boiler code requirements for steam generating and steam heated equipment. Provide A.S.M.E. inspection, stamps, and certification of registration with National Board.
- 7. National Electric Code: Comply with N.E.C. Volume 5 for electrical wiring and devices included with foodservice equipment.
- 8. All authorities having jurisdiction over this type of equipment and/or installation.
- 9. Where specifications and/or drawings require mechanical, electrical or refrigeration work to be performed, such work shall be done in strict conformance to other portions of the Base Building Specification which sets forth standards for this type of work.
- 10. Where there exists two standards or codes for one type of work, the stricter method shall govern.

1.9 WARRANTIES

- A. Warrantee in writing all equipment and fabrication against defects and workmanship for a period of two (2) years from date of acceptance.
 - 1. Each piece of mechanical equipment shall be listed, together with the authorized service and repair agency whom the Owner will call should malfunctions occur within the two-year (2) guarantee period.
- B. Refrigeration system compressors shall be warrantied for five (5) years by the manufacturer. Free refrigeration service, including parts and labor, shall be furnished for two (2) years from date of acceptance, unless otherwise specified.

1.10 JOB CONDITIONS

- A. Visit the job site to field check actual wall dimensions and roughing-in and shall be responsible for fabricating and installing the equipment in accordance with the available space and utility services as they exist on the job site.
- B. Check all door openings, passageways, elevators, etc., to be sure that the equipment can be conveyed to its proper location within the building and if necessary, check the possibility of holding wall erection, placement of doorjambs, windows, etc. for the purpose of moving the equipment to its proper location with the Contractor. Any removal and rebuilding of walls, partitions, doorjambs, etc. necessary to place the equipment, or if caused by incorrect information on the Contractor's drawings, shall be done at the expense of the K.E.C., at no additional cost to the Owner.
- C. Notify the Consultant and Owner before fabrication of equipment of any discrepancies between plans and specifications and actual conditions on the job.
- D. Before finished floors, walls, and/or ceilings are in place, physically check the location of all "rough-ins" at the job site. Report discrepancies in writing.
- E. Any changes required after fabrication has been started to ensure equipment accurately fitting the space as it exists and conforming to actual field dimensions on the job shall be made at no additional cost to the Owner.
- F. If special hoisting equipment and operators are required, include such cost as part of the bid for this work.

1.11 EXISTING EQUIPMENT

- A. Re-Use and Relocation of Existing Equipment On-Site:
 - 1. Dis-assemble, clean, repair, move, re-assemble and re-set listed existing items in new location as shown on plan.
 - 2. Provide necessary hoisting apparatus as required to safely and effectively transport items to new location. Include wrapping or padding of sensitive items to protect against scratching or denting.
 - 3. Any damages incurred as a result of the relocating of equipment shall be repaired by competent service agency to like-new condition with no additional cost to the contract price.
- B. Cleaning and Repair:
 - 1. The Equipment Contractor shall clean listed existing items and replace any defective parts.
 - 2. Cleaning shall consist of the removal of residues of food, ingredients, dirt and all other soiling materials and extraneous matter.
 - 3. Repairs and parts shall be for minor items such as: control knobs, pilot lamps, faucet washers, minor adjustments, etc.

- 4. Major repairs or parts required, which are only detectable during repairs, shall be noted in writing, with cost, to Owner for approval and addition to the contract price.
- C. Storage and Protection:
 - 1. Coordinate a suitable location within the building to store all existing equipment. Otherwise, provide secured on-site storage in the form of a trailer or shed.
 - 2. Should on-site storage not be available, transport equipment to supplier's warehouse.
 - 3. K.E.C. shall be responsible for protection from theft and damage of all existing equipment scheduled for re-use.

1.12 CHANGES IN THE WORK

A. The Owner reserves the right to require reasonable modification to be made in the routing of work and relocation of equipment. This specifically refers to conditions where interference occurs or where more desirable accessibility can be obtained or whose materials cannot be installed because of structural or mechanical conditions encountered. Such changes shall be made at no additional cost to the Owner.

1.13 PATENTS

- A. Hold harmless and save the Owner and its officers, consultants, servants and employees from liability of any nature or kind, including costs and expenses for or on account of any copyrighted, patented, or un-patented invention, process, trademark, design, device, material, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.
- B. If the Contractor has information that the process or article specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner in writing. The contract price shall include all royalties or costs arising from the use of any or all of the above which are, in any way, involved in the contract.

1.14 CONTRACTOR'S WARRANTY

- A. The Contractor represents and warrants:
 - 1. That he is financially solvent and that he is experienced in and competent to perform the types of work or to furnish the plans, materials, supplies or equipment, to be so performed or furnished by him.
 - 2. That he is familiar with all Federal, State, municipal, and department laws, ordinances, orders, and regulations, which may, in any way, affect the work

of those employed therein, including, but not limited to, any special acts relating to the work or to the project of which it is a part.

- 3. That such temporary and permanent work required by the contract as is to be done by him can be satisfactorily constructed and used for the purpose for which it is intended and that such construction will not injure any person or damage any property.
- 4. That he has carefully examined the plans, specifications, addenda, if any, and the site of the work and that, from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality, and quantity of materials likely to be encountered, the character of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other materials which may, in any way, affect the work or its performance.
- 5. That he has satisfied himself as to the existing openings and accesses to the foodservice area through which his equipment shall be required to pass and that he is responsible for his equipment being delivered in as many sections as necessary to conform to the available space dictated by these existing limitations.

1.15 SUBSTITUTIONS

- A. Bids submitted shall be for the specific manufacturer and model, size, capacity, and accessories, as specified or shown on the drawings.
- B. The K.E.C. may quote upon brands and models of equipment other than those specified as a substitute. In the event that it is desired to request approval of substitute material, product, article, process, or item of equipment in lieu of that which is specified, submit a written request at least (10) working days prior to date of bids, setting forth the proposed substitution in detail, including an itemized analysis of the addition or deduction in the amount of the contract, if any, which will result if the substitution is approved. Each such request shall include a complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance and test data and any other data or information necessary for a complete evaluation. If approved, bidders will be notified in the form of addendum.
- C. The Contractor shall be held responsible for additional costs to himself or any other prime contractor for changes required to install materials, devices, equipment, etc., which the Contractor has substituted for that specified.
- D. The Owner reserves the right to award a contract or contracts based upon the inclusion or exclusion of one or more of the alternate estimates. The description of all workmanship and materials under the various headings of the specifications shall have the same meaning and force when applied to similar workmanship and materials in the alternate. If the descriptions are not specific, the workmanship shall be the best quality and the materials the best commercial grade.

- E. Whenever any product is specified in the Contract Documents by reference to the name, trade name, make, or catalog number of any manufacturer or supplier, the intent is not to limit competition but to establish a standard of quality which is necessary for the project. Products of other manufacturers meeting the established criteria will be considered. However, please take note that the plumbing, electrical, steam, heating, ventilating, and air-conditioning drawings prepared by the consulting engineers, have been engineered based on the first product named under each item number designation. Therefore, any other product which is submitted for approval in lieu of the primary item specified, shall conform to the rough-in requirements established for the first product named, as well as physical size and building construction requirements.
- F. Any equipment listed which is not in accordance with the provisions of these specifications will be rejected. If the Contractor fails to submit for approval within the specified time the list of equipment as required herein, the Consultant shall then have the right to make the final equipment selection. The selection made by the Consultant shall strictly conform to these specifications and will be final and binding, and the items shall be furnished and installed by the Contractor without change in the contract price at the time of completion.
- G. It shall be the responsibility of the K.E.C. to prove that substitutions are equal to specified items. NYIKOS GARCIA FOODSERVICE DESIGN, INC. as the Owner's representative, shall be the determining authority as to the acceptability or equality of the substitutions. No substitutions shall be approved after bids are received.

1.16 DESIGN/MODEL CHANGE, DISCONTINUED ITEMS

- A. All equipment specified shall be of latest design. Any improvements made in design and construction of prefabricated items before equipment is actually delivered to the project site, shall be incorporated in equipment, at no additional cost, provided such incorporation does not delay delivery date of equipment.
- B. In the event of an item being discontinued after specified and prior to delivery to project site, the K.E.C. shall be responsible for notifying the Consultant in writing of the discontinued item and request an alternate of equal performance, including all accessories, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. The equipment and its component parts shall be new and unused. All items of standard manufactured equipment shall be current models at the time of delivery.

All parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement, and repair.

- B. Means shall be provided to ensure adequate lubrication for all moving parts. All oil holes, grease fittings, and filler caps shall be accessible without the use of tools.
- C. The design of the equipment shall be such as to provide for safe and convenient operation. Covers or other safety devices shall be provided for all items of equipment presenting safety hazards. Such guards or safety devices shall not present substantial interference to the operation of the equipment. All guards shall provide easy access to the guarded parts.
- D. Trim shall not be an acceptable substitute for accuracy and neatness. When trim is required and accepted by the Consultant and the Owner in lieu of rejection of items of equipment, it shall be the K.E.C.'s responsibility to provide same at no additional cost.
- E. Unless otherwise specified herein, no material lighter than #20 gauge shall be incorporated into the work. All gauges for sheet iron and sheet steel shall be U.S. Standard Gauges, and finished equipment gauge thickness shall not vary more than 5% plus or minus from the thickness indicated below.

GAUGE	THICKNESS	GAUGE	THICKNESS
#10	0.1406	#16	0.0625
#12	0.1094	#18	0.0500
#14	0.0781	#20	0.0375

F. Materials or work described in words which have a well known and acceptable trade meaning shall be held to refer to such accepted meanings.

2.2 MATERIALS

- A. Refrigeration Systems:
 - 1. Self-contained:
 - a. Whether the units be top-mounted or cabinet-mounted, they shall be started by the K.E.C. and shall be tested for maintenance of temperature.
 - b. All units shall be furnished with condensate evaporators.
 - 2. Remote: Provide and install complete refrigeration system(s), charged, started, and operating properly, according to the Item Specifications and the following.
 - a. Single stage compressors with air-cooled condensers operating within the recommended range of suction discharge pressure of economical operation and within the required capacity.
 - b. All units shall be new and factory assembled, to operate with the refrigerant specified. Refrigerant R-404 shall be used for all medium and low temperature applications. Due to the unsettled nature of

refrigerants, no refrigerant shall be used with a phase-out date of less than ten (10) years from the date of installation.

- c. Compressors shall be accessible hermetic type, Copeland or approved equal, and shall be equipped with high-low pressure control, liquid line drier, sight glass, suction and discharge vibration eliminator, and head pressure control.
- d. The system shall have a factory mounted and pre-wired control panel complete with main fused disconnect, compressor circuit breakers, contactors, and time clocks wired for single point power connection.
- e. The supporting frame shall be constructed of structural steel, fully welded, and protected against rust and corrosion with one (1) coat primer, and two (2) coats paint, unless otherwise specified.
- f. Systems specified for outdoor installation shall be fully protected in a weather-proofed housing with louvered front panel and hinged top, constructed to resist rust and corrosion, and furnished with low ambient controls. Crankcase heater shall be provided with every compressor.
- 3. Where specifications call for pre-piped lines (i.e., from a fixture to a valve compartment, etc.), provide such work in strict conformance with other sections of the specifications which set forth standards for this type of work or in conformity with the requirements of the Board of Fire Underwriters or ASHRAE Standards, whichever is greater.
- 4. Each refrigeration item specification is written to provide minimum specifications and scope of work. All refrigeration equipment shall be designed and installed to maintain the following general temperatures unless otherwise specified.

<u>PE</u>	REFRIGERATORS	FREEZERS
Walk-In	+35° F./1.7° C.	-10° F./-23.3° C.
Reach-In	+35° F./1.7° C.	-10° F./-23.3° C.
Undercounter	+35° F./1.7° C.	-10° F./-23.3° C.
Fabricated	+35° F./1.7° C.	-10° F./-23.3° C.
Cold Pans	+0° F./-17.8° C.	
Work Rooms	+50° F./10° C.	
	<u>PE</u> Walk-In Reach-In Undercounter Fabricated Cold Pans Work Rooms	PEREFRIGERATORSWalk-In $+35^{\circ}$ F./1.7° C.Reach-In $+35^{\circ}$ F./1.7° C.Undercounter $+35^{\circ}$ F./1.7° C.Fabricated $+35^{\circ}$ F./1.7° C.Cold Pans $+0^{\circ}$ F./-17.8° C.Work Rooms $+50^{\circ}$ F./10° C.

- 5. Provide (including payment if subcontracted) all electrical and refrigeration components needed by the completed system and complete (or have completed by the respective trades) all connections of and to said components.
- 6. An evaporator coil defrost system shall be provided and installed by the K.E.C. on all refrigeration systems designed to operate at an evaporator coil temperature of less than +35° F. Evaporator coil units provided without electric defrost feature shall be installed with a solenoid valve in the liquid line, controlled by the time clock so as to shut off the flow of refrigerant and allow the compressor to pump down and shut off by activation of the pressure control switch.
- 7. Verify the requirements of and provide any or all additional refrigeration specialty(s) or component(s) required or recommended by the manufacturer

for proper operation under the specific operating conditions and location of each system specified.

- 8. Verify and provide manufacturer's certification that the equipment selection hereinafter specified for each refrigeration system is properly sized and shall meet the operating requirements set forth for each system regarding maintaining specified operating temperature, hours of compressor running time, and system pressures and velocities as recommended by the equipment manufacturer(s).
- 9. All refrigeration systems shall be installed and wired in strict conformance with the manufacturer's instructions and recommendations.
- B. Motors and Heating Elements:
 - 1. Motors up to and including 1/2 HP shall be wired for 120 volt, single phase service. Motors larger than 1/2 HP shall be wired for 208 volt, single or three phase service as indicated. Motors shall be of the drip-proof, splash-proof, or totally enclosed type, having a continuous duty cycle and ball bearings, except small timing motors which may have sleeve bearings. All motors shall have windings impregnated to resist moisture. Motors located where subject to deposits of dust, lint, or other similar matter shall be of the totally enclosed type. Motors shall have ample power to operate the machines for which designated under full load operating conditions without exceeding their nameplate ratings. Insulation shall be N.E.M.A. Class B or better.
 - 2. Heating elements having a connected load up to and including 1,000 watts shall be wired for 120 or 208 volt, single phase service, or as indicated on the drawings.
 - a. Any heating element larger than 1,000 watts or any combination of elements in one fixture totaling more than 1,000 watts shall be wired for 208 volt single or three phase service, as indicated on the drawings.
 - b. Fixtures having multiple heating elements may be wired for three phase service with the load balanced as equally as possible within the fixture.
- C. Switches and Controls:
 - 1. Provide recognized commercial grade signals, "on-off" pushbuttons or switches, and other speed and temperature controls as required for operation of each item, complete with pilot lights and permanent graphics, conspicuously labeled, to assist the user of each item.
 - 2. Mount switches and controls directly adjacent the piece of equipment for which it involves, on operator's side of counter body apron, out of view to the public.
 - 3. Provide on or for each motor-driven appliance or electrical heating or control unit, a suitable control switch or starter of the proper type and rating and in accordance with Underwriter's Code wherever such equipment is not built in. All other line switches, safety cut-outs, control panels, fuse boxes, other control fittings and connections, when not an integral part of the unit or furnished loose by the manufacturer will be furnished and installed by the Contractor, unless otherwise specified. All electrical controls, switches, or

devices provided loose for field installation as a part of the item specified shall be installed in the field by the Contractor unless otherwise specified.

- 4. Appliances shall be furnished complete with motors, driving mechanisms, starters, and controllers, including master switches, timers, cut-outs, reversing mechanisms, and other electrical equipment if and as applicable.
- D. Cover Plates:
 - 1. All controls mounted on vertical surfaces of fixtures shall be set into recessed die stamped stainless steel cups, or mounted onto removable cover plates in such a fashion as to not protrude or interfere with the operation of each item.
 - 2. Cover plates shall be furnished and installed for all electrical outlets, receptacles, switches and controls furnished by the K.E.C., and shall match the material and finish of the equipment to which they will be fastened.
- E. Wiring and Conduit:
 - 1. Wiring shall be properly protected in N.E.M.A. and U.L. approved metal enclosures. Only rigid steel conduit shall be used, zinc coated where unexposed and chrome plated where exposed. All wiring shall be run concealed wherever possible.
 - 2. All equipment furnished under this contract shall be so wired, wound, or constructed so as to conform with the electrical characteristics at the job site.
 - 3. Wiring and connection diagrams shall be furnished with electrically operated machines and for all electrically wired fabricated equipment.
 - 4. Furnish all foodservice equipment completely wired internally using wire and conduit suitable for a wet location. Where an Electrician's services are required, the work shall be done in the K.E.C.'s factory or at his expense at the job site at no additional cost to the Owner. Provide all electrical outlets and receptacles required to be mounted on or in fabricated equipment and interconnect to a master circuit breaker panel with all wires neatly tagged showing item number, voltage characteristics, and load information. Final connection shall be made by the Contractor.
- F. Cords, Plugs, and Receptacles:
 - 1. The Contractor shall provide three- or four-wire, grounding-type receptacles for all wall and floor mounted outlets to be used for plug-in equipment with characteristics as noted on the drawings. Provide Hubbell three-wire or four-wire grounding-type connectors and neoprene cords installed on each item of plug-in equipment, as indicated on drawings and item specifications.
 - 2. K.E.C. shall ensure that the receptacles provided will match the specific plugs provided as part of the plug-in equipment.
 - 3. Reduce the length of all cords furnished with the specified equipment to a suitable or appropriate length so they do not interfere with other equipment or operations.
 - 4. Pedestal receptacles that are part of fabricated equipment exposed to view, shall be similar to T&S Model No. B-1508DD single face, single gang or Model No. B-1528DD single face, double gang.

G. Water Inlets:

- 1. Water inlets shall be located above the positive water level wherever possible to prevent siphoning of liquids into the water supply system. Wherever conditions shall require a submerged inlet, a suitable type of check valve (except in jurisdictions where check valves are prohibited) and vacuum breaker shall be placed on the fixture to form a part of same to prevent siphoning. Where exposed to view, piping and fittings shall be <u>chromeplated</u>.
- H. Drain Lines:
 - 1. Contractor shall provide and install indirect waste lines from equipment which will discharge into floor drains or safe wastes in accordance with Plumbing Rough-In Plans, chrome-plated where exposed. Extend to a point at least 1" (or as required by local codes) above the rim of the floor drain, cut bottom on 45° angle and secure in position.
 - 2. All horizontal piping lines shall be run at the highest possible elevation and not less than 6" above finished floor, through equipment where possible.
 - 3. No exposed piping in or around fixtures or in other conspicuous places shall show tool marks of more than one thread at the fitting.
 - 4. All steam operating valves on or in fabricated and purchased foodservice equipment shall be provided with composition hand wheels, which shall remain reasonably cool in service.
 - 5. Provide suitable pressure regulating valves for all equipment with such components that might reasonably be expected to be affected over a period of time by adverse pressure conditions.
- I. Faucets, Valves and Fittings:
 - 1. All sinks shall be fitted with chromium plated, swing spout faucets of same manufacturer throughout as follows, or otherwise specified in Item Specifications.
 - a. Prep and Utility Sinks:
 - 1.) Splash-Mounted:
 - a.) T&S Brass and Bronze Works, Inc., Model B-231.
 - b.) Fisher Manufacturing Company, Model 3253.
 - 2.) Deck-Mounted:
 - a.) T&S Brass and Bronze Works, Inc., Model B-221.
 - b.) Fisher Manufacturing Company, Model 3313.
 - b. Pot Sinks:
 - 1.) Splash-Mounted:
 - a.) T&S Brass and Bronze Works, Inc., Model B-290.
 - b.) Fisher Manufacturing Company, Model 5214.
 - 2. Pre-Rinse Assemblies:
 - a. Splash-Mounted:
 - 1.) T&S Brass and Bronze Works, Inc., Model B-133 with B-109 wall bracket.
 - 2.) Fisher Manufacturing Company, Model 2210 with 2902-12 wall

bracket.

- b. Deck-Mounted:
 - 1.) T&S Brass and Bronze Works, Inc., Model B-143 with B-510 mixing valve and B-109 wall bracket.
 - 2.) Fisher Manufacturing Company, Model 2810 with 2805-CV mixing valve and 2902-12 wall bracket.
- 3. Vacuum Breakers:
 - a. General Use:
 - 1.) Fisher Manufacturing Company, Model 3990-8000.
 - b. Disposers:
 - 1.) Splash-Mounted:
 - a.) T&S Brass and Bronze Works, Inc., Model B-455.
 - b.) Fisher Manufacturing Company, Model 3990.
 - 2.) Deck-Mounted:
 - a.) T&S Brass and Bronze Works, Inc., Model B-456.
 - b.) Fisher Manufacturing Company, Model 3991.
- 4. Trough Inlets:
 - a. Fisher Manufacturing Company, Model No. 2905.
- 5. Other specialty faucets, pre-rinse assemblies, vacuum breakers, and trough inlets, as specified under Item Specifications.
- 6. All sink compartments shall be fitted with 2" NPT male, chrome-plated, brass rotary waste valves complete with overflow assemblies and stainless steel strainers.
 - a. Prep and General Utility Sinks:
 - 1.) Fisher Manufacturing Company, Model No. 6100.
 - b. Pot Sinks:
 - 1.) Fisher Manufacturing Company, Model No. 6102.
- 7. Refer to Division 22 for all other fittings.
- J. Metals and Alloys:
 - 1. Stainless steel sheets shall conform to ASTM 240, Type 302, Condition A, 18-8, of U.S. Standard Gauges as previously indicated under paragraph 2.1.E.
 - a. All exposed surfaces shall have a No. 4 finish. A No. 2B finish shall be acceptable on surfaces of equipment not exposed to view.
 - b. All sheets shall be uniform throughout in color, finish, and appearance.
 - c. Rolled shapes shall be of cold rolled type conforming to ASTM A36.
 - 2. Stainless steel tubing and pipe shall be Type 304, 18-8, having a No. 4 finish, and shall conform to either ASTM A213 if seamless or ASTM A249 if welded.
 - 3. Where galvanized metal is specified, it shall be copper-bearing galvanized iron, cold-rolled, stretcher leveled, bonderized, re-rolled to insure a smooth surface, and used in the largest possible sizes with as few joints as necessary.
 - 4. Galvanizing shall be applied to rolled shapes in conformance with ASTM A123, and to sheets in conformance with ASTM A526, coating designation G-90.

- K. Castings:
 - 1. Castings shall consist of corrosion resisting metal (white metal) containing not less than 30% nickel. All castings shall be rough ground, polished, and buffed to bright lustre and free from pit marks, runs, checks, burrs, and other imperfections. In lieu of corrosion resisting metal castings, die-stamped or cast 18-8 stainless steel will be acceptable.
- L. Hardware and Casters:
 - 1. All hardware shall be of heavy duty type, satin finished chromium plated brass, cast or forged or highlighted stainless steel of uniform design. All hardware shall be a well known brand, and shall be identified by the manufacturer's name and model number for easy replacement of broken or worn parts.
 - 2. Casters on custom built equipment shall be heavy duty type, ball bearing, solid or disc wheel, with grease-proof rubber, neoprene, or polyurethane tire. Wheel shall be 5" diameter, minimum width of tread 1-3/16", minimum capacity per caster 250 pounds, unless otherwise noted.
 - a. Solid material wheels are to be provided with stainless steel rotating wheel guard.
 - b. All casters shall have sealed wheel and swivel bearings, polished plated finish and be N.S.F. approved.
 - c. All equipment specified with casters shall have a minimum of two (2) with brakes installed on opposite corners, unless otherwise noted.
- M. Locks:
 - 1. When specified, doors and drawers of all custom fabricated or manufactured equipment shall be provided with cylinder locks, disc tumbler type with stainless steel faceplate as manufactured by Standard-Keil Mfg. Co., or approved equal.
 - a. Provide two (2) sets of keys for each lock.
 - b. All locks shall be keyed alike, except at cashiers stations or unless otherwise specified.
- N. Thermometers:
 - 1. All fabricated refrigerated compartments shall be fitted with exterior mounted, adjustable, dial or digital thermometers with flush bezels, and shall be calibrated after installation.
- O. Sealants:
 - Sealant, wherever required, shall conform to ASTM C 920; Type S Grade NS, Class 25, Use Nt, with characteristics that when fully cured and washed meets requirements of Food and Drug Administration Regulation 21 CFR 177.2600 and N.S.F. RTV-732 for use in areas where it comes in contact with food.
 - 2. Dow-Corning #780 or General Electric "Silastic", or approved equal, in either clear or approved color to match surrounding surfaces and applied in

accordance with sealant manufacturers recommendations for a smooth, sealed finish.

2.3 FABRICATION AND MANUFACTURE

- A. Materials and Workmanship:
 - 1. Unless otherwise specified or shown on drawings, all materials shall be new, of best quality, perfect, and without flaws. Material shall be delivered and maintained on the job in an undamaged condition.
 - 2. Fabrication shall be equal to the standards of manufacture used by all first class equipment manufacturers, performed by qualified, efficient, and skilled mechanics of the trades involved.
 - 3. All items of standard equipment shall be the latest model at time of delivery.
 - 4. All fabricated work shall be the product of one manufacturer of uniform design and finish.
 - 5. Each fabricated item of equipment shall include all necessary reinforcing, bracing, and welding with the proper number and spacing of uprights and cross members for strength.
 - 6. Wherever standard sheet sizes will permit, the tops of all tables, shelves, exterior panels of cabinet type fixtures, and all doors and drainboards shall be constructed of a single sheet of metal.
 - 7. Except where required to be removable, all flat surfaces shall be secured to vertical and horizontal bracing members by welding or other approved means to eliminate all buckle, warp, rattle, and wobble. All equipment not braced in a rigid manner and which is subject to rattle and wobble shall be unacceptable, and the K.E.C. shall add additional bracing in an approved manner to achieve acceptance.
- A. Sanitary Construction:
 - 1. All fabricated equipment shall be constructed in strict compliance with the standards of the National Sanitation Foundation as outlined in their Bulletin on Food Service Equipment entitled "Standard No. 2" dated October 1952, and in compliance with the local and State Public Health Regulations in which the installation will occur.
 - 2. All fabricated equipment shall bear the N.S.F. "Seal of Approval".
- B. Construction Methods:
 - 1. Welding:
 - a. All welding shall be the heliarc method with welding rod of the same composition as the sheets or parts welded. Welds shall be complete, strong, and ductile with excess metal ground off and joints finished smooth to match adjoining surfaces; free of mechanical imperfections such as gas holes, pits, cracks, etc., and shall be continuously welded so that the fixtures shall appear as one-piece construction. Butt welds made by spot solder and finished by grinding shall not be acceptable.

- b. Spot welds shall have a maximum spacing of 3". Tack welds shall be of at least 1/4" length, and spaced no greater than 4" from center to center. Weld spacing at the ends of the channel battens shall not exceed 2" centers.
- c. In no case shall soldering be considered as a replacement for welding, nor shall any soldering operation be done where dependence is placed on stability and strength of the joint.
- d. Fixtures shall be shop fabricated of one piece and shipped to the job completely assembled wherever possible. Equipment too large to transport or enter the building in one piece shall be constructed so that the field joints can be welded at the job site.
- e. All exposed joints shall be ground flush with adjoining material and finished to harmonize therewith. Whenever material has been sunk or depressed by welding operation, depression shall be suitably hammered and peened flush with the adjoining surface and ground to eliminate low spots. In all cases the grain of rough grinding shall be removed by successive fine polishing operations.
- f. All unexposed welded joints on undershelves of tables or counters of stainless steel shall be suitably coated at the factory with an approved metallic-based paint.
- g. After galvanized steel members have been welded, all welds and areas where galvanizing has been damaged shall have a zinc dust coating applied in conformance with Military Specification Number MIL-P-26915.
- 2. Joints:
 - a. Butt joints and contact joints, wherever they occur, shall be close fitting and shall not require a filler. Wherever break bends occur, they shall be free of undue extrudence and shall not be flaky, scaly, or cracked in appearance; where such breaks do mar the uniform surface appearance of the material, all such marks shall be removed by suitable grinding, polishing, and finishing. Wherever sheared edges occur, they shall be free of burrs, fins, and irregular projections and shall be finished to obviate all danger of laceration when the hand is drawn over them. In no case shall overlapping materials be acceptable where miters or bullnosed edges occur.
 - b. Field welded joints shall be ground smooth without dips and irregularities and finished to match original finish.
- 3. Bolt, Screw and Rivet Construction:
 - a. All exposed surfaces shall be free from bolt and screw heads. When bolts are required, they shall be of the concealed type and be of similar composition as the metal to which they are applied.
 - b. Where bolt or screw threads on the interior of fixtures are visible or may come into contact with hands or wiping cloths, they shall be capped with a stainless steel or chrome acorn nut and stainless steel lock washer.

- c. If rivets are used to fasten rear paneling to the body of the fixture, such rivets shall be stainless steel. In no case shall iron rivets be used.
- 4. Sound Deadening:
 - a. Schnee Butyl-Sealant 1/2" wide rope continuously between all frame members and underside of stainless steel table tops, overshelves and undershelves.
 - b. Tighten stud bolts for maximum compression of sealant.
- 5. Hi-Liting:
 - a. All horizontal edges of stainless steel tops, splashes, tops of raised rolled rims, and edges of all exposed doors, handles and shelf edges shall be hi-lited, in uniform design by grinding with abrasive not coarser than #240 grit, then polishing with compound to a uniform mirror finish.
- 6. Polishing:
 - a. The grain of polishing shall run in the same direction on all horizontal and on all vertical surfaces of each item of fabricated equipment except in the case where the finish of the horizontal sections of each shall terminate in a mitered edge.
 - b. Where sinks and adjacent drainboards are equipped with backsplash, the grain of the polishing shall be consistent in direction throughout the length of the backsplash and sink compartment.
- 7. Finishes:
 - a. Paint and coatings shall be of an N.S.F. approved type suitable for use in conjunction with foodservice equipment. Such paint or coating shall be durable, non-toxic, non-dusting, non-flaking and mildew resistant, shall comply with all governing regulations, and shall be applied in accordance with the manufacturers recommendations.
 - b. All exterior, galvanized parts, exposed members of framework, and wrought steel pipe where specified to be painted shall be cleaned, primed with rust inhibiting primer, de-greased, and finished with two (2) coats of glossy enamel grey hammertone paint, unless otherwise noted.
 - c. Where baked enamel finishes are specified, they shall be oven baked on the fixtures for a minimum of 1-1/2 hours at a minimum temperature of 300 Fahrenheit.
 - d. Fabricated equipment shall be spray coated with plastic suitable for protecting the equipment during transport and installation. The coating shall be easily removable after the equipment installation is complete at the job site, and final clean-up has begun.
- C. Construction:
 - 1. Legs:
 - All tubular stands for open base tables, sinks, or dishtables shall have legs constructed of 1-5/8" O.D. stainless steel tubing, with 1-1/4" O.D., #16 gauge stainless steel crossbracing running between legs at a point 10" above finished floor.

- b. All joints between legs and crossbracing shall be welded and ground smooth, full 360°.
- c. The top end of legs shall be closely fitted into fully-enclosed stainless steel conical gussets no less than 3" high, similar to Klein #481-58 or #483-58, or approved equal.
- d. Gussets shall be fully welded to framing reinforcing members, so that, set screw is not visible from front.
- e. Legs without crossrails will not be accepted.
- f. Legs shall be spaced at not more than 5'-6" on centers, unless otherwise specified.
- 2. Feet:
 - a. All tubular legs will be swedged for appearance and close fit to United Show Case #BF-158, or approved equal, fully enclosed, stainless steel bullet-shaped foot.
 - 1.) The foot shall be threaded into a collar and completely welded inside the tubular leg to permit a maximum adjustment of 2" without any thread exposure.
 - 2.) Threads shall be National Course Series Class 2 fit or better, machined to prevent end play when foot is at maximum adjustment.
 - 3.) The bullet-shaped foot shall have slightly rounded bottom to protect the floor, and a minimum bearing surface of 3/4" diameter of stainless steel-to-floor contact.
 - 4.) Bottom of tubular leg shall be finished off smoothly to provide a sanitary fitting and prevent the accumulation of grease or other debris.
 - b. Cabinet type fixtures shall be mounted on 8" high die-stamped, sanitary, two-piece stainless steel legs no less than 3" in diameter at the top, United Show Case #CM-68B, or approved equal.
 - 1.) The bottom fully enclosed, stainless steel, bullet-shaped foot threads up into the inside of the upper member, with a male threaded 5/8" bushing to permit maximum adjustment of 2" without thread exposure.
 - 2.) The upper section shall be stamped in a neat design with a flared inverted shoulder and fully welded to a base plate designed for anchoring to the channel underbracing.
- 3. Table Tops:
 - a. Tables shall be constructed of stainless steel, and of a thickness not less than #14 gauge with 1-3/4" by 120° rolled edges, or as otherwise specified and detailed.
 - b. All corners shall be bull-nosed and of the same radius as rolled edges.
 - c. Joints where required shall be butt-welded and ground smooth to present a uniform one-piece appearance.
 - d. All tops shall be reinforced on the underside with a fully welded framework of 1-1/2"x1-1/2"x1/8" galvanized steel angles with the

framing extending around the top perimeter and crossbraced on 24" maximum centers.

- e. 1"x4"x1" galvanized or stainless steel, fully welded, cross channel, closed end members placed at each pair of legs with one (1) channel running lengthwise will also be acceptable.
- f. All tops shall be reinforced so that there will be no noticeable deflection.
- g. Metal tops where adjacent to walls or other items of equipment, shall be constructed with integral, coved, back and/or endsplashes as required and specified in accordance with the standard details contained herein. Close all ends of splashes.
- 4. Enclosed Bases:
 - a. All enclosed bases or cabinet bodies shall be of seamless #18 gauge stainless steel construction, enclosed on the ends and sides as required and called for under each item.
 - b. Ends of body shall terminate at front or operator's side in a 2" wide mullion, vertical, and completely enclosed. All intermediate mullions shall be completely enclosed.
 - c. The bases shall be reinforced at the top with a framework of 1-1/2"x1-1/2"x1/8" galvanized angles, with all corners mitered and welded solid.
 - d. Underside of top shall be reinforced with channels and gussets where necessary. Additional angles and cross members shall be provided to reinforce shelves and support tops under heavy tabletop equipment.
 - e. Where sinks or other drop-in equipment occur, provide additional reinforcing extending crosswise, both sides of opening.
 - f. In the case of fixtures fitting against or between walls, the bodies shall be set in 1" or 2" from the wall line, with the tops continuing to the wall line with integral, coved splashes as specified. Extend vertical face of body to the wall line only. This will permit adjustment to wall irregularities. Vertical trim strips will not be accepted.
 - g. Bodies shall be fitted with counter style stainless steel legs as hereinbefore specified.
- 5. Drawers:
 - a. Drawers, where specified, shall have removable pan inserts of #18 gauge stainless steel, and shall be approximately 20"x20"x5" deep unless otherwise specified.
 - 1.) Perimeter top edge shall be flanged out 1/2".
 - 2.) All interior horizontal corners shall be rounded on a 1" radius, and all interior vertical corners shall be rounded on a 2" radius.
 - b. Fronts shall be double pan #16 gauge stainless steel construction, 1" thick, insulated with a semi-rigid, fiberglass board, un-faced, having a three-pound density.
 - The top of the drawer face shall be formed as an integral pull by breaking the front pan back on a 45° angle 1", then straight up 1", back to front 1", and then down at the front 3/4".
 - 2.) Drawer front shall have all edges and corners ground smooth

with a radius edge pull.

- 3.) Provide hard rubber button bumpers attached to rear of drawer face at each corner.
- c. The drawer shall have an all welded frame of 1"x1", #16 gauge stainless steel angles sized to fit the removable pan insert.
- d. Drawers shall operate on #14 gauge full-extension slides with stainless steel roller bearings with hardened and ground raceways, Component Hardware, S52 Series, or approved equal. Slides shall be pitched approximately 3/8" per foot to permit self closing action.
- e. Drawers shall be adequately and neatly fitted to the guides to permit easy operation without rattle or binding.
- f. Slides and frame shall be reinforced to support a dead weight of 150 pounds when drawer is fully extended.
- g. Adjustable stops shall be provided for each drawer at the fully-opened position, and be readily liftable by hand for easy removal of drawer.
- h. All drawers not mounted inside a cabinet body shall be completely enclosed in an #18 gauge stainless steel box-type enclosure and suspended from angle framing under the fixture top. The housing bottom shall be flanged and welded to an #18 gauge stainless steel reinforcing channel extending across the open end.
- 6. Sliding Doors:
 - a. Sliding doors shall be of the double pan type, with the exterior pan constructed of #18 gauge stainless steel with all four sides channeled and corners welded. The interior pan shall be similarly constructed of #20 gauge stainless steel, set into the exterior pan, and welded in place.
 - b. All doors shall be insulated with semi-rigid fiberglass board, un-faced, having a three-pound density. Styrofoam shall not be acceptable.
 - c. Doors 18" wide or greater, shall have internally welded 4" wide reinforcing channels to prevent warpage.
 - d. Each door shall be fitted with a positive flush-type stainless steel pull, Standard-Kiel #1262-1014-1283 recessed handle, or approved equal.
 - e. In the back of each door install a 1"x1", #16 gauge stainless steel angle stop welded in a suitable location to prevent the doors from overpassing the flush pulls.
 - f. Doors in the closed position shall overlap each other by no more than 2".
 - g. Each door shall be fitted with two (2), 1-3/8" ball bearing sheaves fastened to 1"x1/8" stainless steel bar stock welded to the top corners of each door for suspending on an overhead #16 gauge stainless steel channel track. The hangers shall be tapped for 1/4"-20 thumb screw vertical locks which prevent the doors from jumping the track in operation while permitting easy removal for cleaning without tools.
 - h. Insure that the bottom of the doors are positively and continuously guided to assure proper alignment and passing regardless of the position of each door.

- i. Provide hard rubber bumpers for doors to close against to insure quiet operation.
- 7. Hinged Doors:
 - a. Hinged doors shall be of the same materials and construction as sliding doors previously specified.
 - b. Hinges shall be heavy duty, stainless steel, removable type, and fastened by tapping into 1/4"x3/4" stainless steel bar stock inside the door pan and behind the door jamb.
 - c. The door face shall be flush with the cabinet body when fully closed.
 - d. Size widths of doors equally when installed in pairs, or in series with other pairs, with no door being greater than 36" in width.
 - e. Doors shall be held closed by permanent magnetic closure devices of an approved type and of sufficient strength to hold the doors shut. Install two (2) per door (minimum), mounted to the door jamb, top and bottom, with opposing chrome-plated steel plates securely fastened to the inner panel of the doors.
- 8. Undershelves:
 - a. All open base tables shall be provided with full-length undershelves of #16 gauge stainless steel fully welded to legs with all joints ground smooth and polished.
 - b. Front edge shall turn down 1-1/2" and under 1/2".
 - c. Turn up rear and ends 2", with integral coved radius, when specified.
 - d. If required by width, provide 1-1/2"x1-1/2"x1/8" galvanized angle bracing mounted to underside, full length.
- 9. Interior Shelves:
 - a. All interior shelves within cabinet bodies, enclosed bases and overhead cabinets, shall be of #16 gauge stainless steel.
 - b. Removable shelves shall be constructed in equal sections, and rest in 1-1/2"x1-1/2"x1/8" stainless steel angle frame. Cove all horizontal corners in accordance with N.S.F. requirements.
 - c. Stationary shelves shall have 2" turn-up on back and ends, and continuously welded to cabinet body, polished and ground smooth to form a one-piece interior free of any crevices.
 - d. Front edge shall turn down 1-1/2" and under 1/2", and finished with "z" bar forming completely enclosed edge for maximum strength and sanitation.
 - e. Provide 1-1/2"x1-1/2"x1/8" angle bracing mounted to underside, full length.
- 10. Elevated Shelves:
 - a. Shelves over equipment not adjacent to a wall shall be mounted on 1" diameter #16 gauge stainless steel tubular standards neatly fitted with stainless steel base flanges, unless otherwise specified.
 - b. The top of the tubular standards shall be completely welded to #14 gauge stainless steel support channels, full width of overshelf.
 - c. Inside the tubular standard, and welded to same, provide 1/2" diameter steel tension rod extended through countertop and securely anchored to

lower framework reinforcing with nuts and lock washers in such a manner as to assure a stable, sway-free structure.

- d. If required by width, provide 1-1/2"x1-1/2"x1/8" stainless steel angle bracing mounted to underside, full length.
- e. Cantilevered shelves, when called for, shall be #16 gauge stainless steel supported on #14 gauge stainless steel brackets welded to 1-5/8" O.D. stainless steel tubular standards extending through the backsplash, and fully welded to the table framework. Provide Klein #481-SH welded sleeves where standards penetrate backsplash.
- 11. Wall Shelves:
 - a. Open wall shelves shall be constructed of #16 gauge stainless steel with back and ends turned up 2", positioned 2" out from face of wall, with all corners welded, and supported on #14 gauge stainless steel brackets.
 - b. Brackets shall be flanged inward beneath the shelf and at the wall 1-1/2" with intersecting flanges completely welded, and attached to shelf with studs welded to the underside and bolted with stainless steel lock washers and chrome-plated cap nuts.
 - c. Each bracket shall be fastened to the wall with a minimum of two (2) 1/4"-20 stainless steel bolts anchored securely by means of toggles or expansion shields.
- 12. Sinks:
 - a. All sinks shall be the size and shape as shown on drawings, and constructed of #14 gauge stainless steel with backs, bottoms and fronts formed of one continuous sheet and the ends welded in place.
 - b. Sinks shall have all corners, both vertical and horizontal, coved on a 3/4" radius electrically welded, ground smooth and polished. Solder in filleted corners will not be acceptable.
 - c. Multiple compartment sinks shall be divided with double wall, #14 gauge stainless steel partitions with a 1/2" radius on top and all corners rounded as other corners, continuously welded, ground smooth and polished.
 - d. The bottom of each compartment shall be creased to a die stamped recess, tapered and shaped to receive a lever type waste without the use of solder, rivets, or welding.
 - e. Provide #14 gauge stainless steel waste lever angle bracket mounted to underside of compartment at front.
 - f. The front and exposed ends of sinks shall be fabricated with a 1-1/2", 180° rolled edge. The back and ends adjacent to walls or other fixtures shall be turned up with integral coved edge 12" high and returned 2-1/2" at the top on a 45° angle. Cap ends of all exposed splashes.
 - g. Unless otherwise specified, two (2) faucet holes on 8" centers shall be provided, located over the center line of partitions between compartments, 2-1/2" down from splash break.
 - h. Gussets for legs shall be fully welded all around to #12 gauge stainless steel triangular plates fully welded to underside of sink.

- i. Sinks fabricated into working surfaces shall be constructed of the same material and in like manner to sinks specified above, except rolled edge and backsplash shall be omitted and the bowl shall be completely welded integral and flush with the working surface. Where basket type wastes are called for, they shall be fitted with removable seats.
- j. Where sink bowls are exposed, the exterior shall also be polished to a #4 finish.
- 13. Sink Drainboards:
 - a. Drainboards shall be constructed of the same material as the sinks and shall be welded integral to same.
 - b. The front portion of drainboards shall continue the 1-1/2", 180° rolled edge of sink bowls on a continuous and level horizontal plane.
 - c. The surface of the drainboard shall pitch from 2-1/2" at the end furthest from the sink, to 3" at the bowl; or 1/8" per foot. In addition, the bottom surface shall be dished toward the center for complete drainage.
 - d. The backsplash of the drainboard shall match the rear of the sink contour and shall be welded integral thereto, running parallel to the floor.
 - e. Drainboards shall be reinforced on the underside with a framework of 1"x4"x1" stainless steel channel underbracing placed at each pair of legs, with exposed ends capped, and one (1) channel running lengthwise.
 - f. Where disposer cones are fabricated into drainboards, additional 1"x4"x1" stainless steel channels shall be welded into the top framing, spanning the drainboard from front-to-back on both sides of the cone and located not more than 3" to either side.
 - g. Disposer control panels or switches shall be supported beneath drainboards, when specified, by means of a #12 gauge stainless steel mounting bracket.
- 14. Dishtable Tops:
 - a. Dishtables shall be constructed of #14 gauge stainless steel with all corners, both vertical and horizontal, coved on a 3/4" radius electrically welded, ground smooth and polished. Solder in filleted corners will not be acceptable.
 - b. Fronts and exposed ends shall be fabricated with a 3" high, 1-1/2", 180° rolled edge with rounded corners. The back and ends adjacent to walls or other fixtures shall be turned up with integral coved edge 12" high and returned 2-1/2" at the top on a 45° angle. Cap ends of all exposed splashes.
 - c. All tops shall slope 1/8" per foot (minimum).
 - d. Dishtables shall be reinforced on the underside with a framework of 1"x4"x1" stainless steel channel underbracing placed at each pair of legs, with exposed ends capped, and one (1) channel running lengthwise fully welded between front-to-back channels.

- e. Where tops fit into dishmachines, they shall turn down and into, forming a sealed watertight fit, and attached according to dishmachine manufacturers instructions.
- f. On each side of dishmachine, tables shall be provided with integral splash shields as part of the backsplash.
- g. Silicon filling of gaps caused by poor fit will not be acceptable.
- h. On corner-type door machines, provide #14 gauge stainless steel wallmounted, splash panel to protect adjacent wall, full width of door opening.
- 15. Cafeteria Style Counters:
 - a. All counters shall be constructed as previously specified under Enclosed Bases.
 - b. Provide top and bottom framing for each counter food pan, cold pan, coffee urn, ice cream unit, ice bin, dish dispenser, etc., whether a dropin unit or a cutout for a portable unit.
 - c. Where plate shelves occur, frame horizontally 8-1/2" back from counter edge or as design dictates, and at bottom of shelf at counteredge.
 - d. The countertop shall be constructed of #14 gauge stainless steel, as previously specified, with all joints welded, ground and polished.
 - e. Fronts and exposed ends shall be stainless steel, plastic laminate or other material as noted in the Item Specifications.
 - f. All display glass shelving shall be 1/4" polished plate glass and fully trimmed with #18 gauge stainless steel formed channels. Top shelves shall be the same width as the shelf below. Shelves shall be supported on 5/8" square, #16 gauge stainless steel perimeter tubing fully welded to 1-1/4" square, #16 gauge stainless steel tubing uprights.
 - g. Provide appropriate adjustable glass sneeze or breath guards trimmed in stainless steel along front, entire length, mounted in Klein 4465-A brackets.
 - h. Protector shelf over hot food wells shall be #16 gauge stainless steel supported on 1-1/4" square, #16 gauge stainless steel tubing uprights, with 1/4" polished plate glass front and end panels trimmed in #18 gauge stainless steel channels. When specified for self-service, mount bottom edge of front panel 8" above countertop.
 - i. All display and protector shelves shall be furnished with full-length fluorescent lights wired to on/off switch in counter apron, with lamps and protective shields. Conceal all wiring in tubular uprights.
 - j. Refer to Item Specification for changes, as required.
 - k. Counter shall be internally wired complete by the K.E.C., and in such a way as to meet the requirements of the Electrical Code of the job location.
2.4 EQUIPMENT

- A. All items listed on the Contract Documents under the heading "Equipment Schedule" shall be furnished in strict accordance with the foregoing specifications and with the following detailed Itemized Specifications.
- B. Manufacturer's names and model numbers are shown establishing quality, size, and finish required, representing the Owner's and Consultant's requirements and basis for bid. Equipment is listed hereinafter with same item numbers as shown on Contract Documents.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before beginning the installation of foodservice equipment, the spaces and existing conditions shall be examined by the K.E.C. and any deficiencies, discrepancies, or unsatisfactory conditions for proper installation of foodservice equipment shall be reported to the Architect in writing.
 - 1. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner satisfactory to the installer.
 - 2. Beginning installation shall constitute acceptance of the area.

3.2 PREPARATION

- A. Foodservice equipment drawings are diagrammatic and intended to show layout, arrangement, mechanical and electrical requirements.
- B. Field verify all measurements at the building prior to fabrication of custom equipment. Coordinate measurements and dimensions with rough-in and space requirements.

3.3 INSTALLATION

- A. The K.E.C. shall coordinate his delivery schedule with the Contractor to ensure adequate openings in the building to receive the equipment.
- B. Equipment shall be uncrated, fully assembled and set level in position for final connections. Parts shipped loose but required for connection shall be properly tagged and shall be accompanied by the necessary installation instructions.
- C. Provide a competent, experienced foreman to supervise installation and final connections with other trades.

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- D. Remote Refrigeration Systems:
 - 1. All refrigeration work where applicable to this contract shall be accomplished in an approved manner, using finest quality fittings, controls, valves, etc.
 - 2. Refrigeration items shall be started up, tested, adjusted, and turned over to the Owner in first class condition and left running in accordance with the manufacturer's instructions.
 - 3. Refrigeration lines and hook-ups shall be completed by the K.E.C. with the exception of electric, water, and drain line final connections unless otherwise specified.
 - 4. All copper tubing shall be refrigerant grade A.C.R. or type "L".
 - 5. Silver solder and/or Sole-Phase shall be used for all refrigerant piping. Soft solder is not acceptable.
 - 6. All refrigerant lines in pipe sleeves or conduit shall be effectively caulked at ends to prevent entrance of water or vermin and at penetrations through walls or floors.
 - 7. All tubing shall be securely anchored with clamps, and suspended lines shall be supported with adjustable hangers at 6'-0" o.c. maximum.
 - 8. Wrap drain line in freezer compartment(s) with approved heat-tape for final connection by Contractor.
- E. Sealing and Caulking:
 - 1. Prior to the application of sealant, all surfaces shall be thoroughly cleaned and degreased.
 - 2. Apply around each unit of permanent installation at all intersections with walls, floors, curbs or other permanent items of equipment.
 - 3. Joints shall be air-tight, water-tight, vermin-proof, and sanitary for cleaning purposes.
 - 4. In general, joints shall be not less than 1/8" wide, with backer rod to shape sealant bead properly at 1/4" depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint.
 - 5. At internal corner joints, apply sealant or gaskets to form a sanitary cove, of not less than 3/8" radius.
 - 6. Provide sealant-filled joints up to 3/4" in joint width. Trim strips for wider joints shall be set in a bed of sealant and attached with stainless steel fasteners, 48" o.c., or less, to insure suitable fastening and prevent buckling of the metals fastened.
- F. Cutting:
 - 1. All cutting, fitting, or patching required during installation shall be accomplished by the K.E.C., at his own expense, so as to make the work conform to the plans and specifications.
 - 2. The K.E.C. shall not cut or otherwise alter, except with the consent of the Owner, the work of any other Contractor.
 - 3. Provide cut-outs in foodservice equipment where required to run plumbing, electric, or steam lines through equipment items for final connections.

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3.4 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. Provide access to shop fabrication areas during normal working hours to facilitate inspection of the equipment, during construction, by the Architect or his authorized representative.
 - 2. Errors found during these inspections shall be corrected to the extent required within the scope of the plans, specifications, and approved drawings.
- B. Start-Up and Testing:
 - 1. Delay start-up of foodservice equipment until service lines have been tested, balanced, and adjusted for pressure, voltage, and similar considerations; and until water and steam lines have been cleaned and treated for sanitation.
 - 2. Before testing, lubricate each equipment item in accordance with manufacturer's recommendations.
 - 3. Supply a trained person or persons who shall start up all equipment, test and make adjustments as necessary, resulting in each item of equipment, including controls and safety devices, performing in accordance with the manufacturer's specifications.
 - 4. All gas-fired equipment shall be checked by the local gas company as to calibration, air adjustments, etc., and adjustments made as required.
 - 5. Repair or replace any equipment found to be defective in its operation, including items which are below capacity or operating with excessive noise or vibration.
- C. Demonstration:
 - 1. Provide an operating demonstration of all equipment at a time of Owner's convenience, to be held in the presence of authorized representatives of the Architect and Owner.
 - 2. Provide a follow-up kitchen demonstration three (3) months after the initial demonstration or kitchen opening. K.E.C. to coordinate scheduling with manufacturer's representatives.
 - 3. Demonstration shall be performed by manufacturer's representative knowledgeable in all aspects of his equipment.
 - 4. During the demonstration, instruct the Owner's operating personnel in the proper operation and maintenance of the equipment.
 - 5. Furnish complete, bound, operation/maintenance manuals and certificates of warranty for all items of equipment provided, in accordance with Article 1.5 Submittals, Paragraph F, at this demonstration time.

3.5 ADJUST AND CLEAN

A. Upon completion of installation and tests, clean and sanitize foodservice equipment, and leave in condition ready for use in food service.

- B. Remove all protective coverings, and thoroughly clean equipment both internally and externally.
- C. Make and check final adjustments required for proper operation of the equipment.
- D. Restore finishes marred during installation to remove abrasions, dents, and other damages. Polish stainless steel surfaces, and touch-up painted surfaces with original paint.
- E. Clean up all refuse, rubbish, scrap materials, and debris caused by the work of this Section, and put the site in a neat, orderly, and broom-clean condition.

3.6 ITEMIZED EQUIPMENT:

EXISTING EQUIPMENT ITEMS:

Bidder shall be responsible for visiting the site prior to bidding to fully inform himself with the existing conditions. The Equipment Contractor shall clean listed existing items and replace any defective parts. He shall move and reset listed existing items in new locations shown on plan as required. Renovation shall consist of removing listed existing equipment from premises, storage and complete cleaning (cleaning shall consist of the removal of residues of foods, ingredients, dirt and all other soiling materials and extraneous matter), repainting painted items as required, and all labor and parts necessary to produce a functional item. Repairs and parts shall be for minor items such as control knobs, handles, pilot lamps, minor adjustments, etc. Any major repairs or parts required shall be noted in writing, with cost of parts and labor. Any major repairs or parts required, which are only detectable during repairs shall be noted in writing, with cost, to the Owner for approval and addition to the contract price.

ITEM #1: SHELVING

QUANTITY:Nine (9)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Four-Tier High, Stationary, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

Delivery Queue:

- 1. Two (2) #ESU246072V4580 starter units; 24" W x 60" L x 72" H, 4-tier high.
- 2. Six (6) #EA246072V4580 add-on units; 24" W x 60" L x 72" H, 4-tier high.

ITEM #1: (Continued)

- 3. One (1) #EA244872V4580 add-on unit; 24" W x 48" L x 72" H, 4-tier high.
- 4. One (1) #ECC8580 corner connector set.
- 5. Eight (8) #EDS24H6580 dunnage support, 24"W x 6-1/2"H
- 6. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #2: DUNNAGE RACK

QUANTITY:Eight (8)MANUFACTURER:CambroMODEL NO.:S-Series (N058)PERTINENT DATA:Slotted Top, 3000-lb. Capacity, Heavy-Duty PolypropyleneUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A, K-101B and K-101C; Manufacturer's Instructions and the following:

Existing Teaching Cooler:

1. Six (6) # DRS480480 units, 21" W x 48" L.

Walk-In Cooler:

1. Two (2) # DRS480480 units, 21" W x 48" L.

ITEM #3: HIGH DENSITY SHELVING SYSTEM

QUANTITY:Seven (7)MANUFACTURER:CambroMODEL NO.:Camshelving® Premium Series (N058)PERTINENT DATA:Four-Tier High, 24" Wide, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

ITEM #3: (Continued)

Existing Teaching Cooler:

- 1. One (1) #CSMHDTK10000 High Density Track Kit, 10', for (3) Camshelving® Premium Series High Density mobile units, includes aluminum raised track, stainless steel leveling feet, and hardware.
- 2. Two (2) #CPU246072V4480 starter units; 24" W x 60" L x 72" H, 4-tier high.
- 3. Two (2) #CPDS24H6480 dunnage support, 24" D x 7-1/2" H.
- 4. Five (5) #CPHU246075V4480 mobile stater units, 24" W x 60" L x 72" H, 4-tier high.
- 5. One (1) #CSMHDTKE6000 High Density Track Extension Kit, 6', for Camshelving® Premium Series High Density mobile units, includes (2) each aluminum raised tracks and a joiner kit with (2) joiners & hardware.
- 6. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #4: SHELVING

QUANTITY:Four (4)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Five-Tier High, Stationary, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

Dry Storage:

- 1. One (1) #ESU246084V5580 starter unit; 24" W x 60" L x 84" H, 5-tier high.
- 2. Three (3) #EA246084V5580 add-on units; 24" W x 60" L x 84" H, 5-tier high.
- 3. Four (4) #EDS24H6580 dunnage support, 24"W x 6-1/2"H
- 4. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #5: SPARE NUMBER

ITEM #6: HIGH DENSITY SHELVING SYSTEM

QUANTITY:Nine (9)MANUFACTURER:CambroMODEL NO.:Camshelving® Premium Series (N058)PERTINENT DATA:Four-Tier High, 24" Wide, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

Existing Cooler:

- 1. Two (2) #CSMHDTK10000 High Density Track Kit, 10', for (3) Camshelving® Premium Series High Density mobile units, includes aluminum raised track, stainless steel leveling feet, and hardware.
- 2. Three (3) #CPU246072V4480 starter units; 24" W x 60" L x 72" H, 4-tier high.
- 3. Three (3) #CPDS24H6480 dunnage support, 24" D x 7-1/2" H.
- 4. Six (6) #CPHU246075V4480 mobile stater units, 24" W x 60" L x 72" H, 4-tier high.
- 5. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #7: FLY FAN

QUANTITY:One (1)MANUFACTURER:Mars Air DoorsMODEL NO.:N272-2UA (N058)PERTINENT DATA:72" Long, Wall-MountedUTILITIES REQ'D:(2) 1/2HP, 120V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Accessories:
 - -- Plunger-type micro-switch.
- 2. Attach to wall with expansion bolts centered over door opening.

ITEM #8: CLEAN ROOM REFRIGERATION SYSTEM

QUANTITY: One (1) MANUFACTURER: ColdZone MODEL NO.: ET-1 (N058) PERTINENT DATA: Enviro-Therm, Air-Cooled, Outdoor Installation, Remote, With KE2 Evaporator Efficiency Controller, With Inherent 3PH Condenser Motors UTILITIES REQ'D: 35.2A, 208V, 3PH

Furnish and install per Equipment Plan and Schedule, Sheets K-101A, K-101B and K-101C; Clean Room Refrigeration System Detail, Sheet K-507; Manufacturer's Shop Drawing and the following:

- 1. One (1) pre-engineered and factory-assembled unit including condensing units, evaporator coils, and all required piping, valves and accessories.
- 2. Air-cooled system designed and sized for year-round outdoor operation in Baltimore, Maryland.
- 3. System located outdoors on roof. Curb with pitch-pocket furnished and installed by Contractor. Refer to Mechanical Roof Plan for exact location.
- 4. Overall size: $84" \log x \ 61\frac{1}{2}"$ wide x 54" high weighing 1,332 lbs. with installation clearance of 3'-0" on all sides.
- 5. The system shall be housed in a weather protected stainless steel enclosure and utilize a multi-circuited air-cooled condenser design. The entire housing shall be brushed, 304 stainless steel. The exterior of the housing shall feature stainless steel one piece louvers. The entire steel frame shall be pre-assembled, welded, cleaned and painted with two coats of polyurethane.
- 6. Hot air discharge from condenser fans shall be vertical. Fan motors shall be not less than 1/2 HP with a venturi-contoured air scoop furnished for each fan to reduce air turbulence and fan loading. Fans shall be equipped with thermal sensing controls mounted inside the control panel designed to operate the minimum number of fans required for adequate air flow under varying ambient conditions. Fan blades shall be not less than 20" in diameter and protected with a plastic coated fan guard.
- 7. Unit shall be provided with scroll compressor; Copeland 3.0HP Model #ZS21KAE for the clean room. Each unit shall be equipped with a ball-bearing fan motor, adjustable head pressure control crankcase heater, suction filter, sight glass drier, liquid line inlet and outlet valve, defrost cycle and braided, armored super-hose connections, all factory assembled.

ITEM #8: (Continued)

- 8. All compressor units shall be new and factory assembled to operate with CFC-free refrigerants; R-448A shall be used for medium and low-temperature applications.
- 9. Each compressor shall be equipped with an oversized receiver. Such receivers shall be equipped individually with a fusible plug, as well as installed king and queen valves equipped with service ports. Each receiver shall have a pump down capacity large enough to accept the total liquid volume of refrigerant in the system without exceeding 80% of the volumetric capacity at the designed operating pressure and temperature.
- 10. Unit shall be provided with a 15° TD air-cooled condenser coil with staggered tube design for greater thermal efficiency. The coil shall be tested to 400 PSI and shall be self-draining to assure efficient operation and proper oil return. The condenser fan motor shall be inherently protected and have life-lubricated bearings. A fan guard shall be provided with each motor. Liquid receiver shall conform to UL or ASME codes and bear the appropriate label or stamp.
- 11. All refrigerant lines shall be extended to one side of the package in a neat and orderly manner for connection to refrigerant lines penetrating thru building exterior wall.
- 12. All tubing shall be securely supported and anchored with clamps.
- 13. All copper tubing to be refrigerant grade A.C.R. or type L.
- 14. Silver solder and/or Sil-fos shall be used for all refrigerant piping. Soft solder is not acceptable.
- 15. All piping to be pressure tested with nitrogen at 300 psi. After the condensing unit and coil have been connected, balance of the system shall be leak-tested with valves open.
- 16. The package system shall have a factory mounted and pre-wired control panel complete with main fused disconnect switch, compressor circuit breakers, contactors, and time clocks wired for single power connection.
- 17. Contractor shall provide and install power lines to the control panel, and provide wiring for control and defrost heater between the defrost clock and the refrigeration fixtures, all in accordance with the wiring diagram and local codes.
- 18. The complete system shall be evacuated with a vacuum pump.
- 19. K.E.C. shall charge, test, and adjust each unit to be in an operational system.
- 21. Evaporator Coil with High-Efficiency EC Motors-- Walk-In Clean Room: Four (4) Low-Profile, End-Mount Type, Model CE6A128ADA, 2.4A, 120V, 1PH (each)
 -- System to operate at +35° F.

ITEM #8: (Continued)

- -- Furnished complete with defrost management controller with integrated T-stat, solenoid valve and electronic expansion valve.
- -- K.E.C. to provide Cat5 cable from evaporator coils to kitchen manager's office for temperature monitoring.
- -- KE2 Evap Efficiency Ulti Install Kit PT 08219656
- 22. Systems marked in sequence shall be a factory package refrigeration system UL approved.
- 23. K.E.C. shall guarantee all items in the Packaged Refrigeration System against defects, including all parts and labor for two (2) years. The guarantee is to commence on the day installation is made operational. All repairs and replacements necessary during this period shall be affected at the K.E.C.'s expense on a 24-hour, 7-day a week basis, including emergency service. An emergency service telephone number shall be conspicuously posted in the foodservice office.
- 24. During the first 2-year period, it shall be the K.E.C.'s responsibility to provide all necessary preventive maintenance to protect the interest of all concerned. This shall embrace all components and the performance of the system including coils, valves, controls, etc. furnished with the refrigeration equipment.
- 25. Complete refrigeration system warrantee: five (5) years for the compressor, Two (2) years for the condensing unit, and Two (2) years for all parts of the evaporator coil.
- 26. Provide any required instruction to Contractor for services or related work, as well as, specifications for the preparation of joinings, connections, and materials to be used.
- 27. Provide, for record and reference, as-built diagram of piping systems showing actual locations, components, system identification, and refrigerated equipment on each system. As-built diagram shall be provided in laminated plastic form and shall be conspicuously located in the Engineer's Office. Actual refrigeration system components shall be tagged in a permanent manner to match the as-built diagram.
- 28. Installation drawings and manufacturer's specification sheets shall be submitted to the architect/owner for approval prior to commencing work. Drawings shall include refrigeration piping showing actual line sizes and system allocation, evaporators, compressors, condensers, and all required valves and accessories. Local fire code may require that fiberglass insulation be provided. Such insulation procedure shall be by the Contractor.
- 29. Provide testing and charging of the entire system per the Foodservice General Specifications, Electrical and Mechanical Requirements.

ITEM #8: (Continued)

30. Commissioning of system shall be performed by factory authorized representative. Report to be provided to the Consultant once completed.

ITEM #8A: BLAST CHILLER REFRIGERATION SYSTEM

QUANTITY:Two (2)MANUFACTURER:Thermo-KoolMODEL NO.:TK26BCF-CU-A (N058)PERTINENT DATA:Air-Cooled, Outdoor Installation, RemoteUTILITIES REQ'D:26.5A, 208V, 3PH

Furnish and install per Equipment Plan and Schedule, Sheets K-101A, K-101B and K-101C; Blast Chiller/Shock Freezer Refrigeration System Detail, Sheets K-508 and K-509; Manufacturer's Shop Drawing and the following:

- 1. Condensing Unit: Factory Pre-Assembled, Semi-Hermetic, Medium Temperature, R-404A.
- 2. System located outdoors on roof. Curb with pitch-pocket furnished and installed by Contractor. Refer to Mechanical Roof Plan for exact location.
- 3. Complete winterization package and condensing unit weatherproof cover.
- 4. Overall size: 63³/₄" L x 36³/₄" W x 39³/₈" H.
- 5. Weight: 775 lbs.
- 6. Evaporator Coil with High-Efficiency EC Motors: End-Mount, Low-Profile Type; Model #TK26-2; 15.0A, 208V, 1PH
 - -- System to operate at -40° F.
 - -- Furnished complete with thermostat, solenoid and expansion valves factory mounted ready for final connection by Refrigeration Contractor.
 - -- K.E.C. to provide Cat5 cable from evaporator coils to kitchen manager's office for temperature monitoring.
- 7. Complete refrigeration system warrantee: five (5) years for the compressor, two (2) years for the condensing unit, and two (2) years for all parts of the evaporator coil.
- 8. Factory installed main-fused disconnect switch.

ITEM #9: SHELVING, MOBILE

QUANTITY:Five (5)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Four-Tier High, Stationary, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

Walk-In Cooler:

- 1. Two (2) #EMU244878V4580 units; 24" W x 48" L x 78" H, 4-tier high.
- 2. Three (3) #EMU246078V4580 units; 24" W x 60" L x 78" H, 4-tier high.
- 3. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #10: DUNNAGE RACK

QUANTITY:One (1)MANUFACTURER:CambroMODEL NO.:S-Series (N058)PERTINENT DATA:Slotted Top, 3000-lb. Capacity, Heavy-Duty PolypropyleneUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

Dry Storage:

1. One (1) # DRS480480 unit, 21" W x 48" L.

ITEM #11: SHELVING, MOBILE

QUANTITY:Six (6)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Four-Tier High, Stationary, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

ITEM #11: (Continued)

Dry Storage:

- 1. Four (4) #EMU244878V4580 units; 24" W x 48" L x 78" H, 4-tier high.
- 2. Two (2) #EMU245478V4580 units; 24" W x 54" L x 78" H, 4-tier high.
- 3. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #12: SPICE RACK

QUANTITY:One (1)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Five-Tier High, Stationary, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. One (1) #ESK2448S5580 shelf plate kit; 24" W x 48" L, 5-tier high.
- 2. One (1) #ESR2448151 full shelf rail kit; 24" W x 48" L x 4-1/4" H, includes (2) double level side rails, (2) double level end rails, side & end brackets, polypropylene, soft gray.
- 3. One (1) #CSSD248151 shelf divider; 24" W x 8" L.
- 4. Two (2) #EMPK2478580 post kits for mobile units; 24" W x 78" H, includes: (2) premium swivel casters with brake, 2 posts & 1 set of post connectors (top & bottom), wedges.

ITEM #13: PREP SINK

QUANTITY:Four (4)MANUFACTURER:Custom FabricatedMODEL NO:#14 GA Stainless SteelPERTINENT DATA:8'-3" Long x 2'-6" Wide x 2'-10" HighUTILITIES REQ'D:1/2" HW, 1/2" CW, (2) 1-1/2" IW

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101A, K-101B and K-101C; Manufacturer's Instructions and the following:

ITEM #13: (Continued)

- 1. Front and end edge rolls per Detail 1.02B.
- 2. 13" high backsplash per Detail 1.04A. Three (3) units with finished back.
- 3. Framework per Detail 1.05.
- 4. Legs per Detail 1.07. Three (3) units with flanged feet on each corner leg.
- 5. Stainless steel undershelf on both ends per Detail 1.11.
- 6. Sound-deaden underside of sinks and drainboards with NSF-approved sound dampening material.
- 7. Accessories (each unit):
 - -- One (1) T&S #B-0231 backsplash-mounted swing spout faucet with #B-0199-1 aerator.
 - -- Two (2) T&S #B-3950-01 twist waste valves with overflow assemblies and #010387-45 basket strainers.
- 8. Two (2) units in clean room with interlocking, spring-loaded mechanism
- 9. Item will remain shrink-wrapped until ready for final connection by Plumbing Contractor. Immediately following completion of final connections, K.E.C. shall reshrink-wrap tubs or provide removable panel to avoid use by construction trades.

ITEM #14: HAND SINK

QUANTITY:Three (3)MANUFACTURER:Eagle Foodservice Equipment CompanyMODEL NO.:HSA-10-FAW-LRS (N058)PERTINENT DATA:Wall Mounted, Wrist Action FaucetUTILITIES REQ'D:1/2" HW, 1/2" CW, 1-1/2" W

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Complete sink assembly consisting of: gooseneck faucet, p-trap, tailpiece and basket drain.
- 2. Accessories:
 - -- #606215 skirt assembly, each unit.
 - -- Integral right and left stainless steel splash shield, each unit.

ITEM #15: SOAP & TOWEL DISPENSER--(N.I.K.E.C.-SPEC'D BY VENDOR)

QUANTITY: Three (3)

ITEM #16: VEGETABLE CHOPPER

QUANTITY:One (1)MANUFACTURER:Robot Coupe USA, Inc.MODEL NO.:CL60WS (N058)PERTINENT DATA:Food Processor Workstation, Produces Up to 3,970 Lbs/Hr., 2-SpeedUTILITIES REQ'D:6.5A, 208V, 3PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- Standard food processor package consisting of: vegetable prep attachment with 16-disc MultiCut pack, dice cleaning kit (39881), 3mm mashed potato kit, 4.2 liter capacity pusher feed-head with integrated cylindrical hopper, automatic stainless steel feedhead, 4-tubes feed-head, ergo mobile cart with rotating lower shelf & (3) 1/1 GN containers, storage cart, (2) sets of wall mounted disc racks (holds 16 discs), stainless steel container for cutting tools, adjustable foot, handle and 2 casters, induction motor with stainless steel motor base, two speeds (425 & 850 RPM).
- 2. Accessories:
 - One (1) #LP16DISC LP16 Disc Package, (16) disc package includes: (3) slicing discs (3/64", 5/64", 5/32"), (2) grating discs (1/16", 1/8"), (1) French fry kit (3/8" x 3/8"), (3) dicing kits (3/16", 3/8", 25/32"), (3) julienne discs (5/64" x 3/8", 1/10", 5/32"), dice cleaning kit & disc holder.

ITEM #17: SPARE NUMBER

ITEM #18: RETRACTABLE CORD REEL

QUANTITY:Sixteen (16)MANUFACTURER:APC Group Inc.MODEL NO.:Kitchen Leash KL-152012-D (N058)PERTINENT DATA:Ceiling-Mounted, With Adjustable Stop, Non-GFI ReceptacleUTILITIES REQ'D:20.0A, 120V, 1PH

Furnish and install per Equipment Plan and Schedule, Sheets K-101A, K-101B and K-101C; Manufacturer's Instructions and the following:

ITEM #18: (Continued)

1. Electrical Contractor to furnish and install GFCI type breaker at kitchen electrical panel board.

ITEM #19: WORKTABLE, MOBILE

QUANTITY:Four (4)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:6'-0" Long x 2'-6" Wide x 3'-0" HighUTILITIES REQ'D:----

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Fabrication Detail, Sheet K-501, and the following:

- 1. Perimeter edge roll per Detail 1.02M.
- 2. Framework per Detail 1.05.
- 3. Legs per Detail 1.07.
- 4. 4" diameter heavy-duty swivel casters, front two (2) with brakes.
- 5. Stainless steel undershelf per Detail 1.11.
- 6. One (1) stainless steel drawer assembly per Detail 1.14, Type I, with lock.
- 7. Worktable per Detail 2.01.
- 8. Sound-deaden underside of tabletop with NSF-approved sound dampening material.
- 9. Provide locking mechanism to keep two (2) units together.

ITEM #20: REVERSE OSMOSIS FILTER & RACK

QUANTITY:One (1)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

ITEM #20: (Continued)

Dry Storage:

- 1. Two (2) #CPSK1830V1480 units; 18" W x 30" L.
- 2. One (1) #CPMPK1835480 post kit for mobile unit; 18" W x 35" H.
- 3. Two (2) #CPR18303151 shelf rail kits; 18" W x 30" L x 4-1/4"H, includes (1) double level side rail, (2) double level end rails, side & end brackets, polypropylene, soft gray.
- 4. OptiPure Reverse Osmosis System.

ITEM #21: SPARE NUMBER

ITEM #22: TRAY LIDDER/PACKAGING MACHINE -- (N.I.C. – FUTURE)

QUANTITY: Two (2)

ITEM #23: WORKTABLE, MOBILE

QUANTITY:One (1)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:6'-0" Long x 2'-6" Wide x 3'-0" HighUTILITIES REQ'D:----

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Fabrication Detail, Sheet K-501, and the following:

- 1. Perimeter edge roll per Detail 1.02M.
- 2. Framework per Detail 1.05.
- 3. Legs per Detail 1.07.
- 4. 4" diameter heavy-duty swivel casters, front two (2) with brakes.
- 5. Stainless steel undershelf per Detail 1.11.
- 6. One (1) stainless steel drawer assembly per Detail 1.14, Type I, with lock.
- 7. Worktable per Detail 2.01.

ITEM #23: (Continued)

8. Sound-deaden underside of tabletop with NSF-approved sound dampening material.

ITEM #24: VENTILATOR

QUANTITY:	Two (2)
MANUFACTURER:	Captive-Aire Systems, Inc.
MODEL NO.:	6030-ND2-PSP-F (N058)
PERTINENT DATA:	Wall-Mounted, Captrate Solo Filter, Perforated-Ceiling Plenum
	Make-Up Air, With Fire Protection System
UTILITIES REQ'D:	2,428 CFM Exhaust/2,185 CFM Supply; 350W, 120V, 1PH
	(Lights); 20A, 120V, 1PH, 24-Hour Dedicated Service (Fire
	Protection System)

Furnish and install per Equipment Plan and Schedule, Sheets K-101A and K-101C; Ventilator Detail Drawing, Sheet K-502; Manufacturer's Instructions and the following:

- 1. 5'-0" Wide x 10'-4" Long x 2'-6" High, with bottom edge mounted at 6'-8" A.F.F. Entire unit constructed of 18 GA stainless steel with liquid tight all welded external continuous seams and joints per N.F.P.A. 96,U.L. and State of Maryland Codes.
- 2. Six (6) U.L. Listed, NSF-Approved, recessed Allanson round LED fixtures and lights, equally spaced.
- 3. Matching stainless steel perimeter closure panels to finished ceiling by K.E.C; verify ceiling height.
- 4. Surface fire protection system nozzles and piping to be factory installed, chrome plated or stainless steel where exposed, ready for final connections by fire protection system sub-contractor.
- 5. Hanger rods and support system from structure above by Contractor. K.E.C. to coordinate method and location with other trades.
- 6. Stainless steel hanger brackets.
- 7. Integral 3" wide stand-off @ rear of hood body with closed ends for semi-combustible compliance.
- 8. Stainless steel U.L. Classified 20" captrate solo grease filters with hook.
- 9. Semi-concealed stainless steel grease trough sloped to removable grease cups.

ITEM #24: (Continued)

- 10. Full-length, front-mounted perforated stainless steel ceiling-mounted make-up air plenum with integral supply air balancing dampers.
- 11. 12" wide utility cabinet mounted on left end with factory pre-piped Ansul R-102 fire suppression system and electrical pre-wire package #DCV-1111 with light and fan switches.
- 12. HVAC Contractor to provide tempered supply air during winter months: 60° F 65° F.
- 13. Factory System Design Verification (SDV) shall be performed after all inspections are complete. SDV report shall be available once completed.
- 14. Accessories:
 - -- #18GA stainless steel wall flashing from bottom edge of hood to top of finish floor base. Extend full-length of hood body. Attach to wall with non-exposed fasteners.
 - -- One (1) Ansul Model K01-2 hand-held fire extinguisher, 1.6 gallon, wall-mounted.
 - -- Six-month and twelve-month inspections, servicing, and replacement of components of fire protection system as per NFPA-96 Latest Edition.
 - -- Field wrapper.
 - -- Structural front panel.

ITEM #25: GRIDDLE

QUANTITY:One (1)MANUFACTURER:Garland US RangeMODEL NO.:GTGG60-GT60M (N058)PERTINENT DATA:Countertop, 59-1/16" W x 23" D, Heavy-Duty, 1" Thick Polished
Steel Griddle Plate, Snap Action Thermostatic ControlsUTILITIES REQ'D:3/4" Natural Gas @ 160 MBH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Accessories:
 - -- One (1) Dormont #1675KITCF2S48 Deluxe SwivelMAX Gas Connector Assembly Kit consisting of: 48" long hose, gas valve, connectors and A.G.A. approved coiled restraining device.

MARYLAND FOOD BANK ADDITION AND RENOVATION

ITEM #26: EQUIPMENT STAND, MOBILE

QUANTITY:One (1)MANUFACTURER:Garland US RangeMODEL NO.:A4528800 (N058)PERTINENT DATA:60" W, Open Base With Shelf and Swivel Casters, Stainless SteelUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions.

ITEM #27: REACH-IN REFRIGERATOR, MOBILE

QUANTITY:One (1)MANUFACTURER:The Delfield Co.MODEL NO.:GBR1P-S (N058)PERTINENT DATA:One-Section, Self-Contained, Stainless Steel ExteriorUTILITIES REQ'D:4.2A, 120V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and Sheet K-101C; Manufacturer's Instructions and the following:

- 1. Half-height solid doors hinged per Equipment Plan.
- 2. Cylinder door locks, keyed-alike.
- 3. Standard epoxy-coated wire shelves, furnish three (3) per compartment, six (6) total,
- 4. Exterior mounted digital thermometer installed on kitchen side.
- 5. 5" diameter heavy-duty swivel casters, two (2) with brakes.
- 6. Cord and plug set.
- 7. Accessories:
 - -- Stainless steel interior.
 - -- Foot pedal opener.

ITEM #28: SMOKER OVEN

QUANTITY:One (1)MANUFACTURER:Alto-ShaamMODEL NO.:1200-SK (N058)PERTINENT DATA:Double-Deck, Standard Depth, 120 lb. Capacity Each - (1) Rib Rack
Shelf per Compartment, (3) Full-Size PansUTILITIES REQ'D:33.0A, 208V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

1. Accessories:

-- One (1) #LK-22567 door lock.

ITEM #29: WORKTABLE

QUANTITY:One (1)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:2'-0" Long x 2'-6" Wide x 3'-0" HighUTILITIES REQ'D:----

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Fabrication Detail, Sheet K-501, and the following:

- 1. Perimeter edge roll per Detail 1.02M.
- 2. Framework per Detail 1.05.
- 3. Legs per Detail 1.07.
- 4. Stainless steel undershelf per Detail 1.11.
- 5. Worktable per Detail 2.01.
- 6. Sound-deaden underside of tabletop with NSF-approved sound dampening material.

ITEM #30: FRYER ASSEMBLY, MOBILE

QUANTITY:One (1)MANUFACTURER:Frymaster CorporationMODEL NO.:FPPH355BL (N058)PERTINENT DATA:(3)50-Pound Capacity, Full Pot, FootPrint PRO Filter System, High
EfficiencyUTILITIES REQ'D:2A, 120V, 1PH (Controls); 9A, 120V, 1PH (Filter); 1" Natural Gas
@ 240 MBH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Stainless steel pot, door, and cabinet sides.
- 2. Accessories:
 - -- Three (3) #8063068 full-pot covers.
 - -- Three (3) #8030113 full-pot sediment trays.
 - -- Six (6) #8030271 twin-size baskets.
 - -- Heavy-duty 5" diameter swivel casters, front (2) with brakes.
 - -- One (1) **#PSDU50** shortening disposal unit.
 - -- One (1) Dormont #16100KITCF2S48 Deluxe SwivelMAX Gas Connector Assembly Kit consisting of: 48" long hose, gas valve, connectors and A.G.A. approved coiled restraining device.

ITEM #31: CHARBROILER

QUANTITY:One (1)MANUFACTURER:Garland US RangeMODEL NO.:GTBG36-AR36 (N058)PERTINENT DATA:Countertop, Heavy-Duty, 36" W, Adjustable Cast Iron Grates, 21-
3/16" D Broiling Grid, Manual ControlsUTILITIES REQ'D:3/4" Natural Gas @ 108 MBH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

1. Accessories:

- -- Stainless steel spatter guard.
- -- Stainless steel skirt.
- -- One (1) Dormont #1675KITCF2S48 Deluxe SwivelMAX Gas Connector Assembly Kit consisting of: 48" long hose, gas valve, connectors and A.G.A. approved coiled restraining device.

ITEM #32: EQUIPMENT STAND, MOBILE

QUANTITY:One (1)MANUFACTURER:Garland US RangeMODEL NO.:A4528351 (N058)PERTINENT DATA:36" W, Open Base With Shelf and Swivel Casters, Stainless SteelUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions.

ITEM #33: PAN RACK CART, MOBILE

QUANTITY:Eight (8)MANUFACTURER:CambroMODEL NO.:UPR1826FP20580 (N058)PERTINENT DATA:(20) 18" x 26" Pan Capacity, Composite Plastic MaterialUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions.

ITEM #34: WORKCOUNTER WITH SINK

QUANTITY:Four (4)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:6'-0" Long x 2'-10" Wide x 3'-0" HighUTILITIES REQ'D:½" HW, ½" CW, 1-½" IW

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Fabrication Detail, Sheet K-501; and the following:

- 1. Perimeter edge rolls per Detail 1.02.1M.
- 2. Framework per Detail 1.06.
- 3. Heavy-duty counter legs per Detail 1.08.
- 4. 14" x 18" x 8" deep utility sink per Detail 3.04.
- 5. Workcounter Detail 4.02.
- 6. Stainless steel solid hinged door per Detail 4.26 with plastic laminate finish.

ITEM #34: (Continued)

- 7. Sound-deaden underside of countertop and sink with NSF-approved sound dampening material.
- 8. Accessories:
 - -- One (1) T&S #B-325 deck-mounted swivel gooseneck faucet with #B-199-1 aerator.

ITEM #34A: WORKCOUNTER

QUANTITY:Two (2)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:2'-0" Long x 2'-10" Wide x 3'-0" HighUTILITIES REQ'D:----

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Fabrication Detail, Sheet K-501; and the following:

- 1. Perimeter edge rolls per Detail 1.02.1M.
- 2. Framework per Detail 1.06.
- 3. Heavy-duty counter legs per Detail 1.08.
- 4. Workcounter Detail 4.02.
- 5. Stainless steel solid hinged door per Detail 4.26 with plastic laminate finish.
- 6. Sound-deaden underside of countertop with NSF-approved sound dampening material.

ITEM #35: UNDERCOUNTER REFRIGERATOR, MOBILE

QUANTITY:Four (4)MANUFACTURER:The Delfield Co.MODEL NO.:GUR32P-S (N058)PERTINENT DATA:One-Section, Self-Contained; 8.0 Cu. Ft. Capacity, Stainless Steel
ExteriorUTILITIES REQ'D:3.2A, 120V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

ITEM #35: (Continued)

- 1. Accessories:
 - -- Cylinder door lock.
 - -- Stainless steel interior.
 - -- #UC000-CYT-0052 2" ride height casters.
- 2. Cord and plug set.

ITEM #36: RANGE/OVEN, MOBILE

QUANTITY:One (1)MANUFACTURER:Garland Commercial Industries, Inc.MODEL NO.:G24-4L (N058)PERTINENT DATA:Restaurant Range, Standard Oven Base, (4) Open Burners, G Series,UTILITIES REQ'D:3/4" Natural Gas @ 164MBH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Accessories:
 - -- Four (4) heavy-duty 5" diameter polyurethane swivel casters, front two (2) with brakes.
 - -- Stainless steel front and both sides.
 - -- ³/₄" rear gas connection. Cap and cover manifold ends.
 - -- 34" wide Model #M34LPBG, 10" low-profile backguard.
 - -- Pressure regulator.
 - -- One (1) Dormont #1675KITCF2S48 Deluxe SwivelMAX Gas Connector Assembly Kit consisting of: 48" long hose, gas valve, connectors and A.G.A. approved coiled restraining device.

ITEM #37: VENTILATOR

QUANTITY:	One (1)
MANUFACTURER:	Captive-Aire Systems, Inc.
MODEL NO.:	4830-ND2-PSP-F (N058)
PERTINENT DATA:	Island Back-To-Back Configuration, Captrate Solo Filter,
	Perforated-Ceiling Plenum Make-Up Air, With Fire Protection
	System
UTILITIES REQ'D:	3,600 CFM Exhaust/3,240 CFM Supply; 350W, 120V, 1PH
	(Lights); 20A, 120V, 1PH, 24-Hour Dedicated Service (Fire
	Protection System)

Furnish and install per Equipment Plan and Schedule, Sheets K-101A and K-101C; Ventilator Detail Drawing, Sheet K-502; Manufacturer's Instructions and the following:

ITEM #37: (Continued)

- 1. 4'-0" Wide x 8'-0" Long x 2'-6" High, with bottom edge mounted at 6'-8" A.F.F. Entire unit constructed of 18 GA stainless steel with liquid tight all welded external continuous seams and joints per N.F.P.A. 96,U.L. and State of Maryland Codes.
- 2. Ten (10) U.L. Listed, NSF-Approved, recessed Allanson round LED fixtures and lights, five (5) equally spaced per section, pre-wired to common junction box.
- 3. Matching stainless steel perimeter closure panels to finished ceiling by K.E.C; verify ceiling height.
- 4. Surface fire protection system nozzles and piping to be factory installed, chrome plated or stainless steel where exposed, ready for final connections by fire protection system sub-contractor.
- 5. Hanger rods and support system from structure above by Contractor. K.E.C. to coordinate method and location with other trades.
- 6. Stainless steel hanger brackets.
- 7. Integral 3" wide stand-off @ rear of hood body with closed ends for semi-combustible compliance.
- 8. Stainless steel U.L. Classified 20" captrate solo grease filters with hook.
- 9. Semi-concealed stainless steel grease trough sloped to removable grease cups.
- 10. Full-length, front-mounted perforated stainless steel ceiling-mounted make-up air plenum with integral supply air balancing dampers.
- 11. 12" wide utility cabinet mounted on left end with factory pre-piped Ansul R-102 fire suppression system and electrical pre-wire package #DCV-1111 with light and fan switches.
- 12. HVAC Contractor to provide tempered supply air during winter months: 60° F 65° F.
- 13. Factory System Design Verification (SDV) shall be performed after all inspections are complete. SDV report shall be available once completed.
- 14. Accessories:
 - -- One (1) Ansul Model K01-2 hand-held fire extinguisher, 1.6 gallon, wall-mounted.
 - -- Six-month and twelve-month inspections, servicing, and replacement of components of fire protection system as per NFPA-96 Latest Edition.
 - -- Field wrapper.

ITEM #37: (Continued)

-- Structural front panel.

ITEM #38: SPARE NUMBER

ITEM #39: SPARE NUMBER

ITEM #40: SPARE NUMBER

ITEM #41: SPARE NUMBER

ITEM #42: PREP SINK

QUANTITY:Two (2)MANUFACTURER:Custom FabricatedMODEL NO:#14 GA Stainless SteelPERTINENT DATA:7'-0" Long x 2'-6" Wide x 2'-10" HighUTILITIES REQ'D:1/2" HW, 1/2" CW, (2) 1-1/2" IW

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Front and end edge rolls per Detail 1.02B.
- 2. 13" high backsplash per Detail 1.04A.
- 3. Framework per Detail 1.05.
- 4. Legs per Detail 1.07.
- 5. Stainless steel undershelf on both ends per Detail 1.11.
- 6. Sound-deaden underside of sinks and drainboards with NSF-approved sound dampening material.
- 7. Accessories (each unit):
 - -- One (1) T&S #B-0231 backsplash-mounted swing spout faucet with #B-0199-1 aerator.
 - -- Two (2) T&S #B-3950-01 twist waste valves with overflow assemblies and #010387-45 basket strainers.

ITEM #42: (Continued)

8. Item will remain shrink-wrapped until ready for final connection by Plumbing Contractor. Immediately following completion of final connections, K.E.C. shall reshrink-wrap tubs or provide removable panel to avoid use by construction trades.

ITEM #43: HAND SINK

QUANTITY:One (1)MANUFACTURER:Eagle Foodservice Equipment Co., Inc.MODEL NO.:HSAP-14-ADA-FE-B (N058)PERTINENT DATA:Wall-Mounted Special Purpose - Hands Free ADA TypeUTILITIES REQ'D:1/2" HW, 1/2" CW, 1-1/2" W

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Physically challenged unit furnished complete with splash mounted battery-powered electronic-eye faucet with low battery indicator light, basket drain, front loading C-fold paper towel dispenser, deck-mounted soap dispenser, stainless steel skirt and stainless steel wall brackets.
- 2. Accessories:
 - -- Left and right end splashes.
 - -- One (1) #326015 temperature adjustment valve.
 - -- One (1) #326696 anti-scald valve.

ITEM #44: EYE WASH STATION

 QUANTITY:
 One (1)

 MANUFACTURER:
 T&S Brass

 MODEL NO.:
 EW-7360B-TMV (N058)

 PERTINENT DATA:
 Wall-Mounted, Dual Aerated Spray Heads with Automatic Flow Control, Stainless Steel Bowl, With Thermostatic Mixing Valve

 UTILITIES REQ'D:
 1/2" HW, 1/2" CW, 1-1/4" W

Furnish and install per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Accessories:
 - -- P-trap.
 - -- Flow switch.
 - -- Eye wash station emergency signage.

ITEM #44: (Continued)

-- Scald protection valve.

ITEM #45: REACH-IN FREEZER, MOBILE

QUANTITY:One (1)MANUFACTURER:The Delfield Co.MODEL NO.:GBF2P-S (N058)PERTINENT DATA:Two-Section, Self-Contained, Stainless Steel ExteriorUTILITIES REQ'D:10.0A, 120V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and Sheet K-101C; Manufacturer's Instructions and the following:

- 1. Half-height solid doors hinged per Equipment Plan.
- 2. Cylinder door locks, keyed-alike.
- 3. Standard epoxy-coated wire shelves, furnish three (3) per compartment, twelve (12) total,
- 4. Exterior mounted digital thermometer installed on kitchen side.
- 5. 5" diameter heavy-duty swivel casters, two (2) with brakes.
- 6. Cord and plug set.
- 7. Accessories:
 - -- Stainless steel interior.
 - -- Foot pedal opener.

ITEM #46: SPARE NUMBER

ITEM #47: SPARE NUMBER

ITEM #48: SPARE NUMBER

MARYLAND FOOD BANK ADDITION AND RENOVATION

ITEM #49: SOILED DISHTABLE

QUANTITY:One (1)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:10'-0"± Long x 3'-6" Wide x 2'-10" HighUTILITIES REQ'D:1/2" HW, 1/2" CW, 1-1/2" IW

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Shop Drawing and the following:

- 1. Front edge roll per Detail 1.02B.
- 2. 13" high back and right end splash per Detail 1.04A.
- 3. Framework per Detail 1.05.
- 4. Legs per Detail 1.07.
- 5. Crossbracing per Detail 1.10.
- 6. Soiled dishtable per Detail 2.02.
- 7. Weld flange assembly for scrap collector to underside of drainboard.
- 8. Sound-deaden underside of drainboard with NSF-approved sound dampening material.

ITEM #50: SCRAP COLLECTOR

QUANTITY:One (1)MANUFACTURER:SalvajorMODEL NO.:P914 (N058)PERTINENT DATA:Pot/Pan Scrap Basin, Pre-Flush And Collecting SystemUTILITIES REQ'D:3/4HP, 208V, 3PH; 1/2" HW, 1/2" CW, 2" W

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

1. Weld flange assembly to underside of drainboard, Item #49.

ITEM #51: RETRACTABLE HOSE REEL

QUANTITY:One (1)MANUFACTURER:Fisher Manufacturing CompanyMODEL NO.:29801 (N058)PERTINENT DATA:Wall-Mounted, Open No CoverUTILITIES REQ'D:1/2"HW, 1/2"CW

Furnish and install per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Mount hose reel assembly on wall with bottom of spray head @ 6'-0" A.F.F. when in fully retracted position.
- 2. Accessories:
 - -- One (1) Aquatrol Model #1801 recessed stainless steel control cabinet with valves, gauges, fittings and components for a complete system.

ITEM #52: DISHMACHINE

QUANTITY:One (1)MANUFACTURER:Champion Industries, Inc.MODEL NO:44 PRO VHR (N058)PERTINENT DATA:High Temperature Rack Conveyor, Ventless Heat Recovery, 209
Racks Per Hour, Stainless SteelUTILITIES REQ'D:52.0A, 208V, 3PH; 10.0A, 120V, 1PH (Drain Cooling Kit); 1/2" HW
(180°F.), 1/2" CW (Drain Cooling Kit), 1-1/2" IW

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Stainless steel feet, frame, legs and front panel.
- 2. Single-piece upper and lower wash arm manifolds.
- 3. Automatic tank fill, door safety switches and leak-proof ball valve drains.
- 4. Energy savings auto-timer control package with table-limit switch.
- 5. Right to left operation.
- 6. Single piece hood design.

ITEM #52: (Continued)

- 7. Accessories:
 - -- Drain water tampering kit.
 - -- Water hammer kit.
 - -- Water pressure regulating valve.
 - -- Table limit switch, button style.
 - -- Splash shields.
 - -- Four (4) #101273 flat bottom dish racks.
 - -- Six (6) #101285 peg dish racks.
 - -- Two (2) sheet pan racks.

ITEM #53: CONDENSATE CANOPY

QUANTITY:One (1)MANUFACTURER:Captive-Aire Systems, Inc.MODEL NO:4830VHB-G (N058)PERTINENT DATA:Stainless Steel, Exhaust Only CanopyUTILITIES REQ'D:900 CFM; 3/4" IW

Fabricate and install per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Shop Drawing and the following:

- 1. 4'-0" wide x 6'-0" long x 2'-6" high with bottom edge mounted at 6'-8" A.F.F. Entire unit constructed of 18 GA type 304 stainless steel with #4 finish on all exposed surfaces.
- 2. 1" wide full-perimeter integral gutter with 1/2" turn-up and 3/4" stainless steel drain connection.
- 3. Integral stainless steel rod hanger brackets, each corner.
- 4. Stainless steel duct tap collar with removable aluminum mesh filter.
- 5. Stainless steel perimeter closure panels to finished ceiling by K.E.C.; verify ceiling height.
- 6. Accessories:
 - -- #18GA stainless steel wall flashing from bottom edge of hood to top of finish floor base. Extend full-length of hood body. Attach to wall with non-exposed fasteners.
 - -- Field wrapper.

MARYLAND FOOD BANK ADDITION AND RENOVATION

ITEM #54: CLEAN DISHTABLE

QUANTITY:One (1)MANUFACTURER:Custom FabricatedMODEL NO.:#14 GA Stainless SteelPERTINENT DATA:7'-0"± Long x 3'-6" Wide x 2'-10" HighUTILITIES REQ'D:1/2" HW, 1/2" CW, 1-1/2" IW

Fabricate and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Shop Drawing and the following:

- 1. Front edge roll per Detail 1.02B.
- 2. 13" high back and left end splash per Detail 1.04A.
- 3. Framework per Detail 1.05.
- 4. Legs per Detail 1.07.
- 5. Stainless steel undershelf per Detail 1.11.
- 6. Dishtable per Detail 2.02.
- 7. Sound deaden underside of drainboard with NSF-approved sound dampening material.
- 8. Install button style table limit switch (supplied with Dishmachine, Item #52) in end of dishtable, inter-wired by Electrical Contractor.

ITEM #55: POT & PAN SHELVING, MOBILE

QUANTITY:Six (6)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Five-Tier High, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101B and K-101C; Manufacturer's Instructions and the following:

- 1. Six (6) #EMU244878V5580 units; 24" W x 48" L x 78" H, 5-tier high.
- Six (6) #CSDR73151 Vertical Drying & Storage Cradles, 10-1/4"W x 23-1/2"L x 3-3/4"H, 7-slot rack.
- 3. Locate bottom shelf @ 12" A.F.F.; space remaining shelves equally.

ITEM #56: SHELVING, MOBILE

QUANTITY:One (1)MANUFACTURER:CambroMODEL NO.:Camshelving® Elements (N058)PERTINENT DATA:Four-Tier High, Free-Standing, Vented Shelf PlatesUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

Janitor's Closet:

1. One (1) #EMU245478V4580 unit; 24" W x 54" L x 78" H, 4-tier high.

ITEM #57: MOP SINK & RACK

QUANTITY:One (1)MANUFACTURER:Eagle Foodservice Equipment CorporationMODEL NO.:F1916 (N058)PERTINENT DATA:Floor Mounted, Standard UnitUTILITIES REQ'D:1/2" HW, 1/2" CW, 2" W

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Accessories:
 - -- One (1) #312689 hose and bracket assembly, 30" long.
 - -- One (1) #312690 service sink wall faucet.
 - -- One (1) #321561 mop holder with four (4) individual rubber holders.
- 2. Furnish 16 gauge stainless steel flashing along two (2) walls adjacent sink, 36" high. Attach to wall with non-exposed fasteners and seal to wall and sink.

ITEM #58: WASHER/DRYER, STACKED -- (N.I.C. – FURNISHED BY OWNER)

QUANTITY: One (1)

ITEM #59: FLOOR CLEANING SYSTEM

QUANTITY: One (1) MANUFACTURER: Spray Master Technologies MODEL NO.: SMT-600-WCY (N058) PERTINENT DATA: #300-5356 Wall-Mounted Pump, 2.2 GPM, Remote Station Controlled, Foodservice Package UTILITIES REQ'D: 2HP, 120V, 1PH; 3/4"HW

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. #600-W unit complete with: 3 cylinder CAT® plunger pump, 24V master control panel, thermal limit switch, automatic line-pressure relief, manifold with stainless steel bleeder valve, 6' water inlet supply hose, powder coated stainless steel wall mount brackets and dual chemical injection.
- 2. Food service package includes:
 - -- One (1) #300-5366 Hummer Jet Jr. cleaning attachment with casters for 1,100 PSI.
 - -- One (1) #300-2957 wall & tile brush, 36" & Q.C. shut-off socket.
 - -- One (1) #300-8322 trap shooter drain cleaner with 10' hose & Q.C. shut-off socket.
- 3. Accessories:
 - -- One (1) #300-5217 wall-mounted remote station for new masonry with top tube entry.
 - -- One (1) #300-5258 heavy-duty portable hose reel with #300-3190, 75-foot hipressure hose.
 - -- One (1) #300-5240 wall-mounted hose reel with #300-0177 75-foot hi-pressure hose.
 - -- Two (2) installation supplies.
- 4. Backflow prevention device furnished and installed by Plumbing Contractor.

ITEM #60: FLOOR TROUGH

QUANTITY:One (1)MANUFACTURER:IMC Teddy Foodservice CorporationMODEL NO.:ASFT1572 (N058)PERTINENT DATA:Anti-Spill, 14 GA S/SUTILITIES REQ'D:4" WALTERNATE MFRS.:None

ITEM #60: (Continued)

Furnish and set-in-place per Equipment Plan and Schedule, Sheet K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. 6'-0" long x 1'-3" wide, constructed and installed per Detail, Sheet K-102A.
- 2. SGAS-15 anti-slip stainless steel subway style removable floor grate in equal sections, the lessor of 30 lbs. and/or 20" long.
- 3. Bottom of trough pitched to integral stainless steel waste cup with removable perforated stainless steel basket.
- 4. Top of trough installed flush with top of kitchen finished floor.
- 5. Unit furnished by K.E.C.; installed by Plumbing Contractor.

ITEM #61: BLAST CHILLER/SHOCK FREEZER

QUANTITY:One (2)MANUFACTURER:Thermo-KoolMODEL NO.:TK26BCF-CU-A (N058)PERTINENT DATA:One-Section, Remote Refrigeration, Stainless Steel Interior/ExteriorUTILITIES REQ'D:15.0A, 208V, 1PH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Complete unit with SD card and label printer for complete HACCP documentation, thaw cycle, 13 pan stainless steel mobile rack.
- 2. Remote, air-cooled condenser provided under Item #8A: Refrigeration System.

ITEM #62: SPARE NUMBER

ITEM #63: HAND SINK

QUANTITY:Two (2)MANUFACTURER:Eagle Foodservice Equipment CompanyMODEL NO.:HSAN-10-FA-LRS (N058)PERTINENT DATA:Wall Mounted, Space SaverUTILITIES REQ'D:1/2" HW, 1/2" CW, 1-1/2" W
ITEM #63: (Continued)

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Complete sink assembly consisting of: gooseneck faucet, p-trap, tailpiece and basket drain.
- 2. Accessories:
 - -- #607560 skirt assembly, each unit.
 - -- Integral right and left stainless steel splash shield, each unit.

ITEM #64: SOAP & TOWEL DISPENSER--(N.I.K.E.C.–SPEC'D BY VENDOR)

QUANTITY: Two (2)

ITEM #65: TRASH CONTAINER, MOBILE

QUANTITY:Three (3)MANUFACTURER:Rubbermaid Commercial Products, Inc.MODEL NO.:FG2632 (N058)PERTINENT DATA:32-Gallon CapacityUTILITIES REQ'D:----

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Grey in color.
- 2. Accessories:
 - -- Three (3) #FG2645 matching flat lids.
 - -- Three (3) #FG2640 conversion dollies.

ITEM #66: ELECTRIC CAN OPENER

QUANTITY:One (1)MANUFACTURER:Edlund Company, Inc.MODEL NO.:203 (N058)PERTINENT DATA:Countertop, Dual-SpeedUTILITIES REQ'D:4.0A, 120V, 1PH

FOODSERVICE EQUIPMENT 114000-65

ITEM #66: (Continued)

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

1. Cord and plug set.

ITEM #67: RETRACTABLE CORD REEL -- (N.I.C.-FUTURE)

QUANTITY: Two (2)

ITEM #68: BOOSTER HEATER

QUANTITY:One (1)MANUFACTURER:HatcoMODEL NO.:PMG-100 (N058)PERTINENT DATA:Powermite Series, Gas, 4.75-Gallon Storage CapacityUTILITIES REQ'D:.36KW, 120V, 1PH; ¾" HW, 2" W; 3/4" Natural Gas @ 105MBH

Furnish and set-in-place per Equipment Plan and Schedule, Sheets K-101A and K-101C; Manufacturer's Instructions and the following:

- 1. Basic heater consisting of: stainless steel tank, temperature/pressure relief valve, pressure reducing valve, (2) temperature pressure gauges, low-water cut-off, and blended phosphate water treatment system.
- 2. Accessories:
 - --- One (1) #SSBB-100 stainless steel body and base
 - -- One (1) #QSSSA-LEGS 6" stainless steel adjustable legs.
 - -- One (1) #QSBPRV back pressure relief valve.
 - -- One (1) #PMG-AI air interlock switch.
 - -- One (1) #QSPRVB brass pressure reducing valve with by-pass.

(END OF FOODSERVICE ITEMIZED SPECIFICATIONS)

STANDARD DETAILS

FOODSERVICE EQUIPMENT 114000-67











b.



- c. TOP ANGLE LOCATION ENDS; SIDES OF TOP INSETS; UNDER HEAVY EQUIPMENT LEGS; INTERMEDIATES 24" ON CENTER.
- d. BACK ANGLE LOCATION ENDS; INTERMEDIATE MAXIMUM 5'-6" ON CENTER.
- e. CAFETERIA FRONT ANGLE (CHANNEL) LOCATION ENDS; INTERMEDIATES TO CORRESPOND TO PILASTERS, SLIDE BRACKETS, PANEL SPACING, MAXIMUM 4'-0" ON CENTER. RE: STDS.-4.01 THRU 4.04.
- F. WORK SIDE ANGLE LOCATION ENDS; SIDE OF OPENINGS; INTERMEDIATES MAXIMUM 5'-6" ON CENTER.
- g. BOTTOM LEG CHANNEL LOCATION ENDS; INTERMEDIATES CORRESPOND TO FRONT PANEL SPACING; PILASTERS, SLIDE BRACKETS. MAXIMUM 5'-6' ON CENTER.

Food Facilities Design/Consulting		STANDARD DTL: 1.06
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- c. SET SCREW NOT VISIBLE TO WORKING SIDE OF EQUIPMENT.
- d. MAXIMUM 1/32" CLEARANCE BETWEEN LEG AND FOOT
- e. FOOT SET AT MIDPOINT TO ALLOW I" ADJUSTMENT UP AND I" DOWN. WITHOUT THREAD EXPOSURE.
- F. LEGS UNSUPPORTED LATERALLY BY CROSSBACKING OR UNDERSHELVES SHALL BE PINNED TO FLOOR USING 1/4" DIA. X 1/2" PINS WELDED TO FOOT AND SET IN MATCHING HOLES IN THE FLOOR.

NYIKOS ASSOCIATES, INC.	TABLE & SINK LEGS	STANDARD DTL: 1.07
Food Facilities Design/Consulting		



- d. MAXIMUM 1/32" CLEARANCE BETWEEN LEG AND FOOT
- e. FOOT SET AT MIDPOINT TO ALLOW I" ADJUSTMENT UP AND I" DOWN. WITHOUT THREAD EXPOSURE.

NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting		STANDARD DTL: 1.08
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a. FULLY WELD, GRIND SMOOTH AND POLISH.

NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting	CROSSBRACING	STANDARD DTL: 1.10
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a. FULLY WELD, GRIND SMOOTH AND POLISH.

b. WHEN SPECIFIED, TURN REAR AND ENDS UP 2".

NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting		standard dtl: 1.11
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- a. 16 GA S/S SHELF
- b. STD.- 1.02 EDGE
- c. I'x 3'x I' 14 GA. 5/5 CROSS CHANEL
- d. I'x 3'x I" 14 GA. S/S LENGTHWISE CHANNEL WHEN LENGTH BETWEEN SUPPORTS EXCEEDS 42"
- e. 14 GA. S/S BRACKETS FULLY WELDED TO SUPPORT AND CHANNEL ..
- f. 1-1/4" O.D. 16 GA. S/S UPRIGHT. MAXIMUM 5'-0" ON CENTER.
- g. TIGHT FIT. SEAL WITH SILICONE SEALANT.
- h. 1-1/2"x 1-1/2" 12 GA. 5/5 CLIPS WELDED TO REAR OF SPLASH AT DRAINBOARD HEIGHT.
- I. 3/8"x 16 S.S. HEX HEAD BOLT, S/S NUT \$ S/S LOCKWASHER. NUT WELDED IN TUBE.
- w. WIDTH AS SPECIFIED.

NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting	OVERSHELVES & SUPPORTS	STANDARD DTL: 1.12
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NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting	WORKTABLE	STANDARD DTL: 2.01
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a. BASKET - 16 GA. PERFORATED S/S, ALL WELDED CONSTRUCTION.

b. WASTE - 1-1/2" CHROME PLATED BRASS DRAIN -- STANDARD-KEIL #1816-1812-1368







- e. DRAINBOARDS UP TO 24" IN LENGTH REQUIRE NO LEGS OR BRACES. DRAINBOARDS 25" TO 30" REQUIRE I" O.D. 16 GA. S/S BRACE. DRAINBOARDS OVER 30" REQUIRE LEGS AND CHANNEL FRAMEWORK.
- f. DRAINBOARDS SHALL PITCH TO SINK 1/8" PER FOOT OF LENGTH TO PROVIDE COMPLETE DRAINING WITHOUT POOLING. THE 3" HIGH RAISED ROLLED RIM AT THE SINK SHALL DECREASE IN HEIGHT TOWARD THE OUTER ENDS OF THE DRAINBOARD.
- g. PARTITIONS BETWEEN COMPARTMENTS TO BE DOUBLE WALLED CONSTRUCTION WITH ROUNDED TOP, ALL WELDED INTEGRAL WITH SINK BODY.
- h. BACK, BOTTOM, AND FRONT SHALL BE ONE CONTINUOUS PIECE WITH ENDS WELDED INTEGRAL, WITHOUT OVERLAPPING JOINTS OR OPEN SPACES, BETWEEN COMPARTMENTS.
- i. WASTES SHALL BE SEATED IN DIE STAMPED DEPRESSIONS WITHOUT USE OF SOLDER, RIVETS OR WELDING. INSTALLED COMPONENTS SHALL BE FLUSH WITH SURROUNDING SURFACE.
- j. EACH SINK COMPARTMENT TO BE PITCHED AND CREASED TO WASTE TO ASSURE COMPLETE DRAINING WITHOUT POOLING.
- k. ENTIRE UNIT SHALL BE ALL WELDED COVE CORNERED CONSTRUCTION WITH VERTICAL AND HORIZONTAL AND INTERIOR CORNERS HAVING A 3/4[®] RADIUS.
- 1. STD.- 1.02 b EDGE.
- m. STD. 1.04a. BACKSPLASH.
- n. UNDERSIDE OF DRAINBOARDS AND SINKS TO BE SPRAYED WITH SOUND DAMPENING IN COMPLIANCE WITH N.S.F. STD. 2 PARA 4.441 WHEN SPECIFIED.
- FAUCETS T#S MODEL B-232 WITH AERATOR B-199, REMOVABLE MONEL SEATS AND 1/2" I.P.S. MALE INLETS.
- P. WASTES 2" NICKEL PLATED BRONZE ROTARY HANDLE WASTE 5/5 STRAINER PLATE WITH CHROME WITH CHROME PLATED BRASS CONNECTED OVERFLOW, STAN-DARD- KIEL HARDWARE MFG. CO. #1770-1015-1000.
- q, REAR CROSS BRACING ONLY.
- r. OMIT FRONT AND REAR LENGTHWISE CROSSBRACIG UNDER SINKS.
- S. 12 GAUGE STAINLESS STEEL 6"x 6" TRIANGULAR SUPPORT PLATE WELDED TO UNDERSIDE OF SINKS.
- t. WIDTH AS SPECIFIED.



 STANDARD DTL: 3.01.1



TYPICAL SECTION

- a. MATERIAL 14 GA. 5/5
- b. ENTIRE UNIT SHALL BE ALL WELDED COVE CORNERED CONSTRUCTION WITH VERTICAL AND HORIZONTAL AND INTERIOR CORNERS HAVING A 3/4" RADIUS.
- c. TWO SIDES AND BOTTOM SHELL BE ONE CONTINUOUS PIECE WITH ENDS WELDED INTEGRAL WITHOUT OVERLAPPING JOINTS.
- d. PARTITIONS BETWEEN COMPARTMENTS TO BE DOUBLE WALLED CONSTRUCTION WITH ROUNDED TOP, ALL WELDED INTEGRAL WITH SINK.
- e. FULLY WELD SINK TO TOP WITHOUT OVERLAPPING JOINTS.
- F. WASTES SHALL BE SEATED IN DIE STAMPED DEPRESSIONS WITHUOT USE OF SOLDER RIVETS OR WELDING . INSTALLED COMPONENTS SHALL BE FLUSH WITH SURROUNDING SURFACE.
- g. FAUCET T\$S MODEL B-222 FAUCET WITH B-199 AERATOR, REMOVABLE MONEL SEATS AND 1/2" IPS MALE INLETS.
- h. WASTES I-1/2" NICKEL PLATED BRONZE ROTARY HANDLE WASTE AND S/S STRAINER PLATE WITH CHROME PLATED BRASS CONNECTED OVERFLOW, STANDARD-KEIL HARDWARE COMPANY NO. #1770-1015-1000.

NYIKOS ASSOCIATES, INC. Food Facilities Design/Consulting	DESCRIPTION: COUNTER TOP SINKS	STANDARD DTL: 3.04









HINGE DETAIL



- a. PANELING 18 GA. 5/5 GA. EXTERIOR AND INTERIOR PANS TACK WELDED.
- b. SEMI-RIGID FIBERGLASS SOUND DAMPENING.
- c. HEAVY-DUTY S/S CLIP JOINT HINGE AS MFD. BY STANDARD-KEIL. SET IN FLUSH WITH SURFACE OF DOOR AND JAMB AND WELDED IN PLACE.
- d. STANDARD-KEIL #2932-1010-3000 MAGNETIC CATCH MOUNTED FLUSH IN CUT OUT ON 1" TURN DOWN.
- e. STEEL PLATE FOR MAGNETIC CATCH TACK WELDED TO INTERIOR DOOR PAN.



(END OF SECTION 114000)

SECTION 11450

APPLIANCES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
- A. Residential Appliances (Whirlpool):1. Refrigerator
- 1.2 RELATED SECTIONS
- A. Section 06400 Architectural Woodwork.
- B. Section 16000 Common Work Results for Electrical.
- 1.3 REFERENCES
- A. American National Standards Institute (ANSI): ANSI Z21-Series for gas-fueled appliances.
- B. Association of Home Appliance Manufacturers (AHAM).
- C. Department of Justice (DOJ).
- D. National Fire Protection Association (NFPA).
- 1.4 SUBMITTALS
- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's printed installation instructions, showing required preparation and installation procedures.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Cleaning and maintenance instructions.
- C. Verification Samples: For each finish specified, two 6 inches (150 mm) square samples.
- D. Closeout Submittals: Documentation of manufacturer's warranty.
- 1.5 QUALITY ASSURANCE
- A. Installer: Minimum 2 years experience with similar projects.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.

RESIDENTIAL APPLIANCES 11450-1

2. Do not proceed with remaining work until workmanship and appearance are approved by Architect.

3. Subject to approval by Architect, mock-up may be retained as part of finish work.

- C. Pre-Installation Meetings: Conduct pre-installation meetings to verify project requirements, substrate conditions, construction documents, details and manufacturer's warranty requirements.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged rolls/pallets with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- 1.7 PROJECT CONDITIONS
- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- 1.8 WARRANTY
- A. Manufacturer's Warranty: Manufacturer's standard warranty document executed by authorized company official.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
- A. Acceptable Manufacturer: Whirlpool Corporation, which is located at: 2000 State Rd. 63 N.; Benton Harbor, MI 49022-2692; Toll Free Tel: 800-253-1301; Fax: 269-923-3872; Web: https://www.whirlpool.com | https://amana.com
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- 2.2 PERFORMANCE REQUIRMENTS
- A. Electrical: Listed and labeled as defined in NFPA 70.
- B. Gas-Fueled: Certified per ANSI Z21 series standards.
- C. Each Appliance specified meets corresponding relevant AHAM standards.
 1. Meets relevant AHAM sustainability standards.
- D. Accessibility:

- 1. Standards for Accessible Design per the American Disabilities Act (ADA).
- 2. ABA Standards.
- 3. ICC A117.1.
- 2.3 KITCHENETTE APPLIANCES (Whirlpool unless noted)
- A. Freestanding Refrigerator
 - 1. 32 5/8" wide, 22 cu.ft, Model #WRB3322DMB; Style: Single Door with Bottom Freezer; Finish: Stainless Steel
- B. Microwave

1. Model # WMC50522HT; Style: Under Counter, Front Control; Finish: Stainless Steel

PART 3 EXECUTION

- 3.1 EXAMINATION AND PREPARATION
- A. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
- B. Do not proceed with installation until substrates, electrical connections, and plumbing piping for appliances have been installed and have been properly prepared and deviations from manufacturer's recommended tolerances are corrected.
- C. Prepare substrates using the methods recommended by the manufacturer for achieving the best result for the appliance installation under the project conditions.
- D. Commencement of installation constitutes acceptance of conditions.
- 3.2 INSTALLATION
- A. Install in accordance with manufacturer's written instructions and approved submittals.
- B. Coordinate with installation of other materials for proper tolerances and the sequence of the Work being performed.
- C. Test for operation and adjust until satisfactory results are obtained.
- 3.3 CLEANING AND PROTECTION
- A. Protect installed products from damage during remainder of construction period, per manufacturer's written instructions.

MARYLAND FOOD BANK ADDITION AND RENOVATION

END OF SECTION

RESIDENTIAL APPLIANCES 11450-4

SECTION 19510

1" MINI HORIZONTAL ALUMINUM BLINDS

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

A. Furnish and install 1" Mini Horizontal Aluminum Blinds (Premium Quality)

1.2 RELATED SECTIONS

- B. Section 06100 Rough Carpentry: Wood blocking and grounds for mounting blinds and accessories.
- C. Section 085200 Aluminum Windows: Coordination with window systems for installation of blinds and related accessories.
- D. Section 09260 Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of blinds and related accessories.

1.3 REFERENCES

Flame-resistant mateiral shall pass or exceed one or more of the following tests:

- A. National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
- B. Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials
- C. California Administrative Code Title 19
- D. Federal Standard 191 Method 5903 (used by Port Authority of New York and New Jersey for drapery, curtain, and upholstery material)
- E. Boston Fire Department Test BFD IX-1
- F. New York State Uniform Fire Prevention and Building Code

1.4 SUBMITTALS

A. Product Data: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers recommendations for maintenance and cleaning shall be included.

1" MINI HORIZONTAL ALUMINUM BLINDS 12492-1

- B. Drawings and Diagrams: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.
- C. Sample: Responsible contracting officer or agent shall supply one sample shade of each type specified in this contract for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

1.5 QUALITY ASSURANCE

- A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.
- B. Installer: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.
- C. Uniformity: Provide 1" Mini Horizontal Aluminum Blinds of only one manufacturer for entire project.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Product shall be delivered to site in manufacturer's original packaging.
- B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

1.7 JOB CONDITIONS

- A. Prior to shade installation, building shall be enclosed.
- B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.8 WARRANTY

A. Lifetime Limited Warranty. Specific product warranties available from manufacturer or its authorized agent.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Hunter Douglas Architectural / 13915 Danielson St., Ste.100/ Poway, CA 92064/ Phone: 800-727-8953 Fax: 800-205-9819/ Website: <u>HDarchitectural.com</u>, or architect approved equivalent.

1" MINI HORIZONTAL ALUMINUM BLINDS 12492-2

MARYLAND FOOD BANK ADDITION AND RENOVATION

B. Product substitutions must be approved by the Architect minimum of 30 days prior to close of bid.

2.2 1" MINI HORIZONTAL ALUMINUM BLINDS

- A. PRODUCT: Hunter Douglas "CL62 1" Mini Aluminum Blind".
- B. MATERIALS:
 - Slats: 1" wide x .006" thick, heat-treated and spring tempered (except 5000 series alloy on metallized finishes) aluminum alloy 6011 with eased corners and manufacturing burrs removed. Product to have a minimum of 95% pre-consumer recycled content. Furnish not less than nominal 13.8 slats per foot to ensure tight closure and light control. Finish with manufacturer's standard baked-on finish in colors selected by architect from manufacturer's available contract colors utilizing Dust Shield[™] finish to inhibit dust build-up for easier maintenance.
 - 2. Slat Support: Braided ladders of 100% polyester yarn color compatible with slats and spacing of ladder no more than 22mm.
 - 3. Headrail: U-shaped profile with rolled edges, measuring 1" x 1" x .024" constructed of corrosion resistant steel. Internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation. Headrail finish to be standard baked-on polyester and to match slats. Ends fitted with .024" steel end lock with adjustable tab for centering blinds.
 - 4. Bottom Rail: Steel, with corrosion-resistant finish formed with double-lock seam into closed oval shape for optimum beam and torsional strength. Ends fitted with color-coordinated engineered polymer caps. Color-coordinated engineered polymer tape buttons secure the ladder and cord. Bottom Rail finish to be standard baked-on polyester color coordinated to slats.
 - 5. Lifting Mechanism: Crashproof cordlock in engineering polymer housing with nickel-plate die-cast bearing surface and brass locking clips, two-ply polyester cord filler in braided polyester jacket lift cords, cord equalizers, cordlock adapter, and Cord Stop/Single Pull Cord. Located on either side of individual blind unit as per architect's request.
 - 6. Tilting Mechanism: Permanently lubricated die-cast worm and gear type tilter gear mechanism in fully enclosed housing with clutch action to protect ladder tapes from over rotation of the solid steel, corrosion resistant tilt rod.
 - 7. Tilt Control Wand: Tubular construction 9/32" diameter extruded clear acrylic hexagonal, and detachable without tools. Located on either side of individual blind unit as per architect's request.
 - 8. Mounting Hardware: Manufacturer's standard .040" steel box brackets with baked-on polyester finish to match headrail with additional support brackets for blinds over 60" wide.

9. Design Option: Limited Tilt.

2.3 FABRICATION

- A. Blind measurements shall be accurate to within $\pm 1/8$ " or as recommended in writing by manufacturer.
- 2.4 FINISHES
 - A. Color: 001 Glacier White.
 - B. Slat Support braided ladders shall be color coordinated with slat.

PART 3 - EXECUTION

- 3.1 INSPECTION:
 - A. Subcontractor shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.
 - B. Other Interacting Trades shall receive drawings of shade systems, dimensions, assembly and installation methods from subcontractor upon request.

3.2 INSTALLATION:

- A. Installation shall comply with manufacturer's specifications, standards and procedures as detailed on contract drawings.
- B. Adequate clearance shall be provided to permit unencumbered operation of shade and hardware.
- C. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.
- 3.3 DEMONSTRATION:
 - A. Demonstrate operation method and instruct owner's personnel in the proper operation and maintenance of the blinds.

END OF SECTION

SECTION 14202

PASSENGER ELEVATORS

PART 1 GENERAL

- 1.1 SUMMARY
 - A. Section includes: Product selection and materials related to enclosed passenger lifts.
 - 1. Accessibility provisions for physically disabled persons.
 - 2. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 - 1. Materials and accessories as required to complete the elevator installation.
 - B. Related Sections:
 - 1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
 - 2. Division 3 Concrete: Installing of lift pit.
 - 3. Division 5 Metals:
 - a. Providing hoist beams, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
 - 4. Division 16 Electrical:
 - a. Providing electrical service to elevators, including fused disconnect switches where permitted. (note: fused disconnect switch to be provided as part of elevator manufacture product)
 - b. Emergency power supply, transfer switch and auxiliary contacts.

1.2 SUBMITTALS

- A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
 - 1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 - 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 - 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.

- 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
 - 1. Owner's manuals and wiring diagrams.
 - 2. Parts list, with recommended parts inventory.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
 - 1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.
 - a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
 - 2. The manufacturer shall have a documented, on-going quality assurance program.
 - 3. ISO-9001:2000 Manufacturer Certified
 - 4. ISO-14001:2004 Environmental Management System Certified
 - 5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
 - 1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 - 2. NFPA 70 National Electrical Code.
 - 3. NFPA 80 Fire Doors and Windows.
 - 4. Americans with Disabilities Act Accessibility Guidelines (ADAAG)
 - 5. Section 407 in ICC A117.1, when required by local authorities
 - 6. CAN/CSA C22.1 Canadian Electrical Code

- 7. CAN/CSA B44 Safety Code for Elevators and Escalators.
- D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing:
 - 1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 - 2. Arrange for inspections and make required tests.
 - 3. Deliver to the Owner upon completion and acceptance of elevator work.
- F. Sustainable Product Qualifications:
 - 1. Environmental Product Declaration:
 - a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
 - b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed lifecycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
 - 2. Material Transparency:
 - a. GOOD: Provide Health Product Declaration at any level
 - b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
 - c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
 - LEED v4 Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
 - 4. Living Building Challenge Projects: Provide Declare label for products specified.

1.4 DELIVERY, STORAGE AND HANDLING

A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.5 PROJECT CONDITIONS

A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.6 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.7 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.
 - Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
 - 2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
 - 3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Design based around Savaria V-1504 Vertical Platform Lift
- B. Finish: Powder Coat Finish Black Grey Semi-Gloss with clear acrylic enclosure and door inserts.
- C. Type: Enclosed Type 3, 45" Opening

2.2 MATERIALS, GENERAL

- D. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- E. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- F. Steel:
 - 1. Shapes and bars: Carbon.
 - 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
- 3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.
- G. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.
- H. Flooring: Sheet Vinyl Flooring. Refer to section 09652 for product details. Colors and patterns as selected by the Architect.

2.3 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Deflector Sheaves: None
- D. Guide Rails: Dry, non-lubricated steel, fastened to the building with steel brackets.
- E. Guides: Guide shoes or roller guides with a minimum of three tires shall be mounted on top and bottom of the car and counterweight frame and be held in contact with the guide rail by adjustable devices.
- F. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- G. Machine: The hoisting machine shall be a compact energy efficient permanent magnet Gearless traction type, consisting of PMAC motor, brake and driving sheave mounted on a rigid bedplate in the top of the hoistway. A large solid, forged shaft shall serve as a support for the motor rotor assembly and for the drive sheave and brake system. It shall be supported by roller bearings mounted in the machine housing.
- H. Drive System:

- 1. The drive system shall be of the Variable Voltage Variable Frequency (VVVF) regenerative.
- 2. The system shall be a vector controlled pulse-width modulated AC drive. The variable voltage variable frequency drive shall convert the AC power supply using a two-step process to a variable voltage variable frequency power supply for use by the hoist motor.
- 3. The speed control shall be by means of vector control providing direct torque and field excitation automatically provided by permanent magnet. A digital absolute velocity encoder shall be provided giving feedback to the controller on armature position and motor speed.
- 4. Dual solid state electronics (IGBT Insulated Gate Bipolar Transistor) in series shall be used in place of mechanical contactors.
- I. Motor/Machine: The motor shall be PMAC, totally enclosed, non-ventilated with class "F" insulation. The motor armature shall be dynamically balanced and supported by roller bearings of ample capacity. The armature and driving sheave shall be properly balanced for smooth, high-speed elevator performance. The PM machine shall be mounted horizontally in the top of the hoistway in a unitized formed steel structure on bearing plates furnished by the elevator installer. The unitized formed steel structure shall be securely fastened to the supports supplied by other trades.
- J. Brake: The brake shall be a spring applied electric brake; held open by an electro-magnet actuated by a digital brake controller and designed to make smooth, positive stops. The Brake shall be designed to automatically apply in the event of interruption of power supply from any cause. Operation and control of the brake shall be all digital. The setting and lifting of the brake shall be software based and all electronic. All adjustments and setup of the brake shall be made using a PC interface. No contactors or resistors shall be used in the actuation of the brake.
- K. Suspension Belts and Governor Rope: Suspension belts shall be flat belts of polyurethane with an inner core of 12 steel cords with an FT1 fire rating such that hoistway sprinklers are not required by NFPA-13. Each belt shall have a suspension strength of 60 KN (13,488 pounds).
 - 1. Four to six belts shall be used depending on the car capacity.
 - 2. Suspension tension monitor shall detect differences in belt tension and for loss of tension. If fault is detected, the car shall stop at the nearest floor and an Out of Service call be registered.
 - 3. Trip criteria shall be monitored and data shall be stored in redundant non-volatile locations. Belts shall be replaced prior to the end of service life. Messages shall be issued at 180, 90, and 30 days prior to the last day of service life.

- 4. Governor ropes shall be of iron construction.
- 5. Any special tools, devices, software or equipment required for monitoring the wear of suspension shall be included with the installation of the equipment and become the property of the owner at time of elevator completion. This includes special ongoing monitoring systems, special tools and instruction needed to monitor the suspension system.
- Counterweight: Counterbalance each elevator for smooth and economical operation by using iron or steel plate weights securely fastened in a steel counterweight frame.
 Counterweight shall equal the weight of the complete elevator car and approximately 50 percent of the specified capacity load.
- M. Safety and Governor: Car safety shall be mounted on the bottom members of the car frame and be operated by a centrifugal speed governor. The governor shall be designed to cut off power to the motor and apply the brake whenever the governor indicates the car has excessive speed. The governor shall function when the car over speeds.
- N. Emergency Terminal Limits: Place electric limit devices in the hoistway near the terminal landings. Limit switch(es) shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.
- O. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

2.4 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete stainless steel type hoistway entrances at each hoistway opening bolted\knock down construction.
 - 1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
 - 2. Main landing door & frame finish: Stainless steel panels. No. 4 brushed finish.
 - 3. Typical door & frame finish: Stainless steel panels. No. 4 brushed finish.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

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- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
 - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 - 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.5 PASSENGER ELEVATOR CAR ENCLOSURE

- A. Car Enclosure:
 - 1. Walls: Cab type a steel shell design, reinforced cold-rolled steel with an applied panel design. The applied panels design shall be arranged vertically on wood core panels covered on both sides with manufacturer panel with a factory applied powder coat finish (Chalkboard or Pitch Black per the selection of Architect). Stainless Steel base.
 - 2. Reveals and frieze: Factory applied powder coat
 - 3. Canopy: Cold-rolled steel with hinged exit.
 - 4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in No. 4 brushed finish stainless steel panels. Framework shall be finished with a factory applied powder coat finish.
 - 5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel
 - 6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
 - 7. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.
 - 8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
 - 9. Protection pads and buttons: Manufacturer standard.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give

the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.6 DOOR OPERATION

- A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.
 - 1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 - 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
 - 3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
 - 4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infrared door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
 - 5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.

- 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
- 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
- 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.7 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a No. 4 brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel: Not Required
- D. Column Mounted Car Riding Lantern: Not required for this application.
- E. Special Equipment: Not Applicable

2.8 CONTROL SYSTEMS

A. Controller: The elevator control system shall be microprocessor based and software oriented. The system shall operate in real time, continuously analyzing the car(s) changing position, condition, and work load. All controller and operational circuits including the brake control and drive system shall be digital. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to

PASSENGER ELEVATORS 14202-10 floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

- 1. Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered.
- 2. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed. The car shall not stop at floors where "down" buttons have been pressed, unless the stop for that floor has been registered by a car button or unless the down call is at the highest floor for which any buttons have been pressed. Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button or unless the up call is the lowest for which any button has been pressed.
- 3. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction. If both up and down calls are registered at an intermediate floor, only the call corresponding to the direction of car travel shall be canceled upon the stopping of the car at the landing.
- 4. A car that is stopping for the last hall call in the preference direction, and that hall call is for the opposite direction with no onward car calls, shall reverse preference when the selector position advances to the landing at which the car is committed to stop. A car that is stopping for the last hall call in the preference direction, and that hall call is for the same direction, shall hold its preference until the door is almost closed allowing time for a passenger to register an onward car call which shall maintain the preference. If no car call is registered before the door is almost closed, the car shall lose its preference and shall be available to accept calls in either direction.
- B. Operation: Selective Collective ETA based. The system is optimized to get a car to the floor where a hall call has been registered, in the shortest time. The system receives input information from standard call pushbuttons located in the hall, car position and car load information from individual car loadweighers.
 - When group operation is required, the group supervisory operation shall be embedded within selected car controllers. No separate group controller shall be supplied. The microprocessor shall constantly scan the system for hall calls. When hall calls are registered, the control system shall immediately calculate the estimated time for arrival using such information as, number of floors to travel from the current position, the time it takes to travel one floor at top speed, calls

assigned to a car, and car reversal time to respond to a call in the opposite direction of travel. When a car's status changes or additional hall calls are registered, the estimated time of arrival shall be recalculated and calls reassigned if necessary.

- 2. Traffic Pattern: The microprocessor shall provide flexibility to meet well defined patterns of traffic, including up peak, down peak, and heavy interfloor demands, and adjust for indeterminate variations in these patterns which occur in buildings.
- 3. Artificial Intelligence: Artificial Intelligence shall be an integral part of the group control system software. The enhanced artificial intelligence shall optimize the interfloor traffic performance. Inputs for the artificial intelligence shall include accurate passenger load from an electronic loadweigher, probable car calls generated from each hall call, type of building and observed traffic patterns.
- C. Load Weighing Device: Provide a load weighing device on each car which, when the particular car is filled to an adjustable percentage of the capacity load, shall cause the car to bypass landing calls but not car calls. The passed landing calls shall remain registered for the next following car.
 - 1. The device shall be unaffected by the action of compensating chain or rope. The device shall detect a 50 pound (23 Kg.) load change under all conditions.
 - 2. The load sensor shall use a load cell to accurately measure the weight in the car. The information shall be transferred via a serial link to the elevator controller.
- D. Anti-Nuisance Call Control: The microprocessor control system shall evaluate the number of people on the car and compare that value to the number of car calls registered. If the number of car calls exceeds the number of people by a field programmable value, the car calls shall be canceled after the first call has been answered.
- E. Position Selector: The position selector shall be part of the microprocessor system. The car position in the hoistway shall be digitized through a primary position encoder. The microprocessor control system shall store the floor position and slow down points in memory.
- F. Motion Control: The drive control system shall be dual-loop feedback system based primarily on car position. The velocity profile shall be calculated by the microprocessor control system producing extremely smooth and accurate stops. The velocity encoder shall permit continuous comparison of machine speed to velocity profile and to actual car speed. This accurate position/velocity feedback shall permit a fast and accurate control of acceleration and retardation.

- G. Motor Pre-Torque: Current shall be applied to the elevator drive before the brake is released and the speed pattern is dictated to eliminate roll back and sling shot effects of unbalanced loads in the car. The electronic loadweigher shall determine the load on the car determining a pre-torque reference to send to the drive.
- H. Emergency Power Operation: Full automatic operation (Simplex 10-D4A) Upon loss of the normal power supply, building-supplied standby power is available to the elevator on the same wires as the normal power. Once the loss of normal power has been detected and standby power is available, the elevator is lowered to a pre-designated landing and will open the doors. After passengers have exited the elevator, the doors are closed. At this time the elevator is automatically allowed to continue service using the building-supplied standby power.
- I. Destination Dispatch: Not Applicable
- J. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- K. Special Operation: Not Applicable

2.9 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
 - 1. Provide one pushbutton riser with faceplates having a No. 4 brushed stainless steel finish.
 - a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: An electronic dot matrix position indicator shall be provided and mounted for optimum viewing. As the car travels, its position in the hoistway shall be indicated by the illumination of the alphanumeric character corresponding to the landing which the elevator is stopped or passing. When hall lanterns are provided, the position indicator shall be combined with the hall lanterns in the same faceplate. Faceplates shall match hall stations provided at all typical landings.

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- D. Hall lanterns: A hall lantern with adjustable chime shall be provided at each landing and located adjacent to the entrance. The lanterns, when illuminated, shall indicate the elevator car that shall stop at the landing and in what direction the car is set to travel. When the car reaches a predetermined distance from the floor where it is going to stop, the corresponding hall lantern shall illuminate and the chime shall sound. The hall lantern shall remain illuminated until the car doors close in preparation for leaving the floor. Illumination of the arrow shall be with LED's. Faceplates shall match the hall station finish provided at all typical landings.
- E. Special Equipment: Not Applicable

2.10 CONTROLER LOCATION

A. A control closet shall be provided adjacent to the hoistway. The control closet for simplex cars shall be 5'-6" x 6'-4" x 7'-6" high minimum size. For two-car group operation, the control closet shall be 8'-0" x 5'-6" x 7'6" high minimum. The control closet must be located within a distance that limits the wire length to 150'-0" or less from the elevator machine to elevator controller. The control closet shall have a 3'-0" wide door minimum. The control closet disconnect is provided by others. A disconnect shall be provided by others for each elevator in the optional control closet.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.

- B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- D. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
- I. Lubricate operating parts of system, including ropes, as recommended by the manufacturer.

3.2 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.3 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.4 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
 - 1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.5 **PROTECTION**

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.6 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.7 ELEVATOR SCHEDULE

- A. Elevator #1, Qty. 1
 - 1. Elevator Model: evolution 200

- 2. Elevator Type: Gearless Traction Machine Room-Less, Passenger
- 3. Rated Capacity: 3500 lbs.
- 4. Rated Speed: 200 ft./min.
- 5. Operation System: TAC32T
- 6. Travel: 58'-0"
- 7. Landings: 6 total
- 8. Openings:
 - a. Front: 6
 - b. Rear: 0
- 9. Clear Car Inside: 6' 8" wide x 5' 5" deep
- 10. Cab Height: 8'-0" standard
- 11. Hoistway Entrance Size: 3' 6" wide x 7'-0" high
- 12. Door Type: Single Speed
- 13. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
 - a. Note: Isolation Transformer required for jobs with less than 480vac, 3 Phase building power.
- 14. Seismic Requirements: Zone 1
- 15. Hoistway Dimensions: 8' 6" wide x 6' 11" deep
 - a. Note: Hoistway dimensions listed above are for Seismic Zone 1 only.
- 16. Pit Depth: 5' 0"
- 17. Button & Fixture Style: Traditional Signal Fixtures
- 18. Special Operations: Security Card Reader
- B. Elevator #2, Qty. 1
 - 1. Elevator Model: evolution 200
 - 2. Elevator Type: Gearless Traction Machine Room-Less, Passenger
 - 3. Rated Capacity: 4500 lbs.
 - 4. Rated Speed: 200 ft./min.
 - 5. Operation System: TAC32T
 - 6. Travel: 58'-0"
 - 7. Landings: 7 total
 - 8. Openings:
 - a. Front: 5
 - b. Rear: 2
 - 9. Clear Car Inside: 5' 8" wide x 7' 9 1/2" deep
 - 10. Cab Height: 10'-0" standard
 - 11. Hoistway Entrance Size: 4' 0" wide x 7'-0" high
 - 12. Door Type: Two Speed
 - 13. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
 - a. Note: Isolation Transformer required for jobs with less than 480vac, 3 Phase building power.

- 14. Seismic Requirements: Zone 1
- 15. Hoistway Dimensions: 7' 6" wide x 9' 6 1/2" deep
 - a. Note: Hoistway dimensions listed above are for Seismic Zone 1 only.
- 16. Pit Depth: 5' 0"
- 17. Button & Fixture Style: Traditional Signal Fixtures
- 18. Special Operations: Security Card Reader and Protection Pads and Buttons.
- 3.8 SPECIAL CONDITIONS : NONE.

END OF SECTION

SECTION 15010

MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

- A. Work under this section shall be subject to the GENERAL CONDITIONS hereinbefore written for the entire work, noting especially the reference to interlocking divisions for the Contractors responsibility under each division. Requirements under this SECTION shall apply to all mechanical work.
- B. The Contractor shall furnish labor, materials, equipment and services necessary for the construction of the complete electrical systems.
- C. Labor and materials, although not specifically mentioned, but necessary for the completion of the work and the successful operation of entire electrical system, shall be provided as if specifically called for.
- D. The Contractor shall coordinate the installation of the electrical systems with other trades to insure proper fit, adequate clearances, and proper connections prior to commencement of the work and during the construction phase.

1.2 EXAMINATION OF SITE

A. The Contractor shall examine the site and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in this connection for any error or negligence on the Contractor's part.

1.3 REGULATIONS AND CODE REQUIREMENTS

- A. All plumbing work shall be done in strict accordance with all requirements of the International Plumbing and Building Codes, National Standard Plumbing Code, and the NFPA including specifically NFPA 54. Connections to public utilities shall be in accordance with applicable plumbing and building codes.
- B. All heating and air conditioning shall be done in strict accordance with all requirements of the International Mechanical Code, publications of the American Society of Heating, Refrigerating and Air Conditioning Engineer, the National Electrical Code of the National Fire Prevention Association and other NFPA requirements, specifically NFPA pamphlets 90A and 96, the ASME Boiler Code including C.S.D.-1-1998.

- C. In addition, all work shall be installed in accordance with requirements of any other applicable building, plumbing, mechanical, fire and safety codes. Requirements set forth in the Occupational Safety and Health Act will be strictly adhered to.
- D. Work shall conform to the requirements of the latest editions of the following codes, regulations, specifications and standards:
 - American Society for Testing and Materials (ASTM)
 - Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - Air Conditioning and Refrigeration Institute (ARI)
 - American Society of Mechanical Engineers (ASME)
 - Council of American Building Officials (CABO)
 - National Electrical Code (NEC)
 - National Board of Fire Underwriters
 - National Electrical Manufacturers Association (NEMA)
 - Underwriters Laboratories, Inc. (UL)
 - United States of American Standard Institute
 - National Institute of Standards & Technology (NIST)
 - Occupational Safety and Health Act (OSHA)
 - American National Standards Institute (ANSI)
 - National Fire Protection Association (NFPA)
 - American with Disabilities Act (ADA)
- E. Definitions:
 - 1. <u>Approve</u> Term used in conjunction with Engineers/Architects actions on the Contractors submittals, applications, and requests; is limited to the Architects/Engineers duties and responsibilities as stated in the General and Supplemental Conditions.
 - 2. <u>Equal</u> (or similar phrases, such as "approved equal", "equivalent", "acceptable") Having characteristics which are as good as or better in quality, performance and appearance; meeting qualifications indicated or specified in the Contact documents for a particular product or material.
 - 3. <u>Furnish</u> To supply and deliver to the project site, unload, and store until required for installation or use.
 - 4. <u>Install</u> To set a piece of equipment or material in place at the project site, and connect to the system for which it is intended, complete with appurtenances, accessories, mounting devices, etc. as required.
 - 5. <u>Provide</u> To furnish and install, complete and ready for the intended use.
 - 6. <u>Material</u> Manufactured products and processed and unprocessed natural substances required for the completion of the Contract.

F. The terms "or equal" or "approved equal" or "equivalent" are used as synonyms throughout the contract documents. These terms are not implied, but are stated in the contract documents where applicable. Only materials or products fully equal in all details will be considered.

1.4 GENERAL REQUIREMENTS

- A. Everything necessary for the completion of the work and successful operation thereof, whether they may be definitely specified or indicated or not, shall be furnished and completed in a manner corresponding with the rest of the work as though they were herein distinctly described and specifically provided for.
- B. The Contractor shall have competent foremen on the premises at all times to check layout and superintend the installation of all work included in this division of the specifications and to provide information regarding locations and sizes of chases, openings, etc., and be responsible for the accuracy of such information. The foremen shall layout and superintend the installation of all hangers, inserts, sleeves and other work in masonry and concrete in advance of the work during construction of building, giving consideration to the work of other trades to prevent interference in the location of pipes, conduits, ducts and other equipment.
- C. The Contractor shall provide complete connections for equipment furnished under sections of this division, or under other divisions, or by the Owner, which requires connections under this Division.
- D. All individual pieces of equipment shall be separately valved and fitted with unions so that the individual piece of equipment may be removed for servicing without disturbing other portions of the system.
- E. No beams, columns, structural members, etc., shall be sleeved for the passage of piping or ducts, except where noted on the drawings and approved by the Architect.
- F. The general arrangements and details of the equipment, piping ducts, etc., are shown on the drawings. Dimension or scales shown are approximate and must be checked at the building by the Contractor prior to the installation of any equipment or the fabrication of any equipment. Dimensions for the fabrication of piping, equipment, etc., shall not be scaled from the drawings, but shall be acquired by accurate measurements at the building. Any equipment or materials fabricated off the site, or any work which is installed on the job, which blocks the work of other trades, and is caused by the Contractor's neglect to coordinate his work with the work of other trades, shall be modified or reinstalled without change in the contract price.

- G. All systems and equipment shall be arranged to operate without objectionable noise or vibration. Where objectionable noise or vibration occurs, modifications or changes shall be made until satisfactory results are obtained, at no additional cost to the Owner.
- H. Unless otherwise indicated or required all piping shall be installed parallel to the lines of the building. Piping shall be installed straight and free of traps, sags and bends. Pipe shall be free of kinks, wrinkles and flattened sections. Piping shall properly fit into place and not be forced or stretched.

1.5 QUALITY STANDARDS

- A. Manufacturers specified herein represent products that meet the projects quality standards. Other products which meet or exceed this standard shall be considered equivalent, subject to final review.
- B. Where three or more manufacturers of one product are listed, the Contractor shall bid the job using one of these manufacturers. Should the Contractor desire to substitute another material or product for the material or product specified (if specifically permitted elsewhere within these contract documents), he shall apply in writing for such permission. Requests for substitutions must be submitted within fourteen (14) days after award of contract or notice to proceed, whichever shall occur first; shall state the credit (or extra cost) involved by the use of such substitution, the advantage to the Owner in accepting such substitution, and acknowledgment that ramifications or impact on other trades and the construction schedule has been considered and costs associated with the substitution are reflected in the request. The Contractor shall pay all costs to determine acceptability of the proposed substitution including, but not necessarily limited to, the following:
 - 1. For tests required by the Engineer for evaluation of both the specified product and the proposed substitution.
 - 2. For additional evaluation time of the Engineer.
 - 3. For shipping costs to and from the Engineer, to the Owner, etc. as may be required for evaluation.
 - 4. For any mockup, installation, or other demonstration required by the Engineer for evaluation of the product(s).

In the event that a substituted item is submitted twice and approval is not obtained by the second submission, the Contractor shall furnish the specified item of material or equipment at no additional cost to the Owner.

C. The Contractor is responsible for assuring products supplied by listed or alternate manufacturers are of equivalent or better quality as the primary specified manufacturer. This quality standard will apply to all components of the product.

1.9 SUBMITTALS

- A. Within thirty (30) days after the award of the contract, submit for review to the Engineer a complete list of proposed manufacturers for equipment, materials and Lists shall follow the sequence of the subcontractors to be utilized. specifications. No considerations will be given for partial or incomplete lists. Acceptance of the preliminary list does not relieve the Contractor of responsibility for complete compliance with the specifications. Final acceptance of proposed material and equipment will be pending review of detailed shop drawings. Deviation from the accepted preliminary list will not be permitted without the approval of the Engineer. After review and acceptance of the list, detailed shop drawings and material data shall be submitted. If prior to expiration of the 30 day period or any duly authorized extension thereof, the Contractor fails to submit a schedule of acceptable materials and equipment covering the rejected items, the Owner or his authorized representative reserves the right to select the item. Such selection shall be final and binding upon the Contractor as a condition of the Contract.
- B. Submittals shall consist of manufacturer's certified scale drawings, cuts, catalogs or descriptive literature with complete certified characteristics of equipment, dimensions, capacity, code requirements, motor drive and testing. In addition, Contractor shall provide working shop drawings of ductwork, piping, sprinklers, tank vault and any other details which may be required to clarify installation of piping or equipment.
- C. Certified performance curves for all fans and pumps shall be submitted for approval.
- D. Prior to submittal, the Contractor shall check the submittals thoroughly to ascertain that they comply in detail with the Plans and Specifications, the electrical characteristics are correct for the available service, and that dimensions are shown and checked to fit available space with recommended access. Any deviations from Plans and Specifications shall be clearly noted on the certified submittals. Submittals shall include a reference to the appropriate section, page, paragraph number of the specifications. The Installer shall stamp the submittals with his firm's name, date, and approval noted, indicating that the above has been complied with. Submittals received without his stamp will be returned disapproved without further explanation.
- E. Submittals shall be tendered for items of equipment specified under each section of the specifications or specified on the drawings.
- F. Any changes in any trade brought about by substitutions of specified equipment shall be done at no change in the contract price.
- G. Failure to submit Shop Drawings or Material Lists in ample time for proper

checking and necessary re-submission, shall not be allowed as reason for any claim for extension of time or delay.

- H. The review of a Shop Drawing or Material List shall not be considered as a guarantee of the measurements of the building conditions, or that the Shop Drawings or Material Lists have been checked to see that the item submitted properly fits the building conditions. Review shall not in any way relieve the Contractor of his responsibility or necessity for furnishing material or performing work as required by the specifications and contract drawings, or relieve the Contractor of his responsibilities for correctness of dimensions and quantities, or for proper coordination of details and interface with other trades.
- I. All submittals and all shop drawings for work under this division will be reviewed and stamped by the Engineer. The stamp will be checked with one or more of the following notations:

"No Exception Taken" - This means that the Engineer is satisfied that the equipment or material submitted is in compliance with specified material and equipment in the opinion of the reviewer. This does not relieve the Contractor from his responsibility to determine that the equipment and material is suitable in all respects for the indicated work. This applies to all equipment and material, even if the equipment or material is exactly as specified.

"Make Corrections Noted" - This note is checked in the case of equipment and material that appear to be satisfactory except for some minor corrections which may be noted. The Contractor still bears the same responsibility noted above.

"Revise and Resubmit" - This generally means that the submitted equipment or material is satisfactory subject to noted required revisions. The Contractor's responsibilities remain as previously stated. The submittal must be resubmitted corrected as noted.

"Rejected" - This means that the submitted equipment or material does not meet the requirements of the drawings or specifications and a different submittal must be found which does comply.

1.11 RECORDED CHANGES INFORMATION

A. As the work progresses, the Contractor shall record on a set of white prints, the installed locations, sizes and depths of all piping, services, trenches, etc. in the project wherever they differ from those indicated on the Contract Drawings. All dimensions shall be established from datum points approved by the Architect. Upon completion of the work, the Contractor shall turn over to the Architect one (1) neat copy of white prints showing required Recorded Changes Information.

1.12 TEMPORARY SERVICE

- A. The permanent building facilities, transformers, etc. may be used for temporary power. Written approval must be obtained from the Owner before facilities may be used.
- B. When the permanent heating equipment is installed, it may be used for temporary heating; this time cannot be deducted from the guarantee period. All equipment shall be kept lubricated and in first class operating condition. Filters shall be in place at all times when the air handling system is operating. If the air handling equipment is operated, filters shall be replaced at the conclusion of the work. The equipment and related ductwork shall be thoroughly cleaned at the conclusion of work before final filters are installed. If permanent heating equipment is used, it must be kept in continuous operation.

1.13 ELECTRICAL REQUIREMENTS

- A. Items of electrical work including power wiring, disconnects and motor starters will generally be provided under the Electrical Division of the specifications, unless otherwise noted. Where electrical work is required for equipment furnished and installed under sections of this division including control wiring, interlocking, starters, disconnects, power wiring, heat tracing of mechanical or plumbing piping, etc. and it is not included under the Electrical Division, it shall be furnished and installed under this Division, in conformance with the requirements of the "Electrical Work" Division.
- B. Verify current requirements with electrical drawings. All motors shall be equipped with grease-packed ball bearings, except as noted. All exposed belt drives shall have belt guards.

1.14 SITE UTILITIES

- A. Unless otherwise indicated on the plans, this contractor shall be responsible for all utilities inside the building including but not limited to building sanitary sewer, building storm sewer, domestic water, sprinkler water and gas to within 5-feet of the building foot print. The location of these utilities entering the building shall be fully coordinated with the civil plans, all trades and existing conditions. If there are any discrepancies in size, location, etc between the mechanical, plumbing and civil plans, the contractor shall immediately notify the architect.
- B. All underground utilities shall be installed in complete accordance with all applicable codes and standards including those referenced in this section of the specifications. Backfilling and concrete work shall also be completed in accordance with this section of the specifications. All utilities susceptible to freezing shall be installed below the local frost line unless otherwise directed.

1.15 EXCAVATION AND BACKFILL

- A. The Contractor shall do all excavating and backfilling necessary to install underground piping and tanks included in this division of the work, except as noted. He shall check and establish all lines and grades required for the proper locations of the work and shall be responsible for the correctness thereof. He shall check elevation and location of all utilities before starting work.
- B. All excavation and backfill shall be performed in accordance with the provisions of Site Work covering excavating and backfilling. Trenches over 4'-0" deep shall be shored.
- C. The Contractor shall accurately locate by dimension on the Recorded Changes Information, all underground piping, etc., before trenches are backfilled.

1.16 COORDINATION OF TRADES

- A. The Subcontractor shall give full cooperation to other trades and shall furnish in writing, with copies to Architect, any information necessary to permit the work of all trades to be installed in proper sequence and with the least possible interference of delay.
- B. If the Subcontractor installs his work without coordinating with other trades, and the installation interferes with their installation, he shall make any changes necessary in this work to correct the condition, without extra charge to the Owner.
- C. The Contractor shall provide dimensioned fabrication drawings of critical areas as described hereinbefore.

1.17 SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall provide all scaffolding and rigging services necessary for the erection and delivery into the premises of all equipment and materials provided under this section, and shall remove same from premises when no longer required.

1.18 DRAWINGS

A. The drawings are generally diagrammatic and are intended to convey the scope of work and indicate the general arrangement of equipment, ducts, conduits, piping and fixtures. The location of all items not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project by the Contractor and shall have the approval of the Architect before being installed. Do not scale drawings.

PART 2 - PRODUCTS

2.1 ACCESS DOORS

- A. All concealed valves, dampers, traps, cleanouts, controls, fire dampers and other devices requiring manual operation or maintenance, shall be provided with metal access doors and frames. Doors shall be Zurn, Inland Steel Project Company "Milcor", quality standard of the following Milcor style:
 - Style AT in acoustic tile surfaces
 - Style K in plastered surfaces
 - Style M in masonry or ceramic tile surfaces
 - Style DW in dry wall walls and ceilings
- B. Access panels and doors shall meet the fire protection rating of the rated walls and floor/ceiling assemblies in which they are installed.
- C. Access doors shall be properly sized for the particular application and shall be furnished under the sections requiring same, unless a means of access is otherwise afforded. Access doors in rated surfaces shall carry UL rating equal to the surface in which it is installed.
- D. Access doors shall be installed as required by Local Codes.

2.2 EQUIPMENT FOUNDATIONS AND SUPPORTS

- A. All Contractors responsible for work under the Mechanical and Electrical Divisions are to provide concrete housekeeping pads under their respective equipment mounted on the floor or on the ground. Pads shall be 4" thick and shall extend 1" beyond each edge of the equipment supported and all edges shall be beveled.
- B. Equipment suspended or supported from above shall be secured by means of approved hanger rods and other supports properly attached to the structural system. Sub-framing of structural steel beams, angles, or channels shall be provided for all items of mechanical equipment, where said framing is required, but not furnished under another section.
- D. In no case shall runs of piping be supported from other pipes. Trapeze hangers may be used for parallel runs of pipe with the same pitch or grade. It will be permissible by proper arrangement between the plumbing and heating trades to use common trapeze hangers for such pipes.
- E. Vibration isolators shall be provided for all items of equipment producing vibration likely to be transmitted to the structure, or portions of building which will disturb occupants.
- F. All pipes shall be braced to prevent shock and swaying.

2.3 CONCRETE WORK

A. All concrete work required under any section shall be provided and installed under that section, and shall be performed in accordance with the requirements of the general specifications for concrete work as hereinbefore written, except where included under another section. Coordinate to avoid omission or duplication.

2.4 SLEEVES AND ESCUTCHEONS

- A. Provide standard iron pipe size steel sleeves for all lines passing through concrete slabs and masonry walls. All sleeves shall be set before concrete is poured. Holes required in masonry shall be made with core drills in a manner approved by the Engineer.
- B. Sleeves for pipes through walls and floors shall be of sufficient size to permit the insulation, where specified, to continue through the sleeves. Sleeves through floors shall be flush with the underside of the slab and extend 3/4" above finish floor in wet areas only. Projecting sleeves shall be provided with anchors to prevent them from being loosened and knocked down in the floor construction. The annular space between pipe and all sleeves shall be caulked with polysulfide caulking compound. The annular space shall not be larger than 1/2" for all pipes.
- C. Escutcheon plates shall be used to conceal sleeve openings and openings in masonry walls. Ceiling and wall plates shall be chrome plated, properly secured in place. Floor plates shall be cup type, similar to Grinnell No. 400. At the Contractor's option, split type escutcheons equal in quality to one-piece type may be used.

2.5 FLASHING

- A. Where work included under the following sections of this division require pipes to pass through the roof, the pipes shall be flashed under the section concerned.
- B. All roof drains and all floor drains, pipes and pipe sleeves which are installed in floors or walls with membrane waterproofing, shall have flashing clamp devices.
- C. Where ducts pass through roof, the ducts, roof ventilators or curbs to which they connect shall be provided with counter-flashing under the section concerned. Counter-flashing shall consist of 16 ounce copper or 0.040 inch aluminum as required. Coordinate with Architectural Drawings. All ductwork through roof shall pass through roof curbs which extend a minimum of 8" above the roof.
- D. Piping passing through roof shall be waterproofed and flashed in an approved manner. Coordinate with Architectural Drawings and requirements.

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

- A. All cutting and patching of finished surfaces and the removal of all debris caused by said work shall be performed under the section requiring the installation.
- B. No cutting of any structures or finishes shall be done until the condition requiring such cutting has been examined and approved by the Architect.
- C. All surfaces disturbed as a result of such cutting shall be restored under the section requiring the cutting. The work shall be subject to the Architects approval.

3.2 TESTS

- A. Prior to connection of plumbing fixtures and before sewer connections are made, the entire sanitary and storm drainage piping systems shall be capped and tested as required by the Plumbing Code. The systems shall be filled with water and proven tight under a hydrostatic pressure of at least 15 to 20 feet of water.
- B. All domestic water piping shall be tested and proven tight under a 150 psig hydrostatic test of four (4) hours duration.
- C. After plumbing fixtures have been set and connected, all piping and fixtures shall be tested for operation and a smoke or peppermint test shall be made on all soil, waste and vent piping.
- D. After each piping system has been completed and tested, a preliminary operation shall be made of the system for the purpose of cleaning out all sediment, scale, etc., from the piping. Fill and drain the entire systems as required to thoroughly clean same.
- E. After the building has been occupied and the various equipment is in actual use, the Contractor shall make an operating test of all equipment at a time directed by the Architect to determine that all performance requirements of the Contract are met.
- F. All equipment, specialties, etc., required for all tests shall be furnished by the Contractor under this division.

3.3 PAINTING

A. Prior to shipment or delivery to the building, all equipment metal work installed under this division of the specifications shall be given a coat of preservative paint to prevent rusting. Equipment provided with enameled or factory finish which has been scratched or flaked, must be restored to the approval of the Architect.

- B. Except for cast iron pipe, copper pipe and galvanized surfaces, all exposed piping, hangers and other metal surfaces installed under this division, shall be painted one coat of primer, one coat of enamel under-coater and one coat of machinery enamel.
- C. All finish painting of equipment and piping shall be done under this division of these specifications, except where it is indicated under another division.

3.4 IDENTIFICATION OF PIPING AND EQUIPMENT

- A. All items of mechanical equipment such as HVAC units, fans, pumps, unit heaters, etc. shall be identified by approved nameplates. Nameplates shall be securely affixed, in a manner approved by the Architect, to each individual piece of equipment and also to include, but not be limited to, each starter, switch, relay and transformer, which controls this equipment. Nameplates shall bear notations corresponding to the same notations on the framed wiring diagrams and operating instructions. Nameplates shall be equal to Seton Nameplate Co., aluminum with a black enamel background and with etched or engraved natural aluminum lettering or laminated phenolic with white letters on black background, sizes as indicated. See section 15013 for additional specifications.
- B. All service piping which is accessible for maintenance operations (except piping in finished spaces) will be identified with pressure-sensitive vinyl identification markers. Direction of flow arrows are to be included on each end of the marker.
- C. Where required by local codes, all piping shall be appropriately marked with color-coded bands at the locations and spacing required by the code.

Pipe Designation:		
Heating Water Supply	Domestic Hot Water	
Heating Water Return	Domestic Hot Water Recirculation	
Sanitary Sewer	Domestic Cold Water	
Storm Sewer	Gas Piping	
Condensate		

3.5 LUBRICATION

A. All bearings in equipment shall be provided with adequate facilities for lubrication. All oiling devices, fittings, etc., shall be accessible. Lubricate all bearings upon completion of work. Lubricants shall be as specified by equipment manufacturers.

3.6 **PROTECTION**

A. All materials and equipment shall be properly and effectively covered and

protected by the Contractor during the execution of the work.

- B. During the execution of the work, the open ends of all piping, ducts and conduits and all openings in equipment shall be closed so as to prevent the entrance of all foreign matter. Plumbing fixtures shall be boarded over.
- С. Any damaged equipment, piping, etc., shall be replaced by the Contractor at his expense.

3.7 WATERPROOFING

All waterproofing and damp-proofing of the building shall be cleaned and left A. unharmed by the installation of the work under this division. Wherever any of the work or piping under this division has to pierce waterproofing or damp-proofing, including outside walls, they shall be caulked to wall in a manner satisfactory to the Architect and made watertight. Any waterproofing damaged or destroyed shall be re-water-proofed and made tight by the Contractor. Insulation shall also be waterproofed as required.

START-UP AND INSTRUCTIONS 3.8

A. Upon the completion of the installation of all major pieces of equipment specified under this division, a factory-authorized representative shall fully inspect the installation and confirm it complies with the manufacturer's instructions and is free of any damage and faulty components. The equipment shall be started by the representative and run at peak performance to ensure the equipment operates as intended. The representative shall check operating parameters including but not limited to voltage, running amps, supply and return temperatures, motor speed, combustion efficiency, stack temperatures, vibration and excessive noise. All test data shall be recorded on a factory start-up data sheet and submitted to the engineer for review. Refer to other sections of this specification for additional information on start-up. Equipment to be started includes but is not limited to the following.

	Water Heaters	Backflow Preventer
	Pumps (over 5 HP)	Thermostatic Mixing Valves (2" and larger)
	Variable Frequency Drives	Life Safety Equipment (installed under Div.
15)		
	ASME rated pressure vessels	Smoke Control Systems
	Rooftop Units (over 4,000 cfm)	Automatic Temperature Controls
Systems		-
	Variable Air Volume Boxes	

B. Upon the completion of all work furnished and installed under this division, the

Contractor shall thoroughly instruct the representatives of the Owner in the operation and maintenance of all the various apparatus and equipment to the approval and complete satisfaction of the Architect. This shall be done after the complete system covered by these specifications has been put in operational condition and tested as hereinbefore specified.

- C. Furnish to the Owner, three copies of complete operation and maintenance data covering all equipment installed under this division. This shall include all submittals, shop drawings, factory start-up test sheets, all certifications, as-built drawings and replacement parts literature and a brief description of the operating features of the equipment. This manual shall be submitted to the Architect for approval prior to presentation. Manuals shall be compiled into three ring binders and arranged in a neat organized manner. The binder shall be tabulated and include a table of contents and labeled tabs for quick reference. Each type of equipment shall be placed under a separate tab.
- D. Manufacturers' suggested maintenance schedules shall be provided for all equipment. This shall include periods for greasing, filter changes, oil changes, etc. Maintenance schedules shall be listed as a separate section of the operation and maintenance manual.

3.9 CLEANING

A. At the conclusion of the work, the premises shall be left broom clean. All factory-applied enamel paint shall be cleaned and waxed with industrial quality wax.

3.10 GUARANTEE

- A. Guarantee the complete electrical system installation free from mechanical and electrical defects.
- B. The guarantee period shall be as defined under Division 1. As a minimum, the guarantee period shall be one (1) year, beginning from the day of final acceptance of the work by the Architect or substantial completion and beneficial occupancy by the Owner, whichever occurs first.

END OF SECTION

SECTION 15450

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Plumbing fixtures and specialties; fittings; supports; as indicated on the drawings, as required by code and as specified.

1.2 QUALITY ASSURANCE

- A. All work, materials, equipment, installation and accessories shall comply with the current enforced edition of the International Plumbing Code and all city, local, and federal regulations.
- B. Comply with requirements of ADA and ANSI Standards for plumbing fixtures and fittings for wheelchair accessibility.
- C. All inline devices installed on the domestic service lines or building distribution system downstream of the water main and before end point devices and is in contact with the water intended for human ingestion shall comply with the Safe Drinking Water Act and National Sanitation Foundation (NSF) Standard 61, including Annex G to provide lead free water (not containing more than 0.25 percent lead).
 - 1. Inline devices include water meters, building valves, check valves, meter stops, fittings, backflow preventers, etc.
- D. Provide UL label on electric powered equipment or certification that the equipment has been tested by a testing agency approved by local authority and is equivalent in safety to UL labeled equipment.

1.3 SUBMITTALS

A. Submit in accordance with Division 01 and Section 15050.

- B. Manufacturer's technical product data, including installation instructions, appurtenances, accessories, supports, fittings, finishes, construction details, and dimensions of components:
 - 1. Plumbing Fixtures and Accessories
 - 2. Fittings for Fixtures Supplied Under Other Divisions
 - 3. Automatic Trap Primers
 - 4. Trap Primers
 - 5. Backwater Valves
 - 6. Drains
 - 7. Cleanouts
 - 8. Wall Hydrants
 - 9. Shock Absorbers
 - 10. Vacuum Breakers
 - 11. Backflow Preventers
 - 12. Hose Bibbs
 - 13. Thermostatic Mixing Valve
 - 14. Gas Pressure Regulators
 - 15. Washing Machine Supply and Drain Unit
 - 16. Ice Maker Supply Box
- C. NSF 61-G Certification of domestic water devices.

1.4 APPLICABLE PUBLICATIONS

The publications form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation.

1.5 PROJECT CONDITIONS

- A. Provide all materials, equipment and perform all labor required to install plumbing system complete as indicated on the drawings and as specified.
- B. Plumbing system includes fixtures, equipment, piping and the supports for these items; supplies; stops; faucets; spouts; showerheads; traps; drains; tailpieces; fittings and accessories.
- C. Items indicated to be furnished by the Owner or under other Divisions of the Specifications which require plumbing connections shall be installed and connected to the plumbing system under this Section unless otherwise specified.

Obtain roughin and equipment drawings, as necessary, from the Owner or supplier of the item.

- D. Provide all plumbing fixtures and equipment with accessible stops.
- E. Provide P-traps on fixtures for which traps have not been included as part of the furnished equipment. Size of trap shall be equal to size of fixture tailpiece.
- F. All exposed metal parts of fixtures shall be chromium-plated brass. Piping, fittings, valves, traps and accessories including piping escutcheons shall be chromium plated metals where exposed in finished spaces.
- G. Refer to Section 15100 Building Services Piping for Plumbing System piping material and installation requirements.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND SUPPORTS

A. Provide fixtures as listed.

* <u>NOTE</u>: Specified details are a typical basis of design product. Further coordination with fixtures as selected by the architect may be required.

- B. Fixtures shall be vitreous china unless otherwise noted. Cast iron fixtures shall have acid resisting enamel finish.
- C. Restricting Flow Fittings and Flow Restricting Aerators
 - 1. Provide EPA Water Sense Labeled Fixtures: Water closets, urinals, lavatory sink faucets and showerheads.
 - 2. Provide restricting flow fittings or flow restricting aerators on non-selfclosing and non-metering public lavatory and sink faucets to restrict flow to 0.5 gpm.
 - 3. Provide restricting flow fittings or flow restricting aerators on private lavatories (residential) to restrict flow to 1.5 gpm.
 - 4. Provide restricting flow fittings or flow restricting aerators on showers/bathtubs (residential) to restrict flow to 2.0 gpm.
 - 5. Provide restricting flow fittings or flow restricting aerators on sinks (residential) to restrict flow to 2.0 gpm.

- 6. Restrictor shall compensate for pressure fluctuations between 25 to 80 psig with flow within 10 percent.
- 7. Manufacturers: Dole, Omni Products
- D. Plumbing Fixture Schedule
 - P-1: ADA Water Closet: Kohler Model K-4325, wall mounted, elongated bowl.

Tank Flushing Device: Sloan Model G2 8111-1.6

<u>Seat</u>: Kohler K-4731-SC plastic elongated open-front seat and cover, quiet closing, quick release hinges removal.

Finish/Color: White.

Supply Pipe/Fitting: See MEP Fixture Schedule

P-2: Urinal: Kohler Model K-4991-ET

Flushing Device: Kohler Model K-7546.

Supply Pipe/Fitting: See MEP Fixture Schedule

Finish/Color: White.

P-3: ADA Wall Mount Lavatory: Kohler Model K-2084-N

Faucet: Sloan Model EAF-250-BAT-CP-0.5GPM

Supply Pipes: See MEP Fixture Schedule

<u>Accessories</u>: Grid drain, ASSE 1070 mixing valve, ADA compliant piping covers and carrer.

Finish/Color: Bowl: White.

<u>P-4</u> <u>ADA Counter Mount Lavatory</u>: Kohler Model K-2882

Faucet: Sloan Model EAF-250-BAT-CP-0.5GPM

Supply Pipes: See MEP Fixture Schedule

PLUMBING FIXTURES 15450 - 4 <u>Accessories</u>: Grid drain, ASSE 1070 mixing valve, ADA compliant piping covers and carrer.

Finish/Color: Bowl: White

<u>P-5</u>: <u>Kitchenette Sink (Standard)</u>: Kohler Model K-3894 undermount single bowl kitchen sink, 16-gauge stainless-steel, 19-inches length by 16-inches width by 10-inches depth, 3-1/2-inch rear center drain, with strainer, grid.

Faucet: Kohler Model K-222974

Supply Pipes: See MEP Fixture Schedule

Accessories: Sink strainer

Finish/Color: Stainless Steel

- <u>P-6</u>: <u>Dual Height Water Cooler</u>: Elkay Model LZSTL8WSSP
 - a. Where fixtures are supported from concrete or cinder block walls, install No. 10 USSG Steel plate on the opposite side of the wall and bolt hangers or supports through plate. Where opposite side of wall is exposed to view, place bolts in core of blocks and fill core with cement.
 - b. Where lavatories with wall hangers have been specified and fixtures are supported from metal stud frame partitions, fixture brackets or mounting lugs shall be through bolted to steel channel crosspieces not less than 1-1/2 inches wide anchored to studs. Bolt heads shall be welded to channel web.
- F. Manufacturers
 - 1. American Standard, Crane, Eljer, Kohler, Sloan, and where named:
 - a. Stainless Steel Sinks: American Standard, Elkay, Just, Kohler.
 - b. Service Sinks: Acorn, CECO, Fiat, Stern-Williams.
 - c. Laundry Sinks: Acorn, Fiat, Stern-Williams.
 - 2. Faucets and Accessories: American Standard, Chicago Faucet, Crane, Delta, Eljer, Kohler, Moen, Price Pfister, Speakman, Symmons, T&S Brass.

- 3. Supplies, Traps: American Standard, Brass Craft, Chicago Faucet, Crane, Eljer, Engineered Brass Co., Keeney, Kohler, McGuire.
- 4. Flush Valves: Delany, Sloan, Zurn.
- 5. Water Closet Seats: Bemis, Benecke, Church, Comfort, Olsonite.
- 6. Fixture Supports: Ancon, Josam, J.R. Smith, MIFAB, Wade, Zurn.
- 7. Drinking Water Coolers: Elkay, Halsey Taylor, Haws, Oasis, Sunroc.
- 8. Mixing Valves: American Standard, Lawler, Moen, Price Pfister, Powers, Speakman, Symmons.

2.2 FITTINGS FOR FIXTURES SUPPLIED UNDER OTHER DIVISIONS

- A. Fixtures such as built-in sinks in counters are specified under other Divisions of the specifications and are complete with strainer and tailpiece, except as hereinafter specified. Fittings, accessories and connection of these fixtures to the plumbing system shall be provided under this Section.
- B. Where indicated, provide fittings according to the following schedule:
- C. Manufacturers: See manufacturers listed for "Plumbing Fixtures and Supports" specified under Paragraph 2.1.G.

2.3 DRAINS

- A. Provide drains as listed in schedule. Numbers are Josam unless otherwise noted.
- B. Provide nickel bronze strainers on all floor drains in finished floor areas and painted cast iron strainers on all other floor drains, unless otherwise noted.
- C. Provide flashing clamps on all drains puncturing waterproof membrane and roofing.
- D. Provide suitable flashing material and clamping collar for drains which are not set in place when slab is poured.
- E. Traps for floor drains not used as indirect waste receptors shall be the 4 inches deep seal type or provided with automatic trap priming system as indicated.
- F. Traps for floors drains in food service areas not used as indirect waste receptors from sinks shall be provided with automatic trap priming system.

- G. Trap Primer
 - 1. Type A, Automatic Trap Priming System shall be PPP, Inc. PT Series Electronic Trap Priming Manifold with:
 - a. 24-hour timer set to deliver water once every 24 hours.
 - b. Copper manifold with 1/2-inch compression fittings on each drain connection designed to discharge an equal amount of water to each floor drain.
 - c. 120-volt solenoid valve.
 - d. Vacuum breaker.
 - e. Manual override switch.
 - f. Inlet shutoff valve.
 - g. Water hammer arrestor.
 - h. Circuit breaker.
 - i. Entire unit with timer, solenoid valve, vacuum breaker, override switch, shutoff valve, water hammer arrestor, circuit breaker, shall be located in a surface-mounted cabinet with solid access door with piano hinge. Door and trim flanges shall be stainless steel.
 - 2. Type B: Josam 88250-90 Primer Valve, one valve per trap, with removable operating parts, integral vacuum breaker, and gasketed access cover. Drawings are not all inclusive.
 - 3. Manufacturers: Type A PPP, Inc. or approved equal. Type B J.R. Smith, MIFAB, PPP, Inc., Sioux Chief Manufacturing Co., Watts.
- H. Provide Josam 26200 cast iron vertical expansion joint in each rain leader that does not have 90-degree offsets downstream of the roof drain. The expansion sleeve shall be Schedule 80 PVC and shall conduct the rain water beyond the packing. Install expansion joints in accessible locations for repacking.
- I. In lieu of joints specified in Section 15100, "Building Services Piping," neoprene gaskets may be used if designed for use with the drains and cleanouts employed and if approved by the local plumbing authority.
- J. Where indicated, provide normally closed backwater valves, flapper type with bronze or brass seat and disc and stainless-steel pin. Backwater valves may be an integral part of the drain or a separate device as required by installation condition.
- K. Provide roof drains without traps.
- L. Schedule of Drains and Accessories 1. <u>Roof Drains</u>:

RD-1 <u>Primary Roof Drain</u>: JOSAM 22500 Series coated cast iron 15" diameter Combination Roof Drain and Overflow Drain, one WEJLOC

 ® non-puncturing clamp ring with integral gravel stop, one WEJLOC

® non-puncturing clamp ring with integral gravel stop, one wEJLOC
 ® non-puncturing clamp ring with internal waterguard, double drain receiver and clips and two large polypropylene locking domes.

- <u>RD-2</u> <u>Courtyard Drain</u>: JOSAM 23500-AE Series coated cast iron LEVELEZE ® Roof Drain, square pedestrian grate set in square secured frame, WEJLOC ® non-puncturing flashing collar with weepholes for 2" roof fill, bolted support ring, adjustable top with wide roof flange and large sump with anchor flange and bottom outlet.
- <u>RD-3</u> <u>Green Roof/Planter Drain</u>: JOSAM 39600 Series coated cast iron Planting Area Drain with flashing flange and clamp device, bottom outlet, stainless mesh screen covered dome, secured in place by bolts.
- <u>RD-4</u> <u>Balcony Drain</u>: JOSAM 24500-35 Series coated cast iron small Balcony Drain with flashing flange and clamp device, bottom outlet, flat grate, secured in place by bolts.
- <u>Downspout Nozzle</u>: Josam 25010 cast bronze downspout with loose wall flange and inlet threaded connection.
- Downspout Boot: Josam 25033 4-in. by 3-in., 24-in. height, 1/8-in. galvanized steel body and strap with 1/2-in. dia. cast holes for flat head bolts.
- 2. Floor Drains:
 - <u>FD-1</u> <u>Standard Floor Drain</u>: Josam 30000-S Series coated cast iron floor drain, two-piece body with double drainage flange, invertible nonpuncturing flashing collar, weep holes, bottom outlet and adjustable satin Nikaloy square strainer.
 - <u>FD-2</u> <u>Mech Room Floor Drain</u>: Josam 32300 Series coated cast iron floor drain, medium-deep two-piece body with double drainage flange, nonpuncturing flashing clamp collar, weep holes, bottom outlet, round top and medium-duty loose-set anti-tilting grate with perimeter drainage slots.
- <u>GD-1</u> <u>Parking Garage Floor Drain (Poured Concrete)</u>: Josam 32200-SD special duty grate, double drainage flange. Provide primer tap where required.
- M. Backwater Valves:
 - <u>BWV-1</u> Josam 67500 with bolted, gasketed cover, bronze swing check valve assembly, and with stainless steel hinge pin.
 - <u>BWV-2</u> Josam 67520 with access cleanout top extended to grade.
- N. Manufacturers: Acorn, Josam, J.R. Smith, MIFAB, Wade, Zurn. For Trench Drains: Aco, MEA Josam, MIFAB, Polycast, Polydrain.

2.4 CLEANOUTS

- A. Cleanouts shall be full size of pipe up to 6 inches and shall be 6 inches for 8-inch pipe. Cleanouts shall be 8-inch for 10-inch and larger pipe.
- B. In lieu of joints specified in Section 15100, "Building Services Piping," neoprene gaskets may be used if designed for use with drains and cleanouts employed and if approved by the local plumbing authority.
- C. Materials and Manufacturers: Acorn, Josam, J.R. Smith, MIFAB, Wade, Zurn. Josam numbers are indicated:

CONCEALED PIPING	CAST IRON PIPE	STEEL
Unfinished Areas		
Floors	56000	58460A
Walls	58790	58890
Finished Areas – Floors		
Terrazzo	56040-13	56040-13
Composition Tile	56000-12	56000-12
Ceramic Tile	56020	56020
Carpet	56000-14	56000-14
Finished Areas – Walls		
Plaster	58790	58600
Tile	58790	58640*
* With 9 by 9-inch frame		

MARYLAND FOOD BANK ADDITION AND RENOVATION

Exterior, Flush with Grade				
Walkways	56040-1	-		
Grass Areas * Install in 14-inch square, 6-inch deep concrete pad ** Heavy Duty	56040* or 58680**	-		

EXPOSED AND ACCESSIBLE PIPING	CAST IRON PIPE	STEEL
Walk-in Shafts	58900	58540

2.5 WALL HYDRANTS

- A. Josam 71000-52, self-draining, anti-siphon, 3/4-inch non-freeze, key operated wall hydrant with hinged locking cover, satin finish face, cast bronze box and cover with bronze casing and integral vacuum breaker. Seat and disc shall be removable from front of the hydrant. Hydrant shall conform to ASSE Standard 1019.
- B. Manufacturers: Ancon, Josam, J.R. Smith, MIFAB, Wade, Woodford, Zurn.

2.6 SHOCK ABSORBERS

- A. Type A: Josam 75000 Shoktrol shock absorbers. Sizes shall be in accordance with PDI Standard WH-201 and ASSE Standard 1010.
- B. Manufacturers: Ancon, Josam, J.R. Smith, MIFAB, Precision Plumbing Products, Sioux Chief, Wade, Zurn.

2.7 VACUUM BREAKERS AND BACKFLOW PREVENTERS

- A. Vacuum Breakers:
 - 1. Atmospheric-type, not subject to back pressure, Watts No. 288A; ASSE 1001.
 - 2. Subject to back pressure, Watts series 9D; ASSE 1012.
 - 3. For hose threads, Watts series 8A; ASSE 1011.
- B. Fire Service: Double Check Detector Assembly including UL listed resilient seated OSY shutoff valves and test cocks. The unit shall be UL/FM approved with UL/FM approved OSY shutoff valves. The auxiliary line shall consist of an approved

backflow preventer and water meter. The assembly shall meet the basic requirements of ASSE 1048; AWWA Std. C510 for Double Check Valves. Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. Assembly shall be a Watts Regulator Company Series 709DCDA.

- C. Domestic Water Service: Lead-free double check valve type backflow preventer with strainer, OS&Y rising stem UL/FM listed gate valves and bronze body ball valve test cocks, Watts Series LF709; ASSE 1015. Entire backflow preventer including strainer and valves shall have FDA approved epoxy coating and lining.
- D. Vacuum Relief Valve for domestic water service: Watts Model LFN36-M1 Vacuum Relief Valve. The vacuum relief valve shall be ANSI Z21.22 rated and CSA certified. The vacuum relief valve shall have an all brass body and include a protective cap for automatic venting of a closed system to atmosphere when a vacuum is created.
- E. Manufacturers: Conbraco, Febco, Hersey, MIFAB, Sloan, Watts, Wilkins, Woodford, Zurn.

2.8 HOSE BIBBS

- A. Chicago 998-RCF hose-end faucet, rough chrome finish.
- B. Manufacturers: American Standard, Chicago Faucet, Crane, T&S Brass.

2.9 WATER PRESSURE REDUCING VALVES

- A. Single seated for dead-end service for 30 to 125 pounds range on low pressure side and 150 pounds inlet pressure with cast iron on semi-steel body with brass or bronze trim, flanged or threaded connections, composition diaphragm and bronze springs, suitable for operation with 140 degrees F water system equivalent to Spence Type D34.
- B. Discharge pressure and flow capacity shall be as shown on the drawings.
- C. Delivered pressure shall vary not more than 1 pound for each 10 pounds variation of inlet pressure.
- D. Manufacturers: Clayton, Fisher, Masoneilan, Spence, Watts, Wilkins.

2.10 DOMESTIC WATER (THERMOSTATIC) MIXING VALVE

- A. Type A
 - 1. Valve shall be Lawler Model 802 thermostatic mixing valve as scheduled on the drawings. Valve shall have spindle to control/adjust outlet temperature between 95-115 degrees F.
 - 2. Minimum flow rate of 0.5 gpm.
 - 3. Valve shall be ASSE 1017 and ASSE 1070 approved.
- B. Type B
 - Valve shall be Lawler Model 570 1/2-inch nickel plated thermostatic mixing valve. Valve shall have spindle to control/adjust outlet temperature between 95-115 degrees F.
 - 2. Valve shall have a nominal capacity of 4.0 gpm with a maximum pressure drop across the valve of 5.0 psi.
 - 3. Minimum flow rate of 0.5 gpm.
 - 4. Valve shall be ASSE 1017 and ASSE 1070 approved and CSA B125.3 certified.

2.11 GAS PRESSURE REGULATOR

- A. Provide Fisher 133L or equivalent low-pressure, self-operated service regulator with balancing system.
- B. Construction features shall include 125-pound rated cast iron body, aluminum seat ring and cage, nitrile valve disc and o-rings, nitrile nylon diaphragms, stainless steel stem and stem sleeve, steel diaphragm plate, control line connection, vent connection.
- C. Duty of each regulator is indicated on the Contract Drawings.
- D. Devices shall be in accordance with NFPA 54, National Fuel Gas Code.
- E. Manufacturers: Fisher, Rockwell.

2.12 FOOD WASTE DISPOSER

A. Continuous-feed household, food-waste disposer equal to In-Sink-Erator Model Badger 5XP (3/4 HP). Include reset button; wall switch; 26 oz. grind chamber,

galvanized steel grinding elements, 1-1/2-inch outlet; dishwasher drain connection, quick-mounting, stainless-steel sink flange; 9.5 Amp motor with overload protection, and unjamming wrench.

B. Manufacturers: American Standard, In-Sink-Erator, KitchenAid, Maytag Co., Whirlpool, WhiteRock Corp.

PART 3 - EXECUTION

3.1 PLUMBING FIXTURES AND SUPPORTS

- A. Setting heights of lavatories, drinking fountains, etc. shall be as directed prior to installation.
- B. Install floor-mounted fixtures only after finished floor has been installed.
- C. Seal water closet to the carrier coupling with a closed cell neoprene gasket. Apply adhesive to front and back of gasket.
- D. Provide rubber concussion washers between vitreous china fixtures and supporting brackets.
- E. Protect chromium plated trim from corrosive solutions used to clean tile work.
- F. Provide ASTM C920, Type S white, silicone caulking where fixtures come in contact with walls and floors. Sealant shall be mildew resistant type.
- G. Shower valve temperature limit stops shall be factory set to deliver a maximum outlet temperature of 110 degrees F based on inlet water temperatures of 50 degrees F cold water and 110 degrees F hot water. Confirm outlet temperature in field and adjust as required.
- H. Provide insulation protection in accordance with ADA for exposed traps and supplies for all wheelchair accessible lavatories. Insulation shall provide access to supply valves and shall be equal to Handi-Lav-Guard as manufactured by Truebro, Inc.

Manufacturers: Proto, Truebro.

I. Flush valves shall be mounted not more than 36 inches above the floor for wheelchair accessible water closets and shall be not more than 44 inches above the floor for wheelchair accessible urinal fixtures. Operating lever for water closet shall be mounted on wide side of water closet area.

- J. Showers: Additional reinforcement shall be suitably located to provide required structural integrity. After all valves, grab bars, curtain rods, wall brackets, etc. have been installed, they shall be sealed to make the unit waterproof.
- K. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- L. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- M. Install floor-mounted water closets on closet flanges.
- N. Install counter-mounted fixtures in and attach to casework.
- O. Install fixtures level and plumb according to roughing-in drawings.
- P. Install stops in locations where they can be easily reached for operation.
- Q. Install toilet seats on water closets.
- R. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- S. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- T. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- U. Install traps on fixture outlets, except fixtures with integral traps and indirect wastes.
- V. Set bathtubs, shower receptors, and service basins in leveling bed of cement grout. Grout is specified in Section 15050, "Basic Mechanical Materials and Methods."
- W. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- X. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

- Y. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- Z. Replace washers and seals of leaking and dripping faucets and stops.
- AA. Install supply and drain unit where indicated on drawings. Mount drain rim 18 to 48 inches above drain trap.
- BB. Install ice maker unit where indicated on drawings. Mount supply outlet 48 inches above finished floor.

3.2 DRAINS

- A. Unless otherwise noted, drains are to be installed at the low point of roof, decks, areaways, floors, etc.
- B. Coordinate floor drain installation to avoid interference with toilet room compartment partitions supported from floor.
- C. Install floor drains in low points so the top of grates are at or below the finished floor level.
- D. Drains not functioning properly shall be removed and reinstalled properly at the expense of the Contractor.
- E. Install automatic trap priming system with cabinet where indicated. Install trap primer valves where indicated. Pitch outlet piping from trap primer down toward drain trap a minimum of 1 percent and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.
- F. Install backwater valves and traps for all floor drains directly connected to the storm water system. Backwater valves may be an integral part of the drain or a separate device as required by the conditions of the particular installation. Valves must be accessible for maintenance. If required, provide an adequately sized extension sleeve to floor or grade.
- G. Install backwater valves and no traps on areaway drains. Install backwater valves on drain tile directly connected to storm water systems.
- H. Install traps for all floor drains connected to the sanitary system.

I. Provide suitable pit for access to all concealed backwater valves. Center over backwater valve cover.

3.3 CLEANOUTS

- A. Install cleanouts in sanitary and storm drainage systems at ends of runs, at changes in direction that are greater than 45 degrees, near the base of stacks, every 50 feet in horizontal runs, and where indicated.
- B. All cleanouts required above operating rooms, food storage, preparation, dining and serving areas shall be extended up through the floor above.
- C. Vertical Pipes: Install cleanout in tees near floor.
- D. Horizontal Pipes: Install cleanouts in wyes or long sweep quarter bends.
- E. Extend cleanouts on concealed piping flush to finished walls, floors and grade.
- F. Waterproofing: Cleanouts puncturing waterproofing membrane shall have flashing clamps.

3.4 WALL HYDRANTS

- A. Install where indicated on drawings. Locate 2 to 3 feet above deck or grade.
- B. Locate valve housing inside of interior wall facing.
- C. Install shutoff valve in water pipe to hydrant.

3.5 SHOCK ABSORBERS

Install Type A shock absorbers at solenoid and fast closing valves, at the top of cold water risers, at each flush valve or battery of flush valves, and where indicated.

3.6 VACUUM BREAKERS AND BACKFLOW PREVENTERS

A. Install vacuum breakers on water connections to fixtures and equipment where minimum air gaps required by plumbing code are not possible, on hose bibbs and other outlets to which hoses can be attached, and where indicated on the drawings.

B. Install backflow preventers where indicated on drawings and where required by code. Install air gap on reduced pressure zone backflow preventer and pipe discharge drain to floor drain. Do not install bypass piping around backflow preventers.

3.7 HOSE BIBBS

Install hose bibbs where indicated on drawings. Locate 2 to 3 feet above floor or deck.

3.8 DOMESTIC WATER (THERMOSTATIC) MIXING VALVE

- A. Provide Type A mixing valve as indicated on the drawings. Valve shall be piped to provide equal pressure drop between each water heater and the mixing valve.
- B. Provide Type B mixing valve at each public lavatory and where indicated on the drawings.
- C. Install valves and piping as required to provide complete access for adjustment and maintenance.
- D. Provide minimum 18 inches by 18 inches access panel for complete unobstructed access to the valve where valves are located in a concealed space.

3.9 GAS PRESSURE REGULATOR

- A. Install in accordance with manufacturer's instructions and NFPA 54 requirements.
- B. Provide control line piping connected to discharge line. Provide vent piping extended to atmosphere with screen and weather cap.
- C. Pipe relief valve discharge to atmosphere with screen and weather cap.

3.10 WASHING MACHINE SUPPLY AND DRAIN UNIT

A. Install supply and drain unit where indicated on drawings with drain rim 18 to 48 inches above drain trap.

- B. Install unit according to manufacturer's instructions.
- C. Install shock absorber/water hammer arrestor on hot water and cold water.

3.11 ICE MAKER SUPPLY BOX

- A. Install unit according to manufacturer's instructions.
- B. Provide shock absorber/water hammer arrestor in supply line to ice maker wall box.

3.12 FOOD WASTE DISPOSER

- A. Install disposer in outlet of each sink.
- B. Install switch below sink in an accessible location in accordance with ADA requirements unless otherwise indicated on the Electrical drawings. Coordinate with Electrical Contractor.
- C. Operate and adjust disposers. Replace damaged and malfunctioning units.

END OF SECTION

SECTION 16010

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PART 1 - GENERAL

1.1 SCOPE

- A. Work under this section shall be subject to the GENERAL CONDITIONS hereinbefore written for the entire work, noting especially the reference to interlocking divisions for the Contractors responsibility under each division. Requirements under this SECTION shall apply to all work under DIVISION 16.
- B. The Contractor shall furnish labor, materials, equipment and services necessary for the construction of the complete electrical systems.
- C. Labor and materials, although not specifically mentioned, but necessary for the completion of the work and the successful operation of entire electrical system, shall be provided as if specifically called for.
- D. The Contractor shall coordinate the installation of the electrical systems with other trades to insure proper fit, adequate clearances, and proper connections prior to commencement of the work and during the construction phase.

1.2 EXAMINATION OF SITE

A. The Contractor shall examine the site and observe the conditions under which the work will be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in this connection for any error or negligence on the Contractor's part.

1.3 REGULATIONS AND CODE REQUIREMENTS

- A. Work shall conform to the requirements of the latest editions of the following codes, regulations and specifications:
 - American Society for Testing and Materials (ASTM)
 - National Electrical Code (NEC)
 - National Board of Fire Underwriters
 - National Electrical Manufacturers Association (NEMA)
 - Institute of Electrical and Electronics Engineers (IEEE)
 - Underwriters Laboratories, Inc. (UL)
 - United States of American Standard Institute
 - National Institute of Standards & Technology (NIST)
 - Occupational Safety and Health Act (OSHA)
 - Illumination Engineering Society (IES)
 - National Electrical Safety Code (NESC)
 - American National Standards Institute (ANSI)
 - National Fire Protection Association (NFPA)
 - American with Disabilities Act (ADA)
 - ANSI/ASHRAE/IESNA Standard 90.1

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Local & State Guidelines, Regulations and/or Amendments

B. Definitions:

- 1. <u>Approve</u> Term used in conjunction with Engineers/Architects actions on the Contractors submittals, applications, and requests; is limited to the Architects/Engineers duties and responsibilities as stated in the General and Supplemental Conditions.
- 2. <u>Equal</u> (or similar phrases, such as "approved equal", "equivalent", "acceptable") Having characteristics which are as good as or better in quality, performance and appearance; meeting qualifications indicated or specified in the Contact documents for a particular product or material.
- 3. <u>Furnish</u> To supply and deliver to the project site, unload, and store until required for installation or use.
- 4. <u>Install</u> To set a piece of equipment or material in place at the project site, and connect to the system for which it is intended, complete with appurtenances, accessories, mounting devices, etc. as required.
- 5. <u>Provide</u> To furnish and install, complete and ready for the intended use.
- 6. <u>Material</u> Manufactured products and processed and unprocessed natural substances required for the completion of the Contract.
- C. The terms "or equal" or "approved equal" or "equivalent" are used as synonyms throughout the contract documents pertaining to electrical work. These terms are not implied, but are stated in the contract documents where applicable. Only materials or products fully equal in all details will be considered.

1.4 QUALITY STANDARDS

- A. Manufacturers specified herein, represent products that meet the projects quality standards. Other products which meet or exceed this standard shall be considered equivalent, subject to final review.
- B. Where three or more manufacturers of one product are listed, the Contractor shall bid the job using one of these manufacturers. Should the Contractor desire to substitute another material or product for the material or product specified (if specifically permitted elsewhere within these contract documents), he shall apply in writing for such permission. Requests for substitutions must be submitted within fourteen (14) days after award of contract or notice to proceed, whichever shall occur first; shall state the credit (or extra cost) involved by the use of such substitution, the advantage to the Owner in accepting such substitution, and acknowledgment that ramifications or impact on other trades and the construction schedule has been considered and costs associated with the substitution are reflected in the request. The Contractor shall pay all costs to determine acceptability of the proposed substitution including, but not necessarily limited to, the following:

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- 1. For tests required by the Engineer for evaluation of both the specified product and the proposed substitution.
- 2. For additional evaluation time of the Engineer.
- 3. For shipping costs to and from the Engineer, to the Owner, etc. as may be required for evaluation.
- 4. For any mockup, installation, or other demonstration required by the Engineer for evaluation of the product(s).

In the event that a substituted item is submitted twice and approval is not obtained by the second submission, the Contractor shall furnish the specified item of material or equipment at no additional cost to the Owner.

C. The Contractor is responsible for assuring products supplied by listed or alternate manufacturers are of equivalent or better quality as the primary specified manufacturer. This quality standard will apply to all components of the product.

1.5 SUBMITTALS

- A. Within 30-days after the award of the contract, submit for review to the Engineer a complete list of proposed manufacturers for equipment, materials and subcontractors to be utilized. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. Acceptance of the preliminary list does not relieve the Contractor of responsibility for complete compliance with the specifications. Final acceptance of proposed material and equipment will be pending review of detailed shop drawings. Deviation from the accepted preliminary list will not be permitted without the approval of the Engineer. After review and acceptance of the list, detailed shop drawings and material data shall be submitted. If prior to expiration of the 30-day period or any duly authorized extension thereof, the Contractor fails to submit a schedule of acceptable materials and equipment covering the rejected items, the Owner or his authorized representative reserves the right to select the item. Such selection shall be final and binding upon the Contractor as a condition of the Contract.
- B. Detailed shop drawings based upon the accepted material and equipment list shall be prepared for submission prior to commencement of the work, consisting of manufacturer's certified scale drawings, cuts, wiring diagrams, catalogs or descriptive literature with complete certified characteristics of equipment, dimensions, capacity, code requirements, and testing.
- C. The Contractor shall submit scaled drawings detailing the main and each sub-electric room plan layouts showing proposed equipment and main conduit routing (1/2" = 1'- 0" scale). Elevations shall be provided where necessary to clarify equipment arrangement and clearances. These details shall be submitted for concurrent review with the electrical distribution equipment submittals.
- D. Prior to review submission, the Contractor shall check the shop drawings thoroughly to ascertain that they comply in detail with the Plans and Specifications and that dimensions are shown and checked to fit available space with ELECTRICAL GENERAL PROVISIONS

recommended access. Any deviations from Plans and Specifications shall be clearly noted on the certified shop drawings. Drawings shall include a reference to the appropriate section and paragraph number of the specifications or the appropriate drawings reference. The Installer shall stamp the shop drawings with his firm's name, date and approval noted, indicating that the above has been complied with. Shop drawings received without the Contractor's stamp, or other contract requirements, will be returned disapproved without further explanation.

E. Shop drawings shall be submitted for items of equipment specified under each section of the specifications, or specified on the drawings. Additional shop drawings requirements will be as indicated under the specific section.

Failure to submit Shop Drawings or Material Lists in ample time for proper checking and necessary re-submission, shall not be allowed as reason for any claim for extension of time or delay.

- F. The Contractor shall submit working samples and/or demonstrate proposed system operation upon request.
- G. The review of a Shop Drawing or Material List shall not be considered as a guarantee of the measurements of the building conditions, or that the Shop Drawings or Material Lists have been checked to see that item submitted properly fits the building conditions. Review shall not in any way relieve the Contractor of his responsibility or necessity for furnishing material or performing work as required by the specifications and contract drawings, or relieve the Contractor of his responsibilities for correctness of dimensions and quantities, or for proper coordination of details and interface with other trades.
- H. Samples, drawings, specifications, catalogs, correspondence, and other data submitted for review must be properly labeled, indicating the following data:
 - Project name and address
 - Project title
 - Contractor's name, address, telephone number, contact person
 - Supplier's name, telephone number (shop drawings)
 - Applicable specification section and specific paragraph number, relating to this submission (shop drawings).

Failure to identify any submission data or correspondence in this manner shall be cause for immediate return of the data, submission, or correspondence without further review or comment.

1.6 COORDINATION

- A. It shall be the responsibility of the Contractor to coordinate the work and equipment as specified herein, with work to be performed and equipment to be furnished as specified under other sections of the specifications, in order to assure a complete and satisfactory installation, meeting the approval of the Architect.
- B. Prior to the start of construction, the Contractor shall review the construction documents and specifications of all divisions to assure that electrical provisions for equipment have been made. The Contractor shall notify the Architect of any ELECTRICAL GENERAL PROVISIONS

discrepancies in the electrical provisions prior to commencement of the work and submission of shop drawings. No allowance will be made subsequently in this connection for failure to identify discrepancies between the electrical work and other trades.

- C. The Contractor shall coordinate with all trades and review shop drawings of electrically operated equipment, whether furnished under electrical or not, to verify electrical connection requirements for equipment voltage, phase and loads prior to rough-in of provisions and connections. Replacement costs for damaged equipment and/or labor and material costs associated with roughing-in of improper provisions as a result of the Contractor's failure to coordinate the equipment electrical requirements will be the responsibility of the Contractor.
- D. If a conflict exists between drawings (and/or specifications), the more stringent (which is generally considered to be the more expensive) requirement shall apply. Items shown on the drawings but not specified, shall be provided.

1.7 SCAFFOLDING, RIGGING, HOISTING

A. The Contractor shall provide all scaffolding and rigging services necessary for the erection and delivery into the premises of all equipment and materials provided under this section, and shall remove same from premises when no longer required.

1.8 DRAWINGS

A. The drawings are generally diagrammatic and are intended to convey the scope of work and indicate the general arrangement of equipment, ducts, conduits, piping and fixtures. The location of all items not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project by the Contractor and shall have the approval of the Architect before being installed. Do not scale drawings.

PART 2 - PRODUCTS

2.1 MATERIAL AND EQUIPMENT

- A. Furnish, install and connect equipment as specified herein and under the subsequent sections and/or on the drawings.
- B. The Contractor, in accepting the contract, is assumed to be thoroughly familiar with the materials required and their limitations as to use and requirements for connection, setting, maintenance and operation. Whenever an article, material or equipment is specified and a fastening, furring, connection (including utility connection), access hole, closure piece, or accessory is normally considered essential to the installation in good quality construction, such shall be included as if fully specified.
- C. Material and equipment installed as a part of the permanent installation shall be

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new unless otherwise indicated or specified, and shall be approved by the Underwriter's Laboratories, Inc., for installation in each particular case where standards have been established.

2.2 CONCRETE WORK

A. Unless otherwise indicated, concrete work for electrical equipment foundations, pads, etc., shall be provided under this section of the work. Concrete work shall conform to the requirements specified in other sections of these specifications. Concrete shall be 3,000 psi (minimum) test in 28 days.

PART 3 - EXECUTION

3.1 PERMITS AND CERTIFICATES

A. The Contractor shall obtain necessary permits and certificates and shall pay fees and charges connected therewith. The certificates shall be delivered to the Architect before final payment is made.

3.2 SUPERVISION AND CONSTRUCTION PROCEDURES

- A. It shall be the Contractor's responsibility to completely supervise and direct the work using his best skill and attention. He shall be solely responsible for construction means, techniques, sequence and procedures and for coordinating all portions of the work under the contract.
- B. The Contractor shall completely familiarize himself with the entire project, including work of other trades, and shall also coordinate his work with the other trades. The Contractor shall also familiarize himself with and conduct his work in accordance with other portions of the complete contract documents, including, but not limited to, the GENERAL CONDITIONS and GENERAL REQUIREMENTS of the Contract.

3.3 ELECTRICAL SYSTEM INSTALLATION

- A. The entire work shall be constructed and furnished in a first-class, substantial, and workmanlike manner, according to the full intent and meaning of the drawings and specifications. Everything necessary for the completion of the work and successful operation thereof shall be furnished.
- B. Wiring, conduit runs, risers, and connection points shown on the drawings are diagrammatic; however, the general arrangement of conduit, wiring and equipment shall be as shown on the contract drawings. Detailed drawings of proposed departures due to actual field conditions or other causes, shall be submitted to the Architect for approval. The Contractor shall carefully examine all contract drawings and shall be responsible for the proper fitting of materials and equipment in each location as indicated, without substantial alteration.
- C. Spacing and arrangement of lighting fixtures, etc. shall be coordinated with ceiling patterns so as to be symmetrical and centered in individual bays. Equipment, fixtures, devices, etc., installed in or on the ceiling shall be compatible with the ELECTRICAL GENERAL PROVISIONS

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ceiling pattern and structure.

D. Conduit, outlets, wiring and any other necessary fittings or accessories for power connections for equipment furnished under this division and other divisions, such as heating, cooling and ventilating equipment, pumps, fans, etc., shall be installed under this section. Motor and equipment ratings shown on the drawings are approximate and should be verified. Should substituted equipment of different ratings be furnished, the effected circuit components shall be adjusted accordingly at no additional cost to the Owner.

3.4 CUTTING AND PATCHING

A. Cutting and patching necessary for the installation of the electrical work shall be done under this section. Any damage done to the work already in place by reason of this work shall be repaired at the Contractor's expense. Patching shall be uniform in appearance and shall match the surrounding surface.

3.5 EXCAVATION AND BACKFILLING

- The Contractor shall do excavating and backfilling necessary to install A. underground conduits, ducts, manholes, pole bases and other related electrical items included in this section of the work. He shall establish lines and grades required for the proper location of the work, and shall be responsible for the correctness thereof. He shall check elevation of existing and new utilities before starting work. The Contractor shall do all excavation of every description and in whatever material encountered. Excavation may be accomplished by any customary method. Care shall be exercised that excavations are not carried below the foundation lines or other required limits; such excess excavation shall be backfilled with concrete at the expense of the Contractor. Trenches shall be excavated for conduit or duct lines to the lines and grades indicated on the drawings or established in the field. Trench walls shall be kept as nearly vertical as possible, unless otherwise required by OSHA, and shoring shall be provided as required for protection of work and safety of personnel.
- B. Backfill shall consist of filling the excavated areas for conduit and duct lines and other structures to the required elevation and repairing surfaces to their original condition. The Contractor shall use material obtained from the excavations, unless otherwise directed. Backfill material shall be free from roots, stumps, brush, rubbish, or other objectionable matter. No frozen material shall be placed in backfill, nor shall backfill material be placed on frozen material. No rock shall be used for backfill within 12-inches of the top of final grade. No rock shall be used for backfill within 12-inches of the top of conduit or ducts. Backfilling shall be carefully tamped in 6-inch layers. Where filling or backfill under slabs or other paving is required to produce sub-grades specified or shown, this fill shall be composed of pea gravel furnished by the Contractor.

3.6 SYSTEM IDENTIFICATION

A. Electrical equipment, including service entrance equipment, disconnect switches, panelboards, time clocks, contactors, motor starters, etc., shall be provided with proper identification to relate its function either by reference to the equipment ELECTRICAL GENERAL PROVISIONS

served or to the electrical riser diagram or both. Service entrance equipment shall have main disconnecting devices clearly labeled (e.g., SERVICE MAIN #1 of 4, SERVICE MAIN #2 of 4, etc.). Identification shall be by the use of engraved plastic or metal nameplates screw-attached to the equipment. Uses of embossed plastic "tape" labels as prepared by "Tape-Writer" type equipment, are not acceptable for electrical equipment labeling.

- B. During back-filling/top-soiling of each exterior underground wiring system, provide continuous underground-type plastic line markers, located directly over buried lines at 6" to 8" below finished grade. Where multiple conduits or cables are buried in a common trench and exceed an overall width of 24", provide a line marker for every 24" of width (or fraction thereof). Markers shall indicate type of system.
- C. Junction box and pull box covers shall be labeled using permanent marker or other acceptable means. Covers for circuits shall be marked to indicate circuit numbers, panel source and voltage. Covers for special systems shall be marked to identify system and/or function.

3.7 CLEANING AND PAINTING

- A. Exposed equipment installed under this section shall be cleaned, primed, and finish painted under this section of the specifications. Hangers, supports, etc., not provided with corrosion-proof finish shall be primed and finish painted under this section.
- B. Electrical control equipment, panels, and supporting framework shall have light gray finish which may be manufacturer's standard gray, as approved by the Architect. Where the finish becomes scratched or marred, it shall be touched up or repainted to match the original finish as directed by the Architect. Particular caution shall be exercised so as not to obscure the nameplate data.

3.8 PROJECT CLOSEOUT

- A. As-Built Drawings: As the work progresses, the Contractor shall record, on a set of white prints, the installed locations and sizes of electric feeders, equipment, etc. Upon completion of the work, the Contractor shall deliver to the Engineer one (1) complete set of white prints with "as-built" information neatly recorded thereon in red ink.
- B. Tests:
 - 1. The Contractor shall furnish labor, material, instruments, fuel and power required to perform necessary tests. Tests shall be performed to the complete satisfaction of the Architect. Defective materials and/or workmanship discovered as a result of these tests shall be removed and replaced at the Contractor's expense and the test repeated.
 - 2. A thorough test shall be made to demonstrate that the electrical system is entirely free from ground faults, short circuits and open circuits; that the resistance to ground of non-grounded circuits, before and after connection ELECTRICAL GENERAL PROVISIONS

of fixtures and equipment, has a minimum of one Megohm Insulation Resistance and that circuits are connected properly in accordance with the plans and the manufacturer's wiring diagrams.

- 3. Additional testing requirements will be as required under other sections of this specification.
- C. Operating Instructions:
 - 1. The Contractor shall furnish three (3) brochures of operating and maintenance instructions for each item of equipment installed under this section. Included shall be original catalog cuts of all equipment (panels, lighting fixtures, starters, devices, etc.), schematics as specified under other sections of this specification, maintenance instructions, and warranties.
 - 2. The Contractor shall provide the Owner's authorized representative instructions in the operation and maintenance of the systems before final acceptance of the job.
- D. Guarantee:
 - 1. Guarantee the complete electrical system installation free from mechanical and electrical defects.
 - 2. The guarantee period shall be as defined under Division 1. As a minimum, the guarantee period shall be one (1) year, beginning from the day of final acceptance of the work by the Architect or substantial completion and beneficial occupancy by the Owner, whichever occurs first.

END OF SECTION