

PROJECT MANUAL

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**VOLUME 1
PERMIT SET
NOVEMBER 21, 2023**

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SECTION 00 43 25A

SUBSTITUTION PROCEDURES

1.01 GENERAL

- A. This Section applies to substitute products and procedures requested by the Bidder to be added during the Bid period.
 - 1. Substitutions included with the Bid that have not been approved under this Section must be listed on the Substitution Sheet included with the Form of Proposal.
 - 2. Provide comparable information as required to enable evaluation of the proposed substitution to the specified performance and materials. It is not the responsibility of the Architect/Engineer to further investigate claims of equivalency. Burden of proof is solely the responsibility of the proposer.
- B. Requirements of this Section are in addition to the requirements of Instructions to Bidders, General Conditions and Supplementary Conditions.
- C. Requirements of this Section are part of the requirements specified in Section 00 43 25B - Substitution Request Form.

1.02 LIMITATIONS ON SUBSTITUTIONS

- A. Substitutions will NOT be considered unless Section 00 43 25B - Substitution Request Form attached in this Project Manual is used and the requirements of this Section and ther Substitution Request Form are fully complied with.
 - 1. Other types of forms are NOT acceptable.
- B. Substitutions will NOT be considered when requested directly by subcontractor or supplier.
- C. Architect will determine the acceptability of all substitutions.

1.03 REQUEST FOR SUBSTITUTIONS

- A. Bidder's Representation
 - 1. Request for substitution constitutes a representation that the Bidder has investigated the proposed product and has determined that it is equal to or superior in all respects to the specified product.
 - 2. Request for substitution constitutes a representation that the Bidder will provide same type of warranty for substitution as for specified product.
 - 3. Request for substitution constitutes a representation that the Bidder will coordinate the installation of the accepted substitute, making such changes

- as may be required for the Work to be complete in all respects.
4. Request for substitution constitutes a representation that the Bidder waives all claims for additional costs related to substitutions which consequently become apparent.
 5. Request for substitution constitutes a representation that the cost data is complete and includes all related cost under his Contract.
 6. Request for substitution constitutes a representation that the Bidder has thoroughly investigated the proposed substitute to determine if license fees and royalties are pending on the proposed substitute.
- B. Request for substitutions shall be submitted on Section 00 43 25B - Substitution Request Form attached in this Project Manual. Legible copies of this form shall be made as required for Bidder's submittals. Each submittal request form shall be complete with data substantiating compliance of proposed substitution with requirements of Contract Documents including the following information:
1. Project title and Architect's project number.
 2. Identification of product specified including specification section and paragraph number.
 3. Identification of proposed substitute complete with manufacturer's name and address, trade name of product, model or catalog number and product data.
 4. List of fabricator and supplier (with address and phone number) for proposed substitute.
 5. The affect of substitution on dimensions, material thickness, wiring, piping, ductwork, etc. indicated in Contract Documents.
 6. The affect of substitution on other trades.
 7. The affect of substitution on construction schedule.
 8. Differences in quality and performance between specified product and proposed product.
 9. Comparison of manufacturer's guarantees of specified product and proposed substitute.
 10. Availability of maintenance services and replacement materials for proposed substitute.
 11. License fees and/or royalties pending on proposed substitute.

1.04 SUBMITTAL PROCEDURES

- A. Submit a separate Section 00 43 25B - Substitution Request Form for each substitution.
1. Form shall be completely and properly filled in. If form is incomplete, the Architect reserves the right to reject and return form to Bidder for completion and compliance with this section and Form 00 43 25B.
 2. Submit to Architect two copies of the completed and signed form.
- B. Requests for substitutions of products will be considered no later than ten (10) days prior to Bid Opening Date to allow time for Architect's evaluation of

substitutions and the preparation of an addendum, if required.

- C. Architect will issue the Addendum to all Bidders to notify them of the Architect's decision to accept the requested substitution.

END OF SECTION

SECTION 00 43 25B
SUBSTITUTION REQUEST FORM

GENERAL: This form is part of the substitution requirements specified in Section 00 43 25A.

PROJECT TITLE & NO. _____

TO: MOODY NOLAN INC.

300 Spruce Street, Suite 300

Columbus, Ohio 43215

Telephone (614) 461-4664 FAX (614) 280-8881

Contact and Email:

ATTN: _____

SPECIFIED ITEM _____

Section _____ Paragraph _____

PROPOSED SUBSTITUTE _____

Attach complete description, catalog, spec data, and laboratory tests if applicable

1. What effect will substitution have on dimensions, gauges, weights, etc. indicated in Contract Documents?

2. What effect will substitution have on wiring, piping, ductwork, etc. indicated in Contract Documents?

3. What effect will substitution have on other trades? _____

4. What effect will substitution have on construction schedule? _____

5. What are the differences in quality and performance between proposed substitute and specified product? _____

6. Manufacturer's guarantees of the specified products and proposed products are:
Same: _____ Different (Explain) _____

8. List (on separate sheet), if applicable, the availability of maintenance services and replacement materials for proposed substitute.
9. List (on separate sheet) names, addresses and phone numbers of fabricators and suppliers for proposed substitutes.
10. There [are ____] [are no ____] license fees and royalties pending on the proposed substitute.
(Explain)

11. The undersigned certifies that this substitution meets all requirements of the Contract Documents except as specifically noted herein.

SUBMITTED TO BIDDER BY: (Supplier/Fabricator)

Firm _____

Address _____

Name and Title of Person Signing _____

Signature _____

Telephone No. _____ Date _____

SUBMITTED TO ARCHITECT BY: (Bidder)

Firm _____

Address _____

Name and Title of Person Signing _____

Signature _____

Telephone No. _____ Date _____

FAX No. _____ Email _____

12. ARCHITECT/ENGINEER'S REVIEW COMMENTS:

___ Tentatively Accepted
(pending issuance of
Addendum)

___ Rejected due to
incomplete form.

___ Not Accepted

___ Received Too Late

Signature _____

Date _____

Remarks _____

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractors' Application for Payment.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Contractor: Coordinate the Schedule of Values and Applications for Payment with the Construction Schedule, List of Subcontracts and Submittal Schedule.

1.02 RELATED SECTIONS

- A. Construction Schedules: Section 01 32 16.

1.03 SCHEDULE OF VALUES

- A. Contractor: Coordinate preparation of Schedule of Values for its part of the work with preparation of 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, including continuation sheets.
 - c. List of subcontractors.
 - d. Schedule of allowances.
 - e. Schedule of Alternates.
 - f. List of products.
 - g. List of principal suppliers and fabricators.
 - h. Schedule of submittals.
 - 2. Submit Schedule of Values to Architect at the earliest possible date
- B. Form and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each specification section.
 - 1. Identification: Include the following project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.

- c. 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. Related specification section.
 - b. Description of work.
 - c. Name of subcontractor.
 - d. Name of supplier 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. Coordinate with the Project Manual Table of Contents. Break principal subcontract amounts down into several line items.
4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
6. 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 for that part of the work.
7. Margins of Cost: Show line items for indirect costs, and margins of actual costs, only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Application for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
 - a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
8. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.04 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as reviewed 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: The date for each progress payment applications is the last day of each month. The period covered by each application for payment starts on the day following the end of the preceding period.
- C. Payment Application Forms: As directed by the Contractor
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. 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 signed and notarized original copy of each Application for Payment to the Architect by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of liens and similar attachments, when required.
 - 1. Transmit each copy 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 every entity who is lawfully entitled to file a mechanics lien arising out of the contract and related to the Work covered by the payment.
 - 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. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
 - a. 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 the 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 suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (preliminary if not final).
 5. Schedule of major products.
 6. List of Contractor's staff assignments.
 7. Copies of building permits.
 8. Copies of authorizations and licenses from governing authorities for performance of the work.
 9. Initial progress report.
 10. Report of pre-construction meeting.
 11. 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.
- I. Administrative actions and submittals that shall proceed or coincide with this application include:
1. Occupancy permits and similar approvals.
 2. Warranties (guaranties) and maintenance agreements.
 3. Test/adjust/balance records.
 4. Maintenance instructions.
 5. Start-up performance reports.
 6. Change-over information related to Owner's occupancy, use, operation and maintenance.
 7. Final cleaning.
 8. Application for reduction of retainage, and consent of surety.
 9. Advice on shifting insurance coverage.
 10. List of incomplete work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- J. Final Payment Application: Administrative actions and submittals which must proceed or coincide with submittal of the final payment Application for Payment include the following, as applicable:
1. Completion of project close-out requirements.
 2. Completion of items specified for completion after Substantial Completion.
 3. Ensure that unsettled claims will be settled.
 4. Ensure that work not complete and accepted will be completed without undue delay.
 5. Transmittal of required Project construction records to Owner.
 6. Proof that fees and similar obligations have been paid.
 7. Removal of temporary facilities and services.

8. Removal of surplus materials, rubbish and similar elements.
9. Change of door locks to Owner's access.

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination Drawings.
 - 3. Administrative and supervisory personnel.
 - 4. Requests for Interpretation (RFIs).
 - 5. Pre-Installation Conferences.
- B. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.

1.02 RELATED SECTIONS

- A. Project Meetings: Section 01 31 19.

1.03 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.03 INFORMATIONAL SUBMITTALS

- A. Key Personnel Names: Submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.03 GENERAL COORDINATION PROCEDURES

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
- 1 Preparation of Contractor's Construction Schedule.
 - 2 Preparation of the Schedule of Values.
 - 3 Installation and removal of temporary facilities and controls.
 - 4 Delivery and processing of submittals.
 - 5 Progress meetings.
 - 6 Preinstallation conferences.
 - 7 Project closeout activities.
 - 8 Startup and adjustment of systems.
 - 9 Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure 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 into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.04 COORDINATION DRAWINGS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate required installation sequences and for anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 - g. Complete sufficient demolition to confirm dimensions and clearances before submitting drawings.
 - h. Preparation of coordination drawings of the Work specified in divisions 21 through 28 shall include the following procedure:
 - 1) Ductwork shop drawings shall be prepared indicating bottom of duct elevations.
 - 2) A reproducible of these drawings shall be given to the sub-contractors responsible for Division 21 through Division 28 work, and they shall each review the drawing for conflicts with their work.
 - 3) Contractor shall hold coordination meetings at which coordination conflicts will be resolved. Contractor to document agreed to coordination resolution.
 - 4) Installation of work may not proceed without resolution of coordination conflicts by the Contractor. Work not installed in accordance with the agreed to coordination documents is subject to replacement if conflicts remain, with related costs borne by the Contractor.

B. Coordination Drawing Organization

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Show plumbing lines. Notate code required slope elevations.
 - c. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - d. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger and racks of smaller conduit are required.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads and inspected test valve drains.
 9. Review: Consultant will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Consultant determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Consultant will so inform Contractor, who shall make changes as directed and resubmit.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings or program and system as approved by Architect.
 2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
 4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

- a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 - 1. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 - 2. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.]

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 - 1. Include special personnel required for coordination of operations with other contractors.

1.06 REQUESTS FOR INFORMATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Contractor.
 - 4. Name of Architect.
 - 5. RFI number, numbered sequentially.
 - 6. Specification Section number and title and related paragraphs, as appropriate.
 - 7. Drawing number and detail references, as appropriate.
 - 8. Field dimensions and conditions, as appropriate.
 - 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
- 1 Project name.
 - 2 Name and address of Contractor.
 - 3 Name and address of Architect.
 - 4 RFI number including RFIs that were dropped and not submitted.
 - 5 RFI description.
 - 6 Date the RFI was submitted.
 - 7 Date Architect's response was received.
 - 8 Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 9 Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.07 PREINSTALLATION CONFERENCE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.01 SCOPE

- A. This section specifies administrative and procedural requirements for project meetings including:
 - 1. Pre-Construction Meeting.
 - 2. Progress Meetings.
 - 3. Specially called meetings.
- B. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.

1.02 RELATED SECTIONS

- A. Project Management and Coordination: Section 01 31 00.

1.03 DESCRIPTION

- A. Schedule and administer preconstruction meeting, progress meetings and specially called meetings throughout the progress of the work.
 - 1. Prepare agenda for meetings.
 - 2. Preside at meetings.
 - 3. Record the minutes; include all significant proceedings and decisions.
 - 4. Reproduce and distribute copies of minutes.
 - a. To all participants in the meeting.
 - b. To all parties affected by decisions made at the meeting.
- B. Make physical arrangements for meetings.
- C. Representatives of the Contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.04 PRE-CONSTRUCTION MEETING

- A. Location: A central site, convenient for all parties, designated by Contractor.
- C. Attendance

1. Owner's Representative
2. Architect and Consultants
3. Contractors' Superintendents
4. Major Subcontractors
5. Major Suppliers

D. Agenda: Discuss items of significance that could affect progress, including the following:

1. Tentative construction schedule.
3. Critical work sequencing and long-lead items.
4. Designation of key personnel and their duties.
5. Lines of communications.
5. Procedures for processing field decisions and Change Orders.
6. Procedures for RFIs.
7. Procedures for testing and inspecting.
8. Procedures for processing Applications for Payment.
9. Distribution of the Contract Documents.
10. Submittal procedures.
11. Preparation of Record Documents.
12. Use of the premises.
13. Work restrictions.
14. Working hours.
15. Responsibility for temporary facilities and controls.
16. Procedures for moisture and mold control.
17. Procedures for disruptions and shutdowns.
18. Construction waste management and recycling.
19. Parking availability and restrictions.
20. Office, work, and storage areas.
21. Equipment deliveries and priorities.
22. First aid.
23. Security.
24. Progress cleaning.
25. Owner's occupancy requirements.
26. Phasing.

1.05 PROGRESS MEETINGS

- A. Schedule regular periodic meetings, as required.
- B. Hold called meetings as required by progress of work.
- C. Location of the Meetings: Project field office of the General Contractor.
- D. Attendance
 1. Architect and consultants as needed.
 2. Subcontractors as appropriate to the agenda.
 4. Suppliers as appropriate to the agenda.

5. Owner's Representative

E. Suggested Agenda

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Plan progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Review proposed changes for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the project.
13. Status of RFIs.
14. Status of proposal requests.
15. Pending changes.
16. Status of Change Orders.
17. Pending claims and disputes.
18. Documentation of information for payment requests.
19. Sustainable Design requirements

1.05 PRE-INSTALLATION CONFERENCES

A. Section 01 31 00.

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. These requirements generally describe the form of the construction schedule, a basic description of the schedule contents and the submittal procedures.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Coordination
 - 1. Coordinate schedule with schedules of Sub Contractor.
 - 2. Resolve conflicts among schedules of Sub Contractors.
 - 3. Complete coordination of all items described above before submitting schedule to Architect for review.

1.02 FORM OF SCHEDULES

- A. Prepare schedules in the form of a time-scaled logic diagram, defined as a network logic diagram with connecting lines specifically identifying relationships between all activities of the work using the "Critical Path Method".
 - 1. Diagram may be machine plotted or hand drafted showing the activities duration time-scaled to the appropriate calendar in an easily readable format as approved by Architect. Base schedule on the early start early finish dates of the activities. All relationships between activities must be clearly noted including associated lag times, if required. The diagram must also have the critical path (the series of activities with the least value of total float) clearly marked. In addition, the Contractor must provide a tabular report indicating the early start, early finish, late start, late finish, and total float for every activity in the schedule.

1.03 CONTENT OF SCHEDULES

- A. Quantity of Activities: Defined by complexity of the project. An adequate number of activities are to be included in the project in order that sufficient detail of the demolition process (and resulting temporary construction) and weekly progress requirements are clearly stated.
- B. Where applicable, progress schedule must also include a shop drawing schedule with the activities "Prepare Shop Drawings", "Architect Review and Approval", and

"Fabricate and Deliver to the Jobsite". This sequential series of activities must be assigned to each item on the project which requires a shop drawing or performance data submittal prior to its installation. The shop drawing schedule shall be tied directly to the progress schedule, but shall be provided to the Architect as a separate time-scaled logic diagram.

1.04 PROGRESS REVISIONS

- A. Update schedule and submit in the above format periodically with pay requests. Progress completion shall be defined as the remaining duration of any activity which started on or before the schedule update. In addition, revise the duration of all activities as more accurate scheduling information becomes available.
 - 1. Indicate progress of each activity to date of submission.
 - 2. Show changes occurring since previous submission of schedule:
 - a. Major changes in scope.
 - b. Activities modified since previous submission.
 - c. Revised projections of progress and completion.
 - d. Other identifiable changes.
- B. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the schedule.
 - 2. Corrective action recommended, and its effect.

1.05 SUBMITTALS

- A. Submit revised progress schedules with each application for payment.
- B. Submit four opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. Submit an electronic copy of schedule, using software indicated, in .pdf format. Include type of schedule (Initial or Updated) and date on label.

1.06 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:
 - 1. Job site file.
 - 2. Subcontractors.
 - 3. Owner.
 - 4. Architect.
 - 5. Other concerned parties.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.

1.02 DEFINITIONS

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

1.03 GENERAL REQUIREMENTS

- A. Requirements of this Section are in addition to the requirements of the General Conditions.
- B. This Section includes procedures for processing:
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples.
 - 4. Certificates of compliance.
 - 5. Reports.
 - 6. Schedules.
 - 7. Design data.
 - 8. Other submittals listed.
- C. Submittals as approved do not constitute a change order.
- D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Submittals Schedule:
1. Submittals received prior to receipt of the initial Submittals Schedule will be rejected.
 2. Submittals received prior to the time they are indicated on the Submittal Schedule to be submitted will be rejected.
- F. Make all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.
1. Provide samples via postal or delivery service to Architect or appropriate consultant for their review.
 2. Delays caused by the tardiness of the Contractor in preparing and forwarding submittals will not be an acceptable basis for an extension of the Contract completion date or for consideration of alternate products which do not meet the specified requirements of this Project Manual.
 3. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 4. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Resubmittal Review: Allow 14 days for review of each resubmittal.
 6. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is necessary, allow 14 days for initial review of each submittal.
 7. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- G. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.

- b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- H. Notify Architect in writing at time of submittal of deviations from the requirements of the Contract Documents. In addition, highlight, encircle, or otherwise specifically identify deviations.
- I. Transmittal: Provide Submittal Review Cover following this Section.
- Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
- 1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Submittal and transmittal distribution record.
 - k. Remarks.
 - l. Signature of transmitter.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- J. Resubmittals: When Architect requires that a submittal be resubmitted, comply with requirements of this section.
- 1. Identify changes made since the previous submittal.

- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Digital Documents: At Contractor's written request, copies of Architect's Digital Documents will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. Execute Agreement & Waiver Release of Digital Documents provided by the Architect to obtain files.
 - 2. The digital documents are provided for the Contractor's convenience and their use will be at the Contractors risk.
 - a. There are no assurances that the information in the digital documents is current. All dimensions must be field-verified.
- J. Electronic PDF Submittals: When acceptable, prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- K. Submittals for Web-Based Project Software: When acceptable, prepare submittals as PDF files, or other format indicated by Project software website.

1.04 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data
 - 1. Submit only pages which are pertinent.
 - a. Mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number.
 - b. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
 - 2. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.
 - 3. Stamp and sign each set of manufacturer's product data before submitting to Architect to certify compliance with Contract Documents.
 - 4. Number of Copies Required: Submit two paper copies of Product Data, and in portable data file (.pdf) format, unless otherwise indicated. When submitting for Concurrent Consultant Review, submit two copies to Consultant and one copy to Architect. Architect will return one copy. Mark up and retain returned copy as a Project Record Document.
 - a. Reproduction and cost of reproduction of processed Product Data for distribution to concerned parties is Contractor's responsibility.
- C. Shop Drawings

1. Reproduction of any portion of the Contract Documents for use as submittals for Shop Drawings is not acceptable.
 2. Submit Shop Drawings in a clear and thorough manner.
 - a. Title each drawing with Project name.
 - b. Identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
 3. Identify the following:
 - a. Requirements of the individual section of Project Manual.
 - b. Field measurements.
 - c. Field construction criteria.
 - d. Relation to adjacent or critical features of the Work or products.
 - e. Conformance of submittal with requirements of Contract Documents.
 4. Each sheet of Shop Drawings shall be stamped and signed by Contractor before submitting to Architect. Certify compliance with requirements of Contract Documents.
 5. Review by the Architect shall not relieve Contractor from his responsibility in preparing and submitting proper Shop Drawings in accordance with his current obligations.
 6. All submissions which, in the opinion of the Architect are incomplete, contain errors or have not been checked or only superficially checked, will be returned unchecked by the Architect for resubmission.
 7. Fabrication of products or start of work before required Shop Drawings are approved by Architect and returned to Contractor shall be at Contractor's risk.
 8. Number of Copies Required: Submit two paper copies of each submittal, and in portable data file (.pdf) format, unless indicated otherwise. When submitting for Concurrent Consultant Review, submit two copies to Consultant and one copy to Architect. Architect will return one copy. Mark up and retain one returned copy as a Project Record Drawing.
 - a. Reproduction and cost of reproduction of processed Shop Drawings for distribution to concerned parties is Contractor's responsibility.
 - b. This procedure is to be followed for each submission of a drawing or group of drawings until they are finally approved by the Architect.
- D. Office Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - a. Provide samples via postal or delivery service to Architect or appropriate consultant for review.
 2. Identification: Attach label on unexposed side of Samples that includes the following:

- a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
- 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 4. Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples Required: Submit two sets of Samples. Architect will retain one Sample set; the other will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.

E. Mock-Up Samples: Where samples are specified in the individual specification sections for use in constructing mock-ups, comply with requirements for "Office Samples", and process transmittal forms for mock-ups to provide a record of activity.

F. Submittals Schedule: Refer to project Construction Schedule.

1.05 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit one copy of each submittal, unless otherwise indicated. Architect will not return copy.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification.

Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and Inspection Reports.
 - B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 - C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
 - D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 - F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 - F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
 - G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 - H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 - I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
 - J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.

7. Limitations of use.
- K. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect, except as required in "Action Submittals" Article. Retain copies at jobsite.
- T. Coordination Drawings: Submit when applicable and as required.
- 1.06 DELEGATED DESIGN
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit two copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional. When submitting for Concurrent Consultant Review, submit two copies to Consultant and one copy to Architect.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

3.02 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Reference the General Conditions for Architect's review responsibilities. Approval of a specific item does not indicate approval of an assembly of which the item is a component. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. **No Exceptions Taken**
No further review of submittal is required.
 - 2. **Revise and Resubmit**
Revise as noted; resubmit for review.
 - 3. **For Record Only**
For record or information purposes only.
 - 4. **Make Corrections Noted**
Incorporate corrections in work; resubmission is not required.
 - 5. **Rejected**
Submittal is not in compliance with Contract Documents.
 - 6. **Not Required for Review**
Submittal is not required by Contract Documents.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

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 general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Requirements:
 - 1. Section 31 10 00 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.
- B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line for trees with caliper of 8 inches or greater as measured at a height of 12 inches above the ground.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
 - b. Arborist's responsibilities.
 - c. Quality-control program.

- d. Coordination of Work and equipment movement with the locations of protection zones.
- e. Trenching by hand or with air spade within protection zones.
- f. Field quality control.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of the following:
 - 1. Organic Mulch: 1-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
- C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Species and size of tree.
 - 2. Location on site plan. Include unique identifier for each.
 - 3. Reason for pruning.
 - 4. Description of pruning to be performed.
 - 5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For arborist and tree service firm.
- B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- E. Quality-control program.

1.7 QUALITY ASSURANCE

- A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located.
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

- C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Moving or parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
 - 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 - 3. Color: Natural.
- C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
 - 1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with tie wires, hog ring ties, and other accessories for a complete fence system.
 - a. Height: 72 inches.

2. Gates: Single- swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 48 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to be removed. Flag each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
 1. Apply 2-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

3.3 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to A/E.
 2. Access Gates: Install where indicated; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

- B. Maintain protection zones free of weeds and trash.
- C. Mow grass within the protection zones.
- D. Maintain protection-zone fencing in good condition as acceptable to A/E and remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.
- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Do not paint cut root ends.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.

5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

- B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.
 - 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
 - 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
- B. Unless otherwise directed by arborist and acceptable to A/E, do not cut tree leaders.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Do not paint or apply sealants to wounds.
- E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.
- F. Chip removed branches and dispose of off-site.

3.7 REGRADING

- A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

- D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by A/E.

- 1. Submit details of proposed pruning and repairs.
- 2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
- 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by A/E.

- B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that A/E determines are incapable of restoring to normal growth pattern.

- 1. Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches or smaller in caliper size.
- 2. Large Trees: Provide one new tree of 4-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.

- a. Species: As selected by A/E.

- 3. Plant and maintain new trees as specified in Section 329300 "Plants."

- C. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch uniform thickness to remain.

- D. Soil Aeration: Where directed by A/E, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off University's property.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements of this Section apply to the Work of all other Sections.
- B. Section Includes:
 - 1. Transportation and Handling.
 - 2. Storage and Protection.
 - 3. Standards.
 - 4. Manufacturers and Types.
 - 5. Fabrications.
 - 6. Shop Priming.
 - 7. Prohibited Materials and Methods.

1.02 RELATED SECTIONS

- A. Cutting and Patching: Section 01 73 29.
- B. Shop Drawings, Product Data and Samples: Section 01 33 23.
- C. Execution Requirements: Section 01 73 00.

1.03 STANDARDS

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted otherwise herein.

1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules and installation, coordinate to avoid conflict with work and conditions at the site.
 - 1. Transport products by methods to avoid product damage.
 - 2. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 3. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

1.05 DELIVERY, HANDLING, STORAGE AND PROTECTION

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected. Reject damaged and defective items.
- B. Storage products in accordance with manufacturer's instructions.
 - 1. Store products with seals and labels intact and legible.
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store products subject to damage by the elements in weathertight enclosures.
 - 4. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- C. Exterior Storage

1. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious coverings. Provide adequate ventilation to avoid condensation.
 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign materials.
 3. Store foam plastic away from exposure to sunlight, except to extent necessary for period of installation and concealment.
- D. Arrange storage in a manner to provide access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage.
- E. Protection After Installation: Provide coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Products include materials, equipment and systems.
- B. Products incorporated into the work:
1. Comply with specifications and referenced standards as minimum requirements.
 2. Undamaged.
 2. Manufactured and fabricated products:
 - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing by the Architect.
 4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
 5. New and unused at time of installation, except as otherwise indicated.
 6. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 7. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2.02 MANUFACTURER AND PRODUCT SELECTION PROCEDURES

- A. Specified Product: Where specifications name a single manufacturer and product or refer to a single manufacturer and product indicated on the drawings, provide the named product. Comparable products or substitutions for Contractor's convenience will not be considered.
- B. Specified Manufacturer: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- C. Multiple Specified Products: Where more than one manufacturer and specific product is listed, provide one of the products named. No substitutions will be permitted after signing the contract. Comparable products or substitutions for Contractor's convenience will not be considered
- D. Multiple Manufacturers: Where specifications include a list of manufacturers names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- E. Basis of Design: Where specifications name a Basis of Design or refer to a Basis of Design product indicated on the drawings, the design is based on the product listed. Subject to compliance with requirements, provide the specified product or a product manufactured by one of the other manufacturers listed.
 - 1. The characteristics of the Basis-of-Design Product establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
 - 2. Equipment or materials from these manufacturers will be acceptable contingent upon their meeting the design, appearance and functional standards established by the specified items. If equipment or a material of an acceptable manufacturer requires changes; electrically, mechanically, structurally, from what is indicated on the drawings, it shall be the responsibility of the Contractor requiring such change, to pay all costs involved with no additional costs to the Owner.
 - 3. Submit evaluations as follows:
 - a. Submit proposed comparable products for evaluation by the Architect at least two weeks prior to awarding contract to the manufacturer of a comparable product.
 - b. Obtain samples of Basis-of-Design product.
 - c. Select comparable products that comply with the characteristics specified. Submit evidence demonstrating compliance.

- d. Submit samples of comparable products displayed side-by-side with samples of Basis-of-Design products.

Architect will determine whether the proposed comparable product is acceptable. Architect is not obligated to prove non-equivalence of proposed comparable products.

- F. Where a performance is specified and no manufacturer is listed, submit through the Shop Drawing procedure the name of the manufacturer, the product proposed, and detailed information showing its characteristics. Such proposal shall meet or exceed the specification, line item by line item, or be rejected.
- G. Equivalent components (articles, devices, materials, forms of construction, fixtures, etc.) may be submitted to the Architect for approval prior to bidding regardless of listed manufacturers.
- H. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.03 CONFLICTING REQUIREMENTS

- A. Documents: If documents state 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 A/E for a decision before proceeding.

2.04 FABRICATION

- A. Fabricate all items in the shop insofar as practicable. Where items cannot be completely shop fabricated and assembled for shipment, assemble and fit in shop, disassemble and ship. Identify parts for field assembly.
- B. Fabricate items to be straight, square, in proper alignment, and with hairline joints where joints are necessary and permitted. Pre-plan field joints to be as inconspicuous as possible; coordinate locations with Architect.

2.05 SHOP PRIMING

- A. Shop prime or seal surfaces of all products to receive paint materials in accordance with the requirements of Section 09 91 00.
- B. Apply a primer or sealer compatible with the specified paint materials.
- C. In the event such a primer is determined to be incompatible with the specified finish paint system, provide a barrier coat or remove the primer and reprime as directed, at no additional cost to the Owner.

2.06 PROHIBITED MATERIALS AND METHODS

A. The following items are expressly prohibited:

1. Attachment Related Items
 - a. Powder Fasteners: Powder fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Powder fasteners prohibited for the following conditions:
 - 1) Attachment of structural members.
 - 2) Where public may be endangered by misuse.
 - b. Plug anchorage by use of wood, lead or plastic.
 - c. Perforated steel strap iron for pipe or other support or anchorage.
 - d. Suspension systems that are not independently supported.
 - 1) Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa.
 - 2) Each utility system and the ceiling system shall be a separate installation, each independently supported from the building structure.
 - 3) Where interference occurs, provide trapeze type hangers or other suitable supports for each system.
 - 4) Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing.
2. Methods Related Items
 - a. The penetration of floors and walls by pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials.
 - b. The use of ink marking pens on surfaces of any kind of materials receiving paint or other finish in exposed location.
3. Materials Related Items
 - a. Asbestos or asbestos containing materials.
 - b. Barbed wire in construction fencing.
 - c. Water soluble treatment of insulation jackets or facings, to impede or retard smoke or flames.
4. Earthwork Related Items
 - a. Use of explosives is prohibited.
 - b. Grits as backfill material.
5. Masonry Related Items
 - a. Chicken wire type masonry reinforcing.
 - b. Cinder block.
 - c. Muriatic acid.
6. Door Related Items
 - a. Thresholds raised more than 1/2" at doors indicated as wheel chair accessible.
7. Roofing Related Items
 - a. Dead level roofs. All roofs must slope to drain.
 - b. Pitch pans or pitch pockets.

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 01 73 00

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements of this Section apply to the Work of all other Sections.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Section Includes:
 - 1. Examination of Substrate.
 - 2. Preparation.
 - 3. Installation.
 - 4. Workmanship.
 - 5. Protection.
 - 6. Overhead Attachments.
 - 7. Prohibited Methods.

1.02 RELATED SECTIONS

- A. Cutting and Patching: Section 01 73 29.
- B. Shop Drawings, Product Data and Samples: Section 01 33 23.
- C. Product Requirements: Section 01 60 00.

1.03 STANDARDS

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published

trade and manufacturer's association standards, unless specifically noted otherwise herein.

1.05 NON-CONFORMING WORK

- A. Faulty work or work not in conformance with the Contract Documents will not be permitted by the Architect.
 - 1. It is the responsibility of the Contractor to propose a remedy by means of detailed drawings and written documentation and submit such documentation to the Architect for comments.
 - 2. All costs for the removal and reconstruction of such work, as well as additional services of the Architect, shall be paid for by the Contractor.

PART 2 PRODUCTS - NOT APPLICABLE

PART 3 EXECUTION

3.01 EXAMINATION OF SUBSTRATE

- A. Examine the substrates or structure to which a product is to be applied or installed. Do not proceed until unsatisfactory conditions have been corrected. Starting the work indicates acceptance of conditions and the installer assumes full responsibility for results.
- B. Check the substrate or structure for proper tolerances and clearances. Tolerances are listed under individual specification Sections.

3.02 PREPARATION

- A. Substrate: Where the products are applied to a substrate, prepare the substrate as recommended by the product manufacturer. That generally includes the following:
 - 1. Bringing substrate to a uniform surface by smoothing uneven surfaces and filling holes, cracks and depressions with recommended filler or compatible type material.
 - 2. Depressed Slabs: Bring to required elevation to receive finished materials where finished materials cannot completely fill depression. Use approved cementitious filler or compatible type material. Coordinate depressed slab locations with finish material locations.
 - 3. Remove substances such as dust, oils and other foreign matter, not compatible with the product.
 - 4. Surfaces shall be dry, unless moisture content or wetting requirement is specified or recommended.
- B. Concrete Slabs: Provide steel shot abrasive cleaning of concrete slabs receiving designated finish flooring materials.

1. Designated Finish Flooring Materials
 - a. Cementitious or cementitious set materials.
 - b. Sheet flooring materials.
 - c. Waterproofing materials.
 - d. Paint materials.
 - e. Polymer or epoxy type seamless flooring.
2. Equipment: Electric powered portable unit with self-contained dust collection system. Size(s) of unit(s) and shot media suitable for conditions and proposed finish materials.
3. Cleaning: Remove concrete surfaces to sufficient depth to remove bond breakers and contaminants such as curing compounds, oils, and other foreign matter which may be detrimental to the completed flooring installation.
 - a. Work smoothly and evenly over entire surface; avoid creating dips, ridges, or other imperfections which would show or telegraph in the completed installation.
 - b. Small transitions for different flooring materials may be obtained by multiple passes if carefully executed to create smooth even slope of not more than 1/8" in 2 feet.
4. Clean floor as near as possible to flooring installation to avoid contamination from work of other trades. Protect clean floor from soiling with suitable sheet materials. Reclean soiled areas.

C. Inserts and Anchorages

1. Anchorages where not detailed are the responsibility of the installer to design a suitable connection, structurally sound, and aesthetically acceptable to the Architect. Furnish calculations, drawings and product data when requested by the Architect. Such information may or may not be returned as indicated in Section 01 33 23.
2. It is the responsibility of the installer to furnish built-in fastening devices for his/her product to the proper trade for installation as the work proceeds.
3. In the event such devices are not furnished in time to be built-in, it is the installer's responsibility to provide other methods for attaching their product. Submit drawings and other required data to the Architect.

D. Templates: Provide templates, diagrams and other coordinating documents to the proper Contractor, manufacturer or supplier of related items affecting the Work.

E. Dimensions

1. If the exact location of an item is not indicated by dimension on the Drawings or noted in the Specifications, the Architect reserves the right to determine such location in the field prior to roughing-in.
2. If the exact dimensions of a product are not indicated, the Architect reserves the right to determine dimensions prior to the ordering or fabrication of a product.
3. Such dimensional changes shall not be a basis for changes in the Contract Sum.

4. Where miscellaneous devices, such as thermostats, switches, controls, grilles, pipes, or outlets of any nature are not specifically located by the Contract Documents, request such location or obtain approval of the location prior to installation. If approval has not been obtained, the Architect may direct the relocation of such devices at the expense of the installer.

3.03 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - a. Where pipes occur in partitions, furred-out spaces and chases, determine exact location and size and fit entirely concealed into allotted space. Report conflicts to Architect prior to installation.
 - b. Where two or more pipes are to be installed in parallel, or parallel to the piping of other trades, the piping shall be installed with sufficient space between the pipes to allow for the proper application of pipe covering, painting, and servicing.
 - c. Furnish advance information on locations and sizes of frames, boxes, sleeves and openings needed for the Work to installers.
 4. Install work to allow for installation of future work identified on drawings.
 5. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Install products in accordance with manufacturer's recommendations or the requirements of trade associations, listed standards, Shop Drawings and Contract Documents.
- C. If a conflict exists between these references, the most strict requirements govern. If printed instructions are not available, consult with the manufacturer or the manufacturer's field representative, where applicable.
- D. Provide hangers, auxiliary framing, and other means for installing ceiling suspension systems, lighting fixtures, diffusers, and other equipment in ceilings to avoid ductwork, piping, etc.
 1. Suspend from structural members (i.e. joists, beams, etc.), and not from ductwork or piping.
 2. Provide supplemental framing members (i.e. angles, tubes, light gage steel framing, etc.) to span between structural members where required to support items of this paragraph C.
- E. Install work that will not interfere with the proper installation of the Work of other

trades.

- F. Install work in a manner to facilitate operating, servicing and repairing.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.04 SPACE PREFERENCE

- A. Carefully check and coordinate the location and level of all Work to avoid conflicts between all contractors. Where conflicts occur, the following preferences shall generally govern:
 - 1. Recessed electrical light fixtures
 - 2. High and medium pressure ductwork
 - 3. Low pressure ductwork
 - 4. Soil, waste, vent and storm piping
 - 5. Sprinkler piping
 - 6. Liquid heat transfer and refrigerant piping
 - 7. Domestic water piping
 - 8. Electrical conduits from branch circuits
- B. However, no ductwork or liquid heat transfer main shall have preference over plumbing piping below plumbing fixtures, nor over electrical conduits above or below electrical switchgear and panels. No piping conveying liquids shall be installed directly over electrical or elevator equipment. No piping shall be installed in electrical or elevator equipment rooms.
- C. Where headroom or space conditions resulting from application of these preferences appear inadequate, notify the Architect prior to installing the Work.
- D. Coordinate the mounting heights of busways, electrical equipment and raceways to clear the opening heights of doors, the height of vehicles and the heights of equipment which needs to be routinely removed, and out of paths required for maintenance.

3.05 WORKMANSHIP

- A. Install products straight, plumb, level and in line. Securely attach items to the substrate, using recommended adhesives, mechanical fasteners or other devices. Where holes are provided for attachment, do not field drill or cut new holes without the approval of the Architect.

- B. Where applicable, match finished work to the approved samples or mock-ups.
- C. Conceal fasteners wherever possible, unless exposed fasteners are permitted or specified.
- D. Weld in accordance with AWS standards; comply with AWS for qualifications of operators and for workmanship.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.

3.06 PROTECTION

- A. Protect finished surfaces of product being installed and surrounding products from damage during installation. Provide protective devices as required and as recommended by the manufacturer. Cover work subject to damage at the end of each day's work.
- B. Coat concealed surfaces of metal products with a bituminous or other approved coating to prevent contact between dissimilar metals or other material which can cause deterioration.
- C. Correct damage by repairing or replacing as directed by the Architect. Repairing will be permitted only where the repair is undetectable and does not cause structural damage or interfere with proper functioning of the part.
- D. Protect finish of installed products until Substantial Completion of the Project by use of wrappings, covers or other approved protective devices. Remove such protection immediately prior to final cleaning.
- E. Limiting Exposures: Coordinate and supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Maintain exposures within the manufacturers recommended limits. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading
 - 2. Excessive internal or external pressure
 - 3. Excessive 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
29. Theft
30. Vandalism

F. Take precautions to protect existing concrete and asphalt pavement from damage due to vehicle loads, parking, and storage.

1. Schedule loading to minimize pavement material consolidation during hot weather. Distribute wheel loads to the greatest extent possible.

3.07 OVERHEAD ATTACHMENTS

A. Where overhead hangers are required, and not indicated on the drawings, provide one or more of the following as required:

1. Concrete inserts prior to placement of concrete or drilled type inserts after concrete is placed.
2. Trapeze from adjacent structure with suitable steel framing.
3. Connections to Structure: Suitable anchorage devices with a minimum load carrying capacity of 250 pounds plus safety factor of 4:1 for the applied load.
 - a. Concrete: Steel expansion anchors. See Prohibited Material and Methods specified in Section 01 60 00.
 - b. Steel: Bolted or welded connections to steel structure.

B. Where metal deck is furnished with hanger tabs or similar devices, applied total load, including work of other trades, not to exceed 75 pounds for each device. Loads in excess of permitted limit to be supported by trapeze framing as specified above.

C. Verify support requirements of heavy or unusual loads not specifically shown on drawings with Architect.

3.08 OPERATION AND MAINTENANCE

- A. Contractor shall maintain all systems and equipment operated during construction. The contractor responsible for the installation of the system shall operate and maintain it. Make all repairs and perform all maintenance to assure Work is turned-over to Owner in first class condition.
- B. Maintenance work includes:
 - 1. Lubrication
 - 2. Adjustments
 - 3. Filter replacements
 - 4. Chemical treatment.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Execute cutting, fitting or patching of Work, required to:
 - 1. Make several parts fit properly.
 - 2. Uncover Work to provide for installation of ill-timed Work.
 - 3. Remove and replace defective Work.
 - 4. Remove and replace Work not conforming to requirements of Contract Documents.
 - 5. Remove samples of installed Work as specified for testing.
 - 6. Install specified Work in existing construction.
- B. In addition to contract requirements, upon written instructions of Architect:
 - 1. Uncover Work to provide for Architect's observation of covered Work.
 - 2. Remove samples of installed materials for testing.
 - 3. Remove Work to provide for alteration of existing Work.
- C. Do not endanger any Work by cutting or altering Work or any part of it.

1.02 SUBMITTALS

- A. Prior to cutting which affects structural safety of Project, submit written notice to Architect, requesting consent to proceed with cutting, including:
 - 1. Identification of Project.
 - 2. Description of Affected Work.
 - 3. Necessity for cutting.
 - 4. Affect on other Work, on structural integrity of Project.
 - 5. Description of proposed Work. Designate:
 - a. Scope of cutting and patching.
 - b. Contractor and trades to execute work.
 - c. Products proposed to be used.
 - d. Extent of refinishing.
 - 6. Alternative to cutting and patching.
- B. Should conditions of Work, or schedule indicate change of materials or methods, submit written recommendation to Architect, including:
 - 1. Conditions indicating change.
 - 2. Recommendations for alternative materials or methods.

3. Submittals as required for Substitutions.

- C. Submit written notice to Architect, designating time Work will be uncovered, to provide observation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match adjacent surfaces and proper materials shall be provided accordingly.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching.
- B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide shoring, bracing and support as required to maintain structural integrity of Project.
- B. Provide protection for other portions of the Project, including all Contractors' personnel.

3.03 PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes.
- B. Execute cutting and demolition by method which will prevent damage to other Work, and will provide surface to receive installation of repairs and new Work.
1. No cutting shall be performed which will, in any way, reduce the structural strength of the building. Should such cutting be necessary, consult Architect and do not proceed with such operation unless written approval is given.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- C. Restore Work which has been cut or removed; install new products to provide

completed Work in accord with requirements of Contract Documents.

- D. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match existing or adjacent surfaces and proper materials shall be provided accordingly.
 - 1. Wherever existing walls, floors, ceilings, etc., are cut, the exposed surfaces must be neatly finished by patching, painting, wall covering, etc., as required to blend patched areas into adjacent existing surfaces. Patched areas shall not be visible when viewing entire wall surface.
 - a. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 2. Where painting or finishing of patched surfaces or application of wall or floor covering is required, finish the entire plane of surface in which patched area occurs.
 - 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.04 SLEEVES AND OPENINGS

- A. Where pipes, conduits, ductwork or other materials pass through new walls, partitions, floors, roof or ceilings, provide suitable sleeves in these elements or provide openings where sleeves are not practical.
- B. Close sleeves and openings to prevent passage of smoke or fire using approved methods and materials to maintain the fire rating of the construction being penetrated. See Section 07 84 00.
- C. Where pipes, conduit, ductwork etc., pass through, behind, or above existing construction, provide all cutting, patching, and refinishing for doing this work as specified herein.
- D. Lintels: Provide steel or precast concrete lintels to span openings in masonry walls sized in accordance with schedule shown or as detailed on structural drawings. In general, lintels are not required for openings less than the width of masonry unit in which wall is being constructed. Penetrations under beams or other concentrated loads require approval of Architect.

3.05 CLEANING

- A. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Execute cleaning, during progress of the work and at completion of the work, as required by Contract Documents.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.

1.02 RELATED SECTIONS

- A. Cutting and Patching: Section 01 73 29.
- B. Cleaning for Specific Products or Work: Specification section for the work.

1.03 CLEANING AND DISPOSAL REQUIREMENTS

- A. Standards: Maintain project in accord with the following safety and insurance standards:
 - 1. Applicable Federal and State Requirements.
 - 2. National Fire Protection Association.
- B. Hazards Control: Each Prime Contractor shall comply with the following requirements:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary sewers.
 - 3. Do not dispose of waste into streams or waterways.
 - 4. Wet down dry materials and rubbish to prevent dust.
- D. Clean streets, highways, and private properties of all mud, earth, rubbish, rocks,

refuse or other debris of any kind resulting from such work or related transportation to and from the work site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Select and use cleaning materials and equipment with care to avoid scratching, marring, defacing, staining or discoloring surfaces cleaned.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
- C. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. Provide, maintain and empty 55 gallon metal and dumpster type containers for collection of waste materials, debris and rubbish. Locate containers as directed by Architect.
 - 1. Provide containers with adequate capacity to accommodate anticipated needs. If containers do not have adequate capacity, increase intervals of waste removal or capacity of containers until adequate capacity is provided.
- C. At reasonable intervals during progress of Work, but in no case less than once a week, dispose of waste materials, debris and rubbish.
- D. Site: Maintain Project site free of waste materials and debris.
- E. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

- F. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- G. Direct Special Attention To:
 - 1. Provide non-staining layout lines and other markings on masonry and concrete. Use chalk lines wherever possible and remove when no longer needed.
 - 2. Remove all stains from concrete surfaces, including floors.
 - 3. Shop marks shall not appear on exposed surfaces of any item.
 - 4. Remove concrete, mortar and paint spatters.
 - 5. Clean both brick and concrete unit masonry.
 - 6. Protect aluminum frames during construction and thoroughly clean upon completion of the installation.
- H. Clean interior surfaces before start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- I. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- J. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- K. Vacuum interior building areas where work is performed prior to painting and other finish work. Continue vacuum cleaning on an as needed basis until building is ready for occupancy.
- L. Protect interior of ductwork during construction from accumulation of dirt, dust or debris.
- M. Clean trash from all chases and concealed spaces before final enclosure.

3.02 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - 1. Leave Project clean and ready for occupancy.
- B. Employ experienced workmen, or professional cleaners for final cleaning.
- C. At the completion of the work, remove all surplus material, false work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from their operations and put the site in a neat and orderly

condition.

- D. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
- E. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- F. Sweep concrete floors broom clean in unoccupied spaces.
- G. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- H. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces, including light fixtures and lenses; polish surfaces so designated to a shine finish.
 - 1. Clean finishes free of dust, stains, films and other foreign substances.
 - 2. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- I. Remove temporary protection and labels not required to remain
- J. Clean surfaces of equipment; remove excess lubrication.
- K. Remove debris, rubbish, dirt, etc. from open concealed spaces, chases and above ceilings.
- L. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- M. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- N. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- O. Clean plumbing fixtures to a sanitary condition.
- P. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
- Q. Clean light fixtures and lamps; polish lenses.

- R. Clean dirt and debris from interior of all electrical panels and user accessible electrical enclosure boxes prior to installation of covers or in the case of hinged access doors, before final cleaning of adjacent space. Clean the exterior surfaces of all switchgear located in Mechanical and Electrical Rooms and spaces.
- S. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- T. Clean dirt and dust from interior of air handling units before installing final filters. Wipe down the exterior surfaces of all HVAC equipment located in Mechanical Rooms and spaces.
 - 1. Exposed painted ductwork to be brushed clean of dust.
- U. Site/Exterior Items: Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - 1. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - 2. Rake grounds that are neither planted nor paved to a smooth, even textured surface.
 - 3. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - 4. Clean exposed hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.
- V. Maintain cleaning until Final Completion.
- W. Prior to Final Completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

END OF SECTION

SECTION 01 77 00
PROJECT CLOSEOUT

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Related Requirements
 - 1. Fiscal Provisions, Legal Submittals and Additional Administrative Requirements: Conditions of the Contract.
 - 2. Operating and Maintenance Data: The respective specification sections.
 - 3. Warranties and Bonds: The respective specification sections.
 - 4. Close-out Submittals Required of Contractor: The respective specification sections.

1.02 SUBSTANTIAL COMPLETION

- A. When Contractor considers the work to be substantially complete, he shall submit to the Architect:
 - 1. A written notice that the work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the Architect will make an inspection to determine the status of completion.
- C. Should the Architect determine that the work is not substantially complete:
 - 1. Architect will promptly notify the Contractor in writing, giving the reasons therefore.
 - 2. Contractor shall remedy the deficiencies in the work, and send a second written notice of substantial completion to the Architect.
 - 3. Architect will re-inspect the work.
- D. When the Architect concurs that the work is substantially complete, he will:
 - 1. Prepare a Certificate of Substantial Completion on AIA Form G 704,

accompanied by Contractor's list of items to be completed or corrected as verified and amended by the Architect.

2. Submit the Certificates to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.03 FINAL INSPECTION/COMPLETION

- A. When a Contractor considers the work is complete, he shall submit written certification that:
 1. Contract Documents have been reviewed.
 2. Work has been inspected for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 5. Work is completed and ready for final inspection.
- B. Submit certified copy of Owner and Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner and Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- C. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- D. Should Architect consider that the work is incomplete or defective:
 1. Architect will promptly notify the Contractor, in writing, listing the incomplete or defective work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the work is complete.
 3. Architect will reinspect the work.
- E. When the Architect finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF electronic file.

1.05 CLOSE-OUT SUBMITTALS

- A. Evidence of compliance with requirements of governing authorities:
 1. Certificate of Occupancy
 2. Certificates of Inspection
 - a. Plumbing
 - b. Fire Protection
 - c. HVAC
 - d. Electrical
 - e. Health Department
- B. Project Record Documents: To requirements of Section 01 78 39.
- C. Warranties: To requirements of respective Specification Sections.
 1. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of final acceptance of the work or substantial completion is indicated.
 2. Partial Occupancy: Submit properly executed warranties of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
 3. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - a. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - b. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - c. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Provide additional copies of each warranty to include in operation and maintenance manuals.
- D. Final Commissioning Documentation:

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under contract.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Instruct Owner's designated personnel in the maintenance of products and in the operation of equipment and systems.
- C. Related Requirements
 - 1. Each respective section of specifications listing operating and maintenance data requested for specific products.
 - 2. Division 22: Additional Plumbing requirements.
 - 3. Division 23: Additional HVAC requirements.
 - 3. Division 26: Additional Electrical requirements.

1.02 QUALITY ASSURANCE

- A. Preparation of data shall be performed by personnel:
 - 1. Trained and experienced in maintenance and operation of described product.
 - 2. Skilled to extent required to communicate essential written data and prepare required drawings.

1.03 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.

1.04 CONTENT OF MANUAL

- A. Title Page: Identify title of project, address, date of submittal, name, address and telephone number of Contractor and Architect.
- B. Table of Contents: Typewritten list of each product or system required to be included.

C. Product Data

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:
 - a. Clearly identify the specific product or part installed.
 - b. Clearly identify the data applicable to the installation.
 - c. Delete references to inapplicable information.

D. Drawings

1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
3. Do not use Project Record Documents as maintenance drawings.

E. Written text, as required to supplement product data for the particular installation:

1. Organize in a consistent format under separate headings for different procedures.
2. Provide a logical sequence of instructions for each procedure.

F. Copy of each warranty, bond, and service contract issued.

G. Provide information sheet for Owner's personnel giving:

1. Proper procedures in the event of failure.
2. Instances which might affect the validity of warranties or bonds.

1.05 MANUAL FOR MATERIALS AND FINISHES

A. Content for architectural products, applied materials, and finishes:

1. Manufacturer's data, giving full information on products.
2. Catalog number, size, composition.
3. Color and texture designations.
4. Information required for reordering specially manufactured products.
5. Instructions for care and maintenance.
6. Manufacturer's recommendation for types of cleaning agents and methods.
7. Cautions against cleaning agents and methods which are detrimental to the product.
8. Recommended schedule for cleaning and maintenance.
9. Housekeeping Manuals containing manufacturer's recommended cleaning practices for vinyl wallcoverings, painted surfaces and all floor finishes.

C. Content for moisture protection and weather exposed products:

1. Manufacturer's data, giving full information on products.

2. Applicable standards.
 3. Chemical composition.
 4. Details of installation.
- D. Instructions for inspection, maintenance and repair.
- E. Additional requirements for maintenance data: The respective sections of Specifications.
- F. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials, as applicable:
1. Metal fabrications.
 2. Waterproofing.
 3. Roofing.
 4. Flashing and sheet metal.
 5. Roof accessories.
 6. Joint sealants.
 7. Doors and frames.
 8. Windows.
 9. Hardware.
 10. Glazing.
 11. All finish materials.
 12. Toilet partitions.
 13. Toilet accessories.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Content for each unit of equipment and system, as appropriate:
1. Description of unit and component parts.
 2. Function, normal operating characteristics, and limiting conditions.
 3. Performance curves, engineering data, and tests.
 4. Complete nomenclature and commercial number of all replaceable parts.
- B. Operating Procedures
1. Start-up, break-in, routine and normal operating instructions.
 2. Regulation, control, stopping, shutdown, and emergency instructions.
 3. Summer and winter operating instructions.
 4. Special operating instructions.
- C. Maintenance Procedures
1. Routine operations.
 2. Guide to "troubleshooting."
 3. Disassembly, repair, and reassembly.
 4. Alignment, adjusting, and checking.

- D. Servicing and lubrication schedule.
 - 1. List of lubricants required.
- E. Manufacturer's printed operating and maintenance instructions.
- F. Description of sequence of operation by control manufacturer.
- G. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams, required for maintenance.
 - 1. Predicted life of parts subject to wear.
 - 2. Items recommended to be stocked as spare parts.
- H. As-installed control diagrams by controls manufacturer.
- J. Coordination drawings.
 - 1. As-installed color coded piping diagrams.
- K. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- L. Other data as required under pertinent sections of Specifications.
- M. Content for each electrical and electronic system, as appropriate:
 - 1. Description of system and component parts.
 - 2. Function, normal operating characteristics and limiting conditions.
 - 3. Performance curves, engineering data, and tests.
 - 4. Complete nomenclature and commercial number of replaceable parts.
 - 5. Circuit directories of panelboards.
 - 6. Electrical service.
 - 7. Controls.
 - 8. Communications.
 - 9. As-installed color-coded wiring diagrams.
 - 10. Operating schedules
 - a. Routine and normal operating instructions
 - b. Sequences required.
 - c. Special operating instructions.
 - 11. Maintenance procedures
 - a. Routine operations.
 - b. Guide to "troubleshooting."
 - c. Disassembly, repair, and reassembly.
 - d. Adjustment and checking.
 - 12. Manufacturer's printed operating and maintenance instructions.
 - 13. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 - 14. Other data as required under pertinent sections of Specifications.

- N. Prepare and include additional data when the need for such data becomes apparent during the instruction of Owner's personnel.
- O. Additional requirements for operating and maintenance data: The respective sections of Specifications.
- P. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials:
 - 1. Drainage systems.
 - 2. Plumbing systems.
 - 3. Domestic water conditioners.
 - 4. Fire protection.
 - 5. Power or heat generation.
 - 6. Air distribution.
 - 7. Controls and instrumentation.
 - 8. Motors.
 - 9. Power generation and transmission.
 - 10. Service and distribution.
 - 11. Lighting.
 - 12. Special systems.
 - 13. Communications.
 - 14. Chemical Treatment.

1.07 SUBMITTAL SCHEDULE

- A. Submit one copy of completed data in final form before final inspection and acceptance.

1.08 INSTRUCTION OF OWNER'S PERSONNEL

- A. Before final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
- C. Review contents of manual with personnel in full detail to explain all aspects of operation and maintenance.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 GENERAL

- A. Provide Project Record Documents.
 - 1. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.
- B. Contractor: Maintain at the site one record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Order and other modifications to the Contract.
 - 5. Architect's field orders or written instructions.
 - 6. Approved shop drawings, product data and samples.
 - 7. Field test records.
 - 8. Approved permit sets.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secured storage space for storage of samples.
- B. File documents and samples in accordance with the table of contents of the Project Manual.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection ~~by the Architect.~~

1.03 MARKING DEVICES

- A. Provide colored marking pens for recording information in the color code designated by Architect.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat printed letters.
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction.
 - 1. Depths of various elements of foundation in relation to finish first floor datum.
 - 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 4. Field changes of dimension and detail.
 - 5. Changes made by Field Order or by Change Order.
 - 6. Details not on original contract drawings.
- D. Specifications and Addenda: Legibly mark each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Field Order or by Change Order.

1.05 SUBMITTAL

- A. At Contract close-out, deliver Record Documents to Architect for submission to the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. Title and number of each Record Document.
 - 5. Signature of Contractor or his authorized representative.

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.
- B. These requirements supplement the Owner/Contractor General Conditions. Refer to General Conditions for additional and/or similar requirements. Notify the Architect if any conflicting requirements are evident.

1.02 RELATED SECTIONS

- A. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.03 SUBMITTALS

- A. Instruction Program: Submit instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit one complete training manual(s) for Owner's use.

1.04 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

1.05 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 PRODUCTS

2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections as applicable, and as follows:
 - 1. Motorized doors, including overhead coiling doors and automatic entrance doors.
 - 2. Fire-protection systems, including fire alarm fire pumps and fire-extinguishing systems.
 - 3. Medical equipment.
 - 4. Laboratory equipment, including laboratory equipment and piping.
 - 5. Heat generation, including boilers, feedwater equipment, pumps and water distribution piping.
 - 6. Refrigeration systems, including chillers, condensers, pumps, and distribution piping.
 - 7. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices
 - 8. HVAC instrumentation and controls.
 - 9. Electrical service and distribution, including transformers, switchboards, panelboards, and uninterruptible power supplies.
 - 10. Packaged engine generators, including transfer switches.
 - 11. Lighting equipment and controls.
 - 12. Telecommunications Systems, including voice / data, wireless access points and cable television.
 - 13. Audiovisual Systems, including Audiovisual System and Public Address equipment.
 - 14. Security Systems, including Access Control System, Video Surveillance System, Intrusion Detection System, Wired Duress System, Wireless Duress System and Intercom equipment.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.

- g. Limiting conditions.
- h. Performance curves.
- 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
- 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside normal operating Limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.01 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Owner will furnish Contractor with names and positions of participants.
 2. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - a. Schedule training with Owner with at least seven days' advance notice.
 - b. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The extent of demolition work is indicated on drawings, and includes, but is not necessarily limited to, the following:
 - 1. Selective breaking up, dismantling and/or removal of existing site work items.
 - 2. Cutting and patching.
 - 3. Clean up.
- B. Additional Plumbing, HVAC and Electrical demolition information is specified in Divisions 22, 23 and 26.

1.02 PROJECT CONDITIONS

- A. The Owner assumes no responsibility for actual condition of items to be removed.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.
 - 2. It is solely the Contractor's responsibility to determine demolition procedure and sequence and to insure the safety adjacent items designated to remain during demolition. This includes the addition of whatever shoring, sheeting, temporary bracing, guys or tie-downs which might be necessary. Such material shall maintain the Contractor's property after completion of the project.
 - 3. It is solely the Contractor's responsibility to follow all applicable safety codes and regulations during all phases of the work.
- B. Coordination
 - 1. Demolition sequence, phasing and methods must be approved by Architect prior to start of demolition work.
 - 2. Coordinate shoring with structural modifications. Shoring to be left in place until completion of structural work permits it's removal.
- C. Title to Removed Property
 - 1. All removal items, unless otherwise indicated for salvage or reuse will become the property of the Contractor and shall be removed from the Site. During the demolition operations, Owner reserves the right to add to, or delete from, the list of items designated for reuse or salvage.

- D. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- E. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
- F. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
- G. Utility Services
 - 1. Locate and identify electrical and mechanical services passing through or located within affected area and serving areas outside the work limits.
 - 2. Maintain existing utilities and protect against damage during demolition operations.
 - 3. Notify corporations, companies, individuals and local authorities owning conduits running to property. Arrange for removal of wires running to and on property. Remove pipes and sewers in accordance with instructions of above Owners.
 - 4. Protect and maintain conduits, drains, sewers, pipes and wires that are to remain on the property.
 - 5. Shut-off Active Utilities
 - a. Where existing utilities are to be permanently abandoned, shut-off and cap or arrange with proper utility company for shut-off.
 - b. Where existing utilities are to be rerouted: Where utilities remaining in service interfere with demolition or future construction, shut-off, disconnect, remove, relocate and reconnect as indicated or as required.
 - 6. Shut-down periods
 - a. Arrange timing of shut-down periods of all in-service utilities with the Owner. Do not shut down any utility without prior written approval.
 - b. Keep shut-down period to a minimum or use intermittent period as directed.
 - c. Some shut-down hours may be required after normal working hours. No extra compensation will be made for Work after normal working hours, weekends or holidays.
- H. Explosives: Not permitted.
- I. Scheduling: Conduct work so as to avoid interference with adjacent residents
- J. Permits, Fees and Inspections: Obtain and pay for all permits, fees and inspections

required by governing authorities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Materials (For filling voids resulting from demolition operations): See Section 31 00 00, Earthwork.
- B. Shoring Materials: As determined by Contractor.

PART 3 EXECUTION

3.01 PROTECTION

- A. Use water sprinkling, temporary enclosures and other approved methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, pollution and electrical shock.
 - 2. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations, as directed by the Architect. Return adjacent areas to conditions existing prior to the start of the work.
- B. In removal of existing materials, take care not to damage work remaining in place, salvageable materials or equipment. Repair or replace any existing construction, materials or equipment damaged during demolition to Owner's satisfaction at no additional cost.

3.02 DEMOLITION

- A. Site Items
 - 1. General
 - a. Items specified herein or indicated on drawings.
 - b. Miscellaneous Items: Material or equipment encountered during construction which must be removed to aid in construction operations or that which will not be used in completed facilities.
 - 2. Concrete: Where cut line will be exposed in the finished work and where physically feasible, make edges by saw cutting.
 - 3. Asphalt: Where cut line will be exposed in the finished work or where new asphalt is placed contiguous with existing asphalt, existing asphalt edge shall be saw cut to provide vertical surface.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Remove from site, debris, rubbish and other materials resulting from demolition operations that is not permitted as fill material as determined by

Geotechnical Engineer.

1. Burning of removed materials from demolished structures will not be permitted on site.
- B. Removal: Transport materials removed and dispose of off site.
- C. Clean Up
1. Leave exterior areas "rake clean."
 2. Remove barricades as directed.
 3. Remove shoring.

END OF SECTION

SECTION 02 41 19

SELECTIVE BUILDING DEMOLITION

PART 1 GENERAL

1.01 SUMMARY OF WORK

- A. Work Included: The extent of demolition work is indicated on drawings, and includes, but is not necessarily limited to, the following:
 - 1. Selective breaking up, dismantling and/or removal of existing building items.
 - 2. Salvage of selected existing materials to be turned over to Owner as may be determined by the Owner or to be reused in the project.
 - 3. Cutting and patching.
 - 4. Clean up.
- B. Removal of asbestos and other hazardous materials is not a part of this Contract. If asbestos or other hazardous materials are encountered during demolition, Contractor shall halt demolition operations in that area and notify Architect.

1.02 RELATED SECTIONS

- A. Cutting and Patching: Section 01 73 29.
- B. Selective Site Demolition: Section 02 41 13.

1.03 PROJECT CONDITIONS

- A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, variations within the structure may occur by Owner's removal and salvage operations prior to the start of the Demolition work.
 - 2. It is solely the Contractor's responsibility to determine demolition procedure and sequence and to insure the safety of the building and its component parts during demolition. This includes the addition of whatever shoring, sheeting, temporary bracing, guys or tie-downs which might be necessary. Such material shall maintain the Contractor's property after completion of the project.
 - 3. It is solely the Contractor's responsibility to follow all applicable safety codes and regulations during all phases of the work.
 - 4. Existing Building: Provide temporary supports and other measures as required to prevent damage to the existing building during construction.

Field verify all existing dimensions which affect the new construction.

B. Coordination

1. Demolition sequence, phasing and methods must be approved by Architect prior to start of demolition work.
2. Coordinate shoring with structural modifications. Shoring to be left in place until completion of structural work permits it's removal.

C. Title to Removed Property

1. All removal items, unless otherwise indicated for salvage or reuse will become the property of the Contractor and shall be removed from the Site. During the demolition operations, Owner reserves the right to add to, or delete from, the list of items designated for reuse or salvage.
2. Items to be salvaged for the Owner or for reinstallation are as indicated on the drawings.
3. Site storage or sale of Contractor owned removed items will not be permitted.

D. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

E. Removed and Reinstalled Items:

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

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

G. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- H. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
- I. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
- J. Utility Services
 1. Locate and identify electrical and mechanical services passing through or located within affected area and serving areas outside the work limits.
 2. Maintain existing utilities and protect against damage during demolition operations.
 3. Shut-down periods
 - a. Arrange timing of shut-down periods of all in-service utilities with the Owner. Do not shut down any utility without prior written approval.
 - b. Keep shut-down period to a minimum or use intermittent period as directed.
 - c. Some shut-down hours may be required after normal working hours. No extra compensation will be made for Work after normal working hours, weekends or holidays.
- K. Scheduling: Conduct work so as to avoid interference with operations and work in areas of building which are to remain in service.
- L. Permits, Fees and Inspections: Obtain and pay for all permits, fees and inspections required by governing authorities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Contractor shall furnish all materials, tools, equipment, supplies and labor required to perform the work in accordance with the Drawings and Specifications and within the time limits as specified. All work done under this contract shall conform to all current standards, building codes and ordinances. American National Standard for Demolition Operations – Safety Requirements, ANSI A10.6 (latest edition), is included by reference.
- B. Shoring Materials: As determined by Contractor.

PART 3 EXECUTION

3.01 PROTECTION

- A. Use water sprinkling, temporary enclosures and other approved methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, pollution and electrical shock.
 - 2. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations, as directed by the Architect. Return adjacent areas to conditions existing prior to the start of the work.
- B. In removal of existing materials, take care not to damage work remaining in place, salvageable materials or equipment. Repair or replace any existing construction, materials or equipment damaged during demolition to Owner's satisfaction at no additional cost.
- C. Erect dust chutes and use for removal of materials, rubbish and debris.

3.02 DEMOLITION

- A. Building Items Demolition
 - 1. General
 - a. Items specified herein or indicated on drawings.
 - b. Where indicated to be removed and either turned over to Owner or reinstalled, use methods for removal which will provide the least potential adjacent materials to remain.
 - c. Miscellaneous Items: Material or equipment encountered during construction which must be removed to aid in construction operations or that which will not be used in completed facilities.
 - 2. Concrete and Masonry: Where cut line will be exposed in the finished work and where physically feasible, make edges by saw cutting.
 - a. Structural Reinforced Slabs and Walls: Field drilling of holes, cutting openings and rebar in any structural member, floor slab and load bearing wall is not permitted without written approval of the structural engineer. The Contractor shall be responsible for locating existing rebars in concrete and masonry walls and slabs by non-destructive means for review by the structural engineer.
 - 3. New Door and Window Openings: Cut openings, install lintels and patch jambs and head as required to provide rough openings indicated on drawings.
 - 4. Masonry: Demolish in small sections. Use bracing and shoring where necessary to avoid collapse of structure.
 - 5. Removal of Masonry Units.
 - a. Limits: As indicated on Drawings or as directed by Architect.
 - b. Method.
 - 1) Remove to first full masonry unit beyond limits.
 - 2) Remove all old mortar from existing masonry units adjacent to new construction.
 - 3) Sufficiently brace opening when necessary until construction is completed.

6. Junction Points: Neatly repair the point of junction after removal of parts or all of masonry walls, slabs and like work which tie into new work or existing work, so as to leave only finished edges and surfaces exposed.
7. Except where Contract Documents require leaving an existing floor finish in place, completely remove existing flooring from locations where new finishes are scheduled. Leave top surface of substrate completely free from materials that would interfere with bond of new materials.
8. Completely remove existing carpet from areas to receive new floor finishes. Also remove pad and all traces of adhesive.
9. Floor Preparation: See Section 01 73 00, Execution Requirements.

B. Mechanical (HVAC & Plumbing)

1. Disconnect or shut off service to areas where mechanical work is to be removed.
2. Remove all plumbing, heating, ventilating and air conditioning equipment, fixtures and related piping, ductwork and appurtenances as indicated.

C. Electrical

1. Disconnect or shut off service to areas where electrical work is to be removed.
2. Remove all electrical fixtures, equipment and related switches, outlets, conduit, wiring and appurtenances as indicated, except conduit in walls and ceilings not being removed may remain. If these conduits are left in place, cut ends are to be permanently sealed.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Remove from site, debris, rubbish and other materials resulting from demolition operations.
- B. Removal: Transport materials removed and dispose of off site except as follows:
1. Transport material indicated to be "salvaged" to storage areas as directed by Architect. Storage areas are located on-site.
 2. Store salvaged materials, protected from dirt and damage.
- C. Clean Up
1. Leave interior areas "broom clean".
 2. Remove barricades as directed.
 3. Remove shoring.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. Basic specification: Perform work of this Section according to ACI 301-16, "Specifications for Structural Concrete", except as specifically modified herein.
- B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas. Provide and install dowels for masonry walls.
- C. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work such as concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details of equipment being supplied, prior to placing concrete. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.

1.03 QUALITY ASSURANCE

- A. Reference standards:
 - 1. ACI 301, Specifications for Structural Concrete
 - 2. ACI 318, Building Code Requirements for Structural Concrete.
 - 3. ACI 117, Specification for Tolerances for Concrete Construction and Materials
 - 4. ACI 347R, Guide to Formwork for Concrete.
 - 5. ACI 302.1R, Guide to Concrete Floor and Slab Construction.
 - 6. "Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.
 - 7. ACI 439.5R, Comprehensive Guide for the Specification, Manufacture and Construction Use of Welded Wire Reinforcement.
 - 8. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 9. ACI 305.1, Specification for Hot Weather Concreting.
 - 10. ACI 306R, Guide to Cold Weather Concreting.

11. ACI Field Reference Manual, SP-15.

1.04 SUBMITTALS

- A. Submit a mix design for each type of concrete mix required in accordance with ACI 301, Section 1.5.
 1. Acceptable methods of determining concrete proportions shall be in accordance with one of the following methods per ACI 301, Section 4:
 - a. Establish based on previous field strength test data with standard deviation calculations.
 - b. Establish based on trial mixtures with tested strength data relative to each mix design.

In either case, provide accurate test data within allowable time periods indicated in ACI 301. Incorrect or missing data will cause for rejection of submittals.
- B. Submit Placing Drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.
- C. Submit shop drawings for all formwork and shoring. Formwork design shall follow the guidelines of ACI 347 and ACI 347.2R. Shop drawings shall indicate sequence of form removal and reshoring for each type of construction. Include minimum concrete strengths for each reshored level at time of form stripping and concrete placement. Provide calculations sealed by a professional engineer registered in the applicable state of project location.
- D. Submit test data for aggregates proposed for use, indicating source and compliance with specification requirements.
 1. Submit blended aggregate mix gradation data for review in all mixes which utilize blended aggregates.
- E. Submit aggregate sample for exposed aggregate floors and sidewalks, and proposed procedure for exposing the aggregate.
- F. Submit product literature for admixtures and curing compounds proposed for use.
- G. Submit product literature on all proprietary materials including joint systems, waterstops, hooked anchorage systems, sealers, and patching compounds.
- H. For formed slabs and slabs on metal deck, provide a proposed layout of construction joints and placement methods to verify construction live load used in the design of supporting framing members will not require additional shoring or re-design by the Engineer of Record.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Portland Cement, ASTM C150, Type I or Type II or ASTM C1157, Type LH or GU. All cement to be from the same mill.
- B. Supplementary Cementitious Materials
 - 1. Fly Ash: ASTM C618, Type C or F
 - 2. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989, Grade 100 or 120
 - 3. Silica Fume, Microsilica: ASTM C1240
- C. Water: Potable.
- D. Aggregates:
 - 1. Normal weight aggregates: conform to ASTM C33, (4.2.1.2).
 - 2. Light weight aggregates, fine and coarse: conform to ASTM C330, (7.2.1).
 - 3. Coarse aggregate:
 - a. Topping slabs on precast concrete deck and fill on stair pans: Gradation #8.
 - b. All other classes: Gradation #57.
 - c. A blended aggregate mix may be used at the Contractor/Suppliers' discretion.
 - 4. For architecturally exposed concrete, use a single source of uniform quality throughout the work.
- E. Admixtures, where required or permitted per ACI 301, Section 4:
 - 1. Water-Reducing: ASTM C494, Type A or D.
 - 2. Mid-Range Water-Reducing admixture: ASTM C494, Type A.
 - 3. Air-entraining: ASTM C260 (4.2.1.4).
 - 4. High-Range Water-Reducing admixture (Superplasticizer): ASTM C494, Type F or G.
 - 5. Non-Chloride, Non-Corrosive accelerator: ASTM C494, Type C or E.
 - 6. Fly Ash: ASTM C618, Type C or F.
 - 7. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989.
 - 8. Calcium Chloride and admixtures containing more than 0.06% chloride ions are NOT permitted.
 - 9. Use of admixtures other than those listed will be permitted only when approved prior to bid.
- F. Reinforcing:
 - 1. Deformed bars - Uncoated: ASTM A615 or A706. Minimum yield strength to be 60 ksi.

2. Deformed bars – Epoxy Coated. ASTM A615, A616, A617, or A706. Minimum yield strength to be 60 ksi. Epoxy coated in accordance with the requirements of ASTM A775 or A934.
 3. Welded Wire Fabric:
 - a. Plain welded wire reinforcement: ASTM A1064. Provide in sheet form for all uses other than slabs-on-grade. Minimum yield strength is to be 65 ksi.
 - b. Deformed welded wire reinforcement: ASTM A1064. Minimum yield strength is to be 70 ksi.
 - c. Lap sheets a minimum distance of cross wire spacing plus two inches.
 4. Deformed joint dowel bars: ASTM A615, Grade 60, plain steel bars, cut true to length with square ends.
 5. Smooth joint dowel bars: ASTM A36, plain steel bars, cut true to length with square ends.
 6. Reinforcing support accessories:
 - a. Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties, and similar items as required for spacing, assembling, and supporting reinforcement in place. Conform with CRSI RB4.1 and Manual of Standard Practice and the following requirements:
 - b. For footings, grade beams, and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
 - c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finish surfaces, provide supports with legs which are galvanized, plastic-protected, or stainless steel.
 - d. For galvanized reinforcement, provide all galvanized accessories
 - e. For epoxy-coated reinforcement, provide accessories which are nylon-, epoxy, or plastic coated
 7. Shear stud rails: ASTM A1044
 - a. Studs: Minimum yield strength to be 51 ksi. Minimum ultimate strength to be 65 ksi.
 - b. Rails, when used as stud anchorage: Minimum yield strength to be 44 ksi. Minimum ultimate strength to be 65 ksi.
 8. Structural synthetic fiber reinforcement: Structural fibers shall be a coarse monofilament or self-fibrillation, polypropylene / polyethylene blend in accordance with ASTM C1116, Paragraph 4.1.3, Type III. Structural fibers shall have a minimum tensile strength of 73 to 80 ksi, have a minimum length of 1-1/2 inches, thickness of 0.015 inches, and a width of 0.045 inches.
- G. Mechanical Reinforcing Splices: All mechanical splices must develop $1.25f_y$ of the reinforcing being spliced.
1. Welded Lap Splice: Welding of all non-prestressed bars shall conform to the requirements of AWS D1.4. Provide mill test reports of reinforcing bars to demonstrate compliance.

2. Proprietary coupling devices. Provide proprietary testing reports demonstrating compliance to strength requirements.
- H. Premolded expansion joint filler: ASTM D1751.
- I. Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.40 kg/m² when applied at 300 ft²/gal. Manufacturers' certification is required. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile resilient flooring, vinylbacked carpet, wood, terrazzo, epoxy or urethane overlays or adhesives, or other coating or finishing products. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows
- J. Curing Compound (Strippable): The compound shall conform to ASTM C309 and is to be used on slabs that are to receive subsequent applied finishes and where noted on the drawings. Install in strict accordance with the manufacturer's recommendations and supervision. Verify compound is compatible with the applied finish prior to placement. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows
- K. Curing compound for the parking area slabs on grade: ASTM C1315, Type 1, Class A, and AASHTO M148. Compound must contain a fugitive dye. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows.
- L. Penetrating Sealer for Elevated Parking Decks: Meets or exceeds performance requirements of NCHRP 244 and have minimum 40% silane content. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Kaufman Company.
 3. Sika Corporation.
- M. Grout for masonry core fill: ASTM C476, coarse type.
- N. Grout under steel base plates and bearing plates: Non-shrinking, non-metallic, with minimum 28-day strength of 5,000 psi, when mixed to a fluid consistency. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. Kaufman Company.
- O. Vapor Retarder:
1. Conform to ASTM E1745 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs", Class A.
 2. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity-controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity-controlled areas.
 3. Vapor retarder shall be installed in accordance with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs. The vapor retarder/barrier shall be a minimum of 10 mils thick and placed directly on the granular fill, below the concrete floor slab. Lap joints a minimum of 6 inches and seal with manufacturer's recommended tape or adhesive.
- P. Granular fill below slabs on grade: Provide as recommended in project specific soils report. If soils report is not provided for project, use 4" deep of compacted ODOT 304 or approved equivalent AASHTO dense graded base course. Provide ASTM D448 size #57 stone under slabs-on-grade where radon evacuation is anticipated.
- Q. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide either premolded polyvinylchloride or swellable type.
1. Premolded, flexible, polyvinylchloride, with center bulb. CRD C572
 2. Rubber and Swellable Clay CRD C513
- R. Structural Bonding Compound: Epoxy adhesive, 100% solids, two-component material suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Kaufman Company.
 3. Sika Corporation.
- S. Patching Compound, Epoxy Type: 100% solids, suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Sika Corporation.
 3. W.R. Meadows
- T. Patching Compound, Cementitious Type: Subject to project requirements, provide one from the following manufacturers:

1. Euclid Chemical Company.
 2. Sika Corporation.
 3. W.R. Meadows
- U. Curing sheets for wet curing – the following materials are approved:
1. Sisalcraft Sk-10 (C171).
 2. Burlap
 3. Filter Fabric (8-ounce minimum)
 4. Visqueen plastic, 8 mils minimum.
 5. Bur-lene curing blankets.
- V. Concrete Inserts:
1. Dovetail Inserts
 - a. Heckman #100 Inserts; hot-dip galvanized.
 2. Brick Ledge Inserts:
 - a. Hohmann & Barnard LW-340 Inserts; hot-dip galvanized.
- W. Frictionless Bearing Pads:
1. Frictionless bearing pads shall be a nominal 3/32" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. Provide one sliding pad tack welded to the lower supporting surface and one tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings. The lower frictionless bearing pads shall be a nominal 1/16" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. The upper frictionless bearing pad shall be a 20-gauge stainless steel sheet (RMS<20) resistance welded to a 10-gauge A36 steel backing plate. The lower sliding pad shall be tack welded to the lower supporting surface and the upper pad tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings.
 2. Design: The pad size and design shall conform to 1998 AASHTO "LRFD Bridge Design Specifications," Section 14. Design bearing pressure under total service load shall not exceed the manufacturer's recommendation. If Neoprene is used the compressive load shall be limited to 800 psi.
 3. Corrosion Resistance: Frictionless bearing pads for exterior or exposed usage shall be manufactured for use in an exposed climate of heat, cold, moisture, and ultraviolet rays. All backing steel in an exposed or open environment shall be shop painted with a zinc rich paint or field painted with "ZRC Cold Galvanizing Compound".

X. Neoprene bearing pads:

1. 100% virgin chloroprene meeting AASHTO Specifications. Shore A hardness of 60, unless noted otherwise.

2.02 MIXES

A. The following mixes of concrete are required:

Mix Usage	f'_c at 28 days	Exposure Class	Maximum Water Cementitious Ratio	Air Content
Lean Concrete, & Mud Slabs	1,500 PSI	F0	---	---
Footings & Interior Column Piers	3,500 PSI	F1	0.55	optional
Interior Slabs on Grade	3,500 PSI	F0	0.50	optional
Interior Slabs on Grade Which Receive Moisture-Sensitive Floor Coverings	4,000 PSI	F0	0.45	optional
Interior Slabs on Metal Deck	3,500 PSI	F0	0.45	optional
Exterior Foundation Stem Walls, Foundation Walls, & Exterior Column Piers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior, Unreinforced Slabs on Grade and Exterior Concrete Not Subjected to Deicers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior Reinforced Site Concrete subjected to Deicers, Parking Structures	5,000 PSI	F3, C2	0.40	5%-7%

Concrete Mix Notes:

- 1) Exposure class requirements are achieved through the F'_c , w/cm, and air content requirements provided to ensure adequate durability conforms to Freeze/Thaw exposures (F) or Corrosive exposures (C).
- 2) For all slab mixes, provide a minimum cementitious content of 520 lbs.
- 3) Use No. 8 coarse aggregate for concrete topping on precast concrete deck and metal stair pan fill.
- 4) Provide 3 pounds per cubic yard of collated fibrillated polypropylene fibers for topping on precast concrete plank.
- 5) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
- 6) Fly ash is permitted in all mixes but shall not exceed 25% of cement weight indicated above and can be included in the water-to-cementitious ratio.
- 7) Ground granulated blast-furnace slag is permitted in all mixes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
- 8) Silica fume (microsilica) is permitted in all mixes but shall not exceed 10% of the cement weight indicated above and can be included in the water-to-cementitious ratio.

- 9) Total supplemental cementitious material shall not exceed 35% of the total cement weight.
- 10) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
- 11) Concrete for slabs on grade must include a mid-range or high-range plasticizer.
- 12) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Engineer of Record and verification that the water-to-cement ratio has not been exceeded.
- 13) Maximum water-soluble chloride ion content in Non-Prestressed concrete shall not be more than the ACI limits set forth for defined corrosion classes. For all other concrete, the maximum water-soluble chloride ion content shall not be more than 0.06 percent (by weight) of the weight of cement as determined by ASTM C1218.
- 14) Lightweight concrete shall have an equilibrium density, as determined by ASTM C567, between 90 and 115 pounds per cubic foot.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete.
- B. Determine field conditions by actual measurement.
- C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Construction Manager is present, unless this requirement is specifically waived.

3.02 FORMWORK AND REINFORCING

- A. All formwork shall follow the guidelines of ACI 347R resulting in final formed surfaces within the tolerances of ACI 117.
- B. Footings may be cast against earth cuts when soil conditions permit.
- C. Removal of forms and shoring:
 1. Remove no forms within 24 hours after placement.
 2. Shoring is to remain in place until concrete reaches its design strength. Windsor Penetrometer is to be used to verify in-place strength if forms are removed prior to 28 days after casting concrete.
- D. Reinforcing:
 1. Welding of reinforcing is prohibited, except where shown.
 2. Use plastic-tipped or stainless-steel bar supports for surfaces exposed to view in finished structure.

3.03 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install all embeds shown on contract documents, including but not limited to: headed stud embeds, anchor bolts, brick ledge inserts, and dovetail anchor slots.
 - 2. Install sleeves for mechanical, electrical, and plumbing penetrations.
 - 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.
- B. Aluminum conduit shall not be installed in concrete.

3.04 DELIVERY AND PLACEMENT

- A. Preparation before placement:
 - 1. Remove all debris from forms and deck. Clean steel deck of grease, oil, and other substances that would reduce bond to concrete.
 - 2. Standing water shall be removed from place of deposit before concrete is placed.
 - 3. Do not use additives or salts to remove ice. Non-chloride deicers may be used.
 - 4. In cold weather, comply with ACI 306R; maintain temperature of forms and reinforcing within a range of 55 - 90 degrees F.
 - 5. In hot weather, comply with ACI 305.1.
 - 6. Prior to placing topping slabs on Precast Concrete Hollow Core Planks, thoroughly dampen the precast surface but do not leave standing water. Immediately before placing topping, re-dampen the surface and broom on a coat of thin neat cement grout. Apply grout only to small enough areas so that it will not begin to set or dry before placement of the topping slab.
 - a. In lieu of neat cement grout, a manufactured bonding agent may be used. The bonding agent must be integrally colored to show the extent of application. Apply by brush or spray, at recommended rates, in accordance with the manufacturer's directions.
- B. Delivery is to conform to ASTM C94.
 - 1. Delivery tickets to contain the following, in addition to the information required by C94:
 - 2. Reading of revolution counter at first addition of water.
 - 3. Type and brand of cement and supplementary cementitious materials.
 - 4. Cementitious content.
 - 5. Total water content by producer.
 - 6. Maximum size of aggregate.
 - 7. Secure Architect's written approval if non-agitating type equipment is to be used for transportation.

8. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to the aggregates. Architect may require an earlier discharge during hot weather, or when high-early strength cement is being used.
- C. Water addition at the site will not be permitted, except when the approved mix design has been formulated to allow for on-site addition of water. Water may only be added by personnel authorized by the Architect/Engineer and Concrete Producer.
- D. Conveying: Keep delivery carts and buggies on runways; do not allow them to bear on reinforcing or uncured concrete.
- E. Placement.
 1. Place within 6 feet of final position. Spreading with vibrators is prohibited.
 2. In walls and columns, deposit concrete in uniform horizontal layers, with a maximum depth of 4 feet (18 inches for architectural concrete).
 3. Maximum free fall without chutes or elephant trunks to be 5 feet (3 feet for architectural concrete).
 4. Place concrete continuously to a designed joint such that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of cold joints or planes of weakness.
 5. Concrete shall be consolidated per guidelines in ACI 309.2R.
- F. Records: Keep a complete log of pours, including date, location, quantity, weather, and identification of test cylinders for each pour.

3.05 JOINTING

- A. Interior slabs on grade:
 1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, and inside corners. The maximum spacing of contraction (control) joints, for reinforced and unreinforced slabs, is to be 6 times the square root of the slab thickness (i.e. for a 4-inch slab the maximum spacing is 12 feet). Cut joints $\frac{1}{4}$ times the slab thickness. The Soff-Cut Saw shall be used immediately after final finishing. A conventional saw shall be used as soon as possible without dislodging aggregate. Schedule slab pours and saw-cutting operations such that sawing is completed prior to onset of shrinkage cracking.
 2. Provide isolation joints at columns ($\frac{1}{2}$ inch thick) and at walls ($\frac{1}{8}$ inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.
- B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):

1. Expansion joints: Full depth, with ½ inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
 2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.
- C. Above-grade, Below-grade and foundation walls: Locate contraction joints at maximum spacings of 60'-0" on center, except as approved otherwise. Provide horizontal reinforcing separation, doweling of adjacent placements, and v-grooves each face per details on Structural Drawings. Construction joints in walls shall be submitted to EOR for review and approval.
- D. Construction Joints in supported slabs and slabs on metal deck: Locate per Contract Document requirements, and in accordance with ACI 301 section 2.2.2.5. Submit proposed construction joint locations for review prior to proceeding with construction.

3.06 FINISHES

- A. Schedule of finishes on flatwork per ACI 301, section 5 is as follows:
1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish.
 2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish.
 3. Exterior slabs - broom finish.
 4. Areas indicated on Drawings:
 - a. Exposed aggregate.
 - b. Non-slip.
 - c. Liquid sealer/densifier – per manufacturer's instructions, under direction of manufacturer's representative. Use on all interior trowel finished slabs subject to small-wheeled vehicular traffic.
 - d. Hardener - per manufacturer's instructions, under direction of manufacturer's representative.
- B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117:
1. Minimum flatness of F(f) 30, and a minimum levelness of F(l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F(f) 25 and F(l) 17 shall be obtained.
 2. Minimum flatness of F(f) 25 is required for elevated slabs. Preceding value is an average value to be obtained over a given area. Minimum local value (one-half bay) of F(f) 20 shall be obtained.
- C. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E115. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.

- D. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner.
- E. "F Numbers" shall be submitted to the Owner and Architect immediately after they are determined by the testing laboratory.

3.07 CURING AND PROTECTION

A. Curing:

1. Interior slab areas that will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, or a liquid sealer/densifier, are to be moist-cured for a minimum of 7 days, without the use of a curing compound.
2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 7 days. Edges and joints are to be sealed. Rewetting of the slab at any time during construction should be avoided.
3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound, except that when concrete above grade is placed in the open, and the air temperature exceeds 60 °F, the concrete is to be moist-cured for the first 24 hours.
4. Whichever curing method is used, it is to commence immediately after placement. Do not allow curing to be delayed overnight.
5. Prevent excessive moisture loss from formed surfaces. If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

B. Protection:

1. When air temperature during placement is less than 40 °F, or will be within 24 hours, temperature of concrete as placed is to be between 50 °F and 90 °F (55 °F and 90 °F for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days.
2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

3.08 CLEANING AND REPAIR

- A. Repair any slabs that do not meet the finish requirements. The Architect will determine whether grinding, filling of cracks, or patching and leveling procedures are required.
- B. For slabs that are dusting, or showing other signs of improper curing, any corrective measures attempted will be subject to prior approval of the Architect

and will be performed at Contractor's expense. These may include additional applications of sealer/densifier, or grinding, or covering with specified repair topping.

- C. Immediately prior to final acceptance, remove from all interior and exterior surfaces that are exposed to view, any stain-producing elements, such as pyrites, nail, wire, reinforcing steel, and form ties.
- D. Remove all stains completely. Use of weak acids or patented cleaners is acceptable, but surface is to be completely neutralized after use.
- E. All repairs shall conform to ACI 301, Section 5.3.7 except that the specified bonding compounds, cementitious, or epoxy repair materials must be used. Repair procedures must be submitted and reviewed by the Engineer of Record.
- F. As-cast formed finishes shall be comply with the following:
 - 1. Concrete surfaces not exposed to view (Surface Tolerance Class D per ACI 117)
 - a. Patch voids larger than 1-1/2" wide or 1/2" deep.
 - b. Remove projections larger than 1".
 - 2. Concrete surfaces exposed to view (Surface Tolerance Class C per ACI 117)
 - a. Patch voids larger than 3/4" wide or 1/2" deep.
 - b. Remove projections larger than 1/2".
 - c. Patch tie holes.
- G. Failure of concrete topping to bond to substrate (as evidence by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

3.09 ACCEPTANCE

- A. Concrete work with serious honeycombing, form misalignment, or other deviation from Contract requirements is subject to rejection per ACI 301, Section 1.
- B. When observations or tests indicate that the Contract requirements have not been met, the Contractor is to bear the costs of any additional testing and analysis to determine acceptability and also the cost of removal and replacement, if such is required per ACI 301, Section 1.

3.10 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the jurisdiction.
- B. All tests and inspection shall be per ACI 301, Section 1.6

END OF SECTION 03 30 00

SECTION 03 35 30

CONCRETE CLEANING AND SEALING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Cleaning - Existing and New Concrete Slabs: Clean cured concrete surfaces. All exposed slabs including slabs with applied cure and seal compounds.
 - 1. Clean surfaces without stripping sealing compounds unless hardening-densifying type is to be applied.
- B. Cure and Sealing - Fresh Construction Slabs: See Section 03 30 00 for cure and seal compound. If not specified in 03 30 00, apply cure and seal compound specified herein.
- C. Test and ensure all concrete surface preparations and subsequent compound applications are compatible.

1.02 RELATED SECTIONS

- A. Cast in Place Concrete: Section 03 30 00.

1.03 REFERENCES

- A. ACI 515.1R - Guide to the Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete.

1.04 SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, surface preparation, and application instructions.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Certify in writing that proposed materials meet or exceed specifications and are appropriate for intended use.
- B. Test Sample: Identify an area approximately 36" x 36" where a test cleaning and sealing can be performed and sealer application can be applied. Obtain Architect's approval of test area prior to start of test. Clean area and apply sealer using materials and methods proposed for the project. Repeat sample applications until approval by Architect. After sample's acceptance by the Architect, sample will be regarded as the minimum standard of workmanship/finish acceptable for the

project.

1.06 PROJECT CONDITIONS

- A. Do not apply materials when temperature is expected to be below 40° F within 48 hours or when rain is imminent.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Keep product from freezing.
- D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.
- E. Protect materials during handling and application to prevent damage or contamination.
- F. Use product full strength from the container.
- G. Dispose of material according to all local, state and federal regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Source Limitations: Obtain each color, grade, finish, type, and variety of product from single source with resources to provide products of consistent quality in appearance and physical properties. Verify compatibility of cleaner and sealer products.

2.02 CONCRETE CLEANING MATERIAL

- A. Description: Pre-mixed, non-acidic pre-packaged degreaser/stripper. Product to be effective in removing existing curing and sealing compounds
- B. Manufacturer and Product: Citrex by L & M CHEMICAL or Ultrite Degreaser by W. R. MEADOWS. Products by CHEM MASTERS, DAYTON SUPERIOR; MASTER BUILDERS SOLUTIONS; SURE BUILDING CHEMICALS; H & C PRODUCTS or CONPROCO are acceptable providing they meet the requirements specified.
- C. Properties
 - 1. Appearance: Clear.

2. pH: 10.9.
3. Biodegradable: 100% after dilution.

2.03 CURE AND SEAL MATERIAL – FRESH AND EXISTING CONCRETE

- A. Description: Spray on - clear, film forming, one component, transparent, acrylic copolymer cure and sealer that locks in moisture, and cures concrete. 2-coat application.
- B. Primer: Type as recommended by sealer manufacturer.
- C. Properties
 1. VOC Content: Less than 170 g/L.
 2. Solids: 30%.
 3. ASTM C 1315, Type 1, Class A
- D. Manufacturer and Product: Dress and Seal WB 30 by LATTICRETE - L & M CHEMICAL or equal products by CHEMMASTERS, DAYTON SUPERIOR; MASTER BUILDERS SOLUTIONS; SURE BUILDING CHEMICALS; W. R. MEADOWS or CONPROCO.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive concrete degreaser. Notify architect if surfaces are not acceptable. Do not begin application until unacceptable conditions have been corrected.
- B. Do not apply the sealer products until all surfaces are porous. Test for adhesion.

3.02 SURFACE PREPARATION

- A. Protect adjacent surfaces not designated to receive concrete degreaser.
- B. Follow ACI Guide 515.1R (Section 3.4.2) for severe oil and grease stains.
- C. Clean surfaces of residual flooring adhesive, curing, previous sealers or compounds, if present, and other foreign deposits using warm water, scraping, adhesive removing chemicals or similar methods.
- D. New Sealers to Cured Concrete: Remove all previous surface sealers and film forming curing compounds. Ensure surfaces are clean and free of all contaminants, and any film forming curing compounds or sealers.

3.03 APPLICATION

- A. Cleaner

1. Conform to manufacturer's requirements and recommendations. Apply in number of applications as required.
2. Finish cleaned surface to match test sample area.

B. Sealer:

1. Verify that slab surfaces have been cleaned and prepared in accordance with sealer manufacturer requirements.
2. Conform to manufacturer's requirements and recommendations. Provide two coats. Apply first coat at approximately 300 square feet per gallon; second coat at approximately 400 square feet per gallon.
3. Do not thin material.

3.04 CLEANUP

- A. Dispose of material according to local, state, and federal regulations.
- B. Clean all tools and equipment with water.

END OF SECTION

SECTION 03 54 16

HYDRAULIC CEMENT UNDERLAYMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide hydraulic cement underlayment leveling for the following:
 - 1. Self-leveling underlayment for application below interior floor coverings.
 - 2. At other conditions where existing floor defects require patching and filling.

1.02 RELATED SECTIONS

- A. Selective Building Demolition: Section 02 41 19.
- B. Concrete: Section 03 30 00.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- C. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

1.04 QUALITY ASSURANCE

- A. Installer: Specialist in the installation of materials specified and regularly engaged in the installation of same; qualified in, and familiar with, manufacture's recommendations for the installation of materials.
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency

1.05 PROJECT CONDITIONS

- A. Environmental Conditions: Temperature, ventilation, time requirements and other factors affecting installation as recommended by manufacturer.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specifications are based on products by ARDEX INC. The product catalog numbers listed herein are to establish a level of quality. Products by SIKA CORP., BASF, INC., MAXXON CORPORATION, SHONOX, MAPEI CORP., LATICRETE, DEPENDABLE, SCHONOX, CUSTOM BUILDING PRODUCTS or EUCLID CHEMICAL are acceptable provided they meet the requirements specified herein and design intent and usage indicated on the drawings.

2.02 MATERIALS

- A. Self-Leveling Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations. ARDEX K-15; High strength, fast setting, non-shrink type. Conform to the following minimum requirements:
 - 1. Cement Binder: ASTM C150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
 - 2. Compressive Strength - ASTM C109: Minimum 4000 after 28 days.
 - 3. Final Set - ASTM C191: Approximately 2 hours at 70° F.
- B. Primer: ARDEX P-51 "Ultra Prime"; two-part, non-flammable, non-toxic primer or ARDEX P-51 as recommended for substrates encountered.
 - 1. Wood Subfloors: Provide continuous galvanized metal lath or similar type reinforcement as recommended by fill manufacturer.
- C. Aggregate (For thicknesses over 1-1/2" +/-): Washed, well-graded gravel, 1/8"-1/4".
- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect surfaces to receive cementitious leveling and verify that conditions are satisfactory for the installation.
- B. Substrate must be solid, clean, dry, and free from oil, wax, grease, curing

compounds, latex compounds, gypsum, asphalt or other foreign matter.

- C. Notify Architect of any conditions deemed unsatisfactory for the installation.
- D. Installation of work under this Section is understood as acceptance of the substrates as satisfactory.

3.02 PREPARATION

- A. Using materials recommended by underlayment manufacturer, remove all substances adversely affecting bond, and prime existing substrate.
 - 1. Fill cracks and other subsurface irregularities that may telegraph through fill or otherwise deem a detriment to a satisfactory concrete topping/fill application.
- B. Verify that temperature control is provided to meet requirements of underlayment manufacturer.

3.03 INSTALLATION

- A. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.
- B. Install all materials in accordance with manufacturer's recommendations and printed instructions.
- C. Where thickness is greater than 1-1/2"+/-, provide aggregate as recommended by manufacturer; provide finish layer without aggregate to achieve smooth finish; feather edges.

3.04 PROTECTION

- A. Installer to advise Contractor of protection requirements required to prevent damage from work of other trades including limits for foot traffic and equipment.

END OF SECTION

SECTION 04 00 00

MASONRY

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide the following:

1. Face brick.
2. Concrete masonry units.
 - a. Standard
 - b. Fire-rated
3. Masonry lintels and setting of steel angles furnished under Section 05 50 00.
4. Setting bearing plates supported and embedded with masonry furnished under Section 05 50 00.
5. Provide masonry fill concrete and reinforcing steel where indicated on drawings. See Section 03 30 00.
6. Wall reinforcing and accessories.
7. Built-in collars, sleeves, inserts, anchors, ties, sockets, bolts, blocking, miscellaneous metal work, etc., in contact with, supported on or enclosed by masonry. When these items are furnished by others, they shall include information for setting.
8. Through-wall flashing.
9. Mortar and grout.

1.02 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.03 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory and other manufactured products 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. Samples: Provide samples of items specified herein to be used in the work.
- D. Submit certification that fire resistant concrete units conform to the requirements

specified herein for Fire Resistant Concrete Block.

E. Brick Cleaner

1. Applicator Qualifications: Submit qualifications of applicator.
 - a. Certification stating applicator is experienced in the application of the specified products.
 - b. List of recently completed masonry cleaning projects, including project name and location, names of owner and Architect, description of cleaning products used and substrates, applicable local environmental regulations, and application procedures.
2. Environmental Regulations: Submit description for testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Submit applicable local environmental regulations.
3. Protection: Submit description for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and nonmasonry surfaces during the work from contact with masonry cleaners, stain removers, residues, rinse water, fumes, wastes, and cleaning effluents.
4. Surface Preparation: Submit description for surface preparation of substrates to be completed before application of masonry cleaners and stain removers.
5. Application: Submit description for application procedures of masonry cleaners.

F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated.

1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
2. Mortar complying with property requirements of ASTM C270.
3. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.

G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.
 - a. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
2. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

3. Each material and grade indicated for reinforcing bars.
4. Each type and size of joint reinforcement.
5. Each type and size of anchor, tie, and metal accessory.

H. Cold-Weather Procedures: Detailed description of methods, materials and equipment to be used to comply with cold-weather requirements.

1.05 QUALITY ASSURANCE

A. Supervisor: A supervisory journeyman mason shall be appointed for the project and shall be present at all times masonry work is being performed and:

1. have a minimum of 5 years experience on masonry projects of this type and size.
2. be thoroughly familiar with the design requirements, types of materials being installed, referenced standards and other requirements.

B. Use only skilled journeyman masons for cutting and placing of masonry; no allowance shall be made for lack of skill on the part of the workmen.

C. Consult other trades and make provisions that shall permit the installation of their work in a manner to avoid cutting and patching. Build-in work under other sections, as necessary, and as the work progresses.

D. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602, 2013 Edition "Specifications for Masonry Structures". Maintain one copy of the standard in project field office at all times during construction. Contractor's supervisory personnel shall be thoroughly familiar with the material as it applies to this Project.

E. Concrete Unit Masonry Construction: Comply with the National Concrete Masonry Association (NCMA) "TEK Bulletins", and other requirements specified.

1. NCMA TEK Bulletin 3-02A "Grouting for Concrete Masonry Walls".
2. NCMA TEK Bulletin 8-02A "Removal of Stains from Concrete Masonry Walls".
4. NCMA TEK Bulletin 10-01A "Crack Control in Concrete Masonry Walls".
5. NCMA TEK Bulletin 10-02C "Control Joints for Concrete Masonry Walls".
6. NCMA TEK Bulletin 14-2 "Reinforced Concrete Masonry".
7. NCMA TEK Bulletin 19-04A "Flashing Concrete Masonry".
8. NCMA TEK Bulletin 19-05A "Use of Flashing in Concrete Masonry Walls".

F. Brick Industry Association (BIA)

1. BIA Technical Notes No. 8 and 8B: Mortar for Brickwork.
2. BIA Technical Notes No. 20: Cleaning Brick Masonry.
3. BIA Technical Notes No. 28D: Brick Veneer.
4. BIA Technical Notes No. 18A: Expansion of Brickwork.

G. Sample Panels

1. Construct where approved by Architect.
2. Panel shall be at least 6 feet long by 6 feet high and shall show full color range, joint detail, reinforcement, air barrier, insulations, through-wall flashing and drips, cavity drainage material, weeps and all other details of construction that will be used in the completed work. Include at least one 90° corner.
 - a. Include brick masonry and paint system specified; see Section 09 91 00.
 - b. Clean sample panel using the same methods and materials prior to painting that will be utilized for cleaning the building masonry
3. Construct additional panels as required by Architect if original panel construction is not acceptable.
4. Do not start masonry construction until the sample panel is approved by the Architect.
5. Retain acceptable sample as reference standard for the project.
6. Demolish and remove panel from site after acceptance of work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store cement and lime materials and masonry units off the ground, under cover and protected from weather damage. If units become wet, do not install until they are dry. Do not use cementitious materials that have become damp.
- C. Stockpile and store aggregates to prevent contamination from foreign materials, in locations where grading and other required characteristics can be maintained.
- D. Use care in handling units to avoid chipping and breakage.
- E. Locate storage areas where they will not be disturbed or damaged by construction operations.
- F. Protect finished floor areas from damage.

1.07 COLD WEATHER CONSTRUCTION

- A. Comply with recommended practices for cold weather construction of the International Masonry Industry All-Weather Council and requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Do not build on frozen or snow covered work. Remove and replace masonry work damaged by frost or freezing.
- C. Requirements During Construction: Provide the following minimum requirements for the air temperatures listed:
 1. Above 40° F: Normal masonry procedures.
 2. 40° F to 32° F: Heat mixing water to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same

temperatures falling within this range. Do not heat mortar to greater than 120° F.

3. Below 32° F to 25° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F.
4. Below 25° F to 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using auxiliary heat. Provide enclosure when wind is in excess of 15 mph.
5. Below 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using enclosure and auxiliary heat.

D. Protection Requirements for Completed Masonry (and masonry not being worked on): Provide the following minimum requirements for the mean daily air temperatures listed:

1. Above 40° F: Normal masonry procedures.
2. 40° F to 32° F: Protect from rain or snow for 24 hours with weather-resistive membrane.
3. Below 32° F to 20° F: Completely cover with weather-resistive membrane and maintain above freezing for 24 hours.
4. Below 20° F: Provide weather-resistant enclosure and auxiliary heat to maintain above freezing for 24 hours.

E. Requirements During Grouting Operations (Vertically Reinforced Walls): Provide the following minimum requirements for the air temperatures listed:

1. Above 32° F: Normal masonry procedures. Cover at end of work day with weather-resistive membrane.
2. 32° F to 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1/2" thick insulating blanket.
3. Below 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1" thick insulating blanket or maintain heated enclosure to 40° F for a period of 48 hours.
 - a. Grout Containing Type III Cement: Maintain 40° F temperature for 24 hours.

1.08 HOT WEATHER CONSTRUCTION

- A. Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 90° F., or greater in shade with relative humidity less than 50%. Provide artificial shade and wind breaks and use cooled materials as required. Provide artificial shade, wind breaks, use cooled materials and other procedures outlined in BIA Tech Notes #1.

1.09 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.
 - 1. Brace unsupported and newly laid masonry walls. Maintain bracing in place until building structure provides permanent bracing.
- 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 become 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 on completed masonry.

PART 2 PRODUCTS

2.01 CLAY MASONRY UNITS

- A. Face Brick
 - 1. Reference: Select exterior building brick conforming to ASTM C216, Grade SW.
 - 2. Size and Texture: Norman – Match existing
 - 3. Manufacturer/Color: None required.
 - a. Manufacturers: Existing and new exterior face brick to be painted. Provide matching brick units to accept paint as required. See sample panel herein and Specification 09 91 00.
 - 4. Special Shapes: Provide solids, shelf angle bricks and other special shapes as indicated or required so as no brick cores are exposed to view. Color and texture to match face brick or accent brick as applicable.

2.02 CONCRETE MASONRY UNITS

- A. General
 - 1. Curing: Cure for at least 7 days and units must be at least 28 days old

when used in the work.

2. Corners (Interior Walls): Provide bullnose edges at all outside corners unless otherwise indicated or directed.
3. Integral Water Repellents: Use in units exposed to weather. Amount as recommended by water repellent manufacturer as approved by concrete block manufacturer.
 - a. Type: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - b. Products/Manufacturers: Subject to compliance with requirements, provide W. R. GRACE Dry-Block; MASTER BUILDERS' INC. Rheomix-Rheopel; ACME-HARDESTY CO. Acme-Shield; KRETE INDUSTRIES KreteControl 202 Internal Water Repellent; EUCLID CHEMICAL Hydrapel System.

B. Hollow Load Bearing, Solid Load Bearing (75%) and Fire Resistant Concrete Masonry Units

1. Type: Hollow, load bearing, standard modular size and shapes, thoroughly cured and dried.
2. References: ASTM C90.
3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
4. Weight Classification: Normal weight, unless otherwise indicated.
5. Linear Shrinkage: Not to exceed 0.065 percent, ASTM C426.
6. Aggregate: ASTM C33 normal weight aggregates. Cinder aggregates not permitted.
7. Fire Resistant
 - a. Rating: Design for fire ratings indicated on drawings.
 - b. Manufacturer
 - 1) Listed in the Building Materials List published by the Underwriters' Laboratories, Inc.
 - 2) In lieu of above, provide a report from a nationally recognized testing agency stating that the units are equivalent in fire rating to those furnished by the producers as listed above.
 - c. Location: Where indicated.

2.03 MORTAR

A. Materials

1. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated or selected.

2. Masonry Cement: ASTM C91, provide non-staining type for stonework.
3. Hydrated Lime: ASTM C207, Type S.
4. Aggregate: ASTM C144, clean masonry sand, not over 10% to pass No. 100 sieve for general use.
5. Water: Clean, fresh and free of deleterious amounts of acids, alkalis and foreign organic matter.
6. Water Repellent Admixture: W. R. GRACE Dry-Block, RHEOMIX - Rheopel Mortar Admixture; MASTER BUILDERS, INC., KRETE INDUSTRIES KreteGuard 390. Manufacturer must submit certification that water repellent admixture meets or exceeds requirements specified herein.
 - a. Conformance: ASTM E514.
 - b. Type: Integral polymeric water-repellents (IPWR).
7. Color Additive: Inorganic pigments as required to produce colored mortar as selected by Architect. SGS Colors by SOLOMON GRIND CHEM SERVICE; DAVIS COLORS or equal.
 - a. Resistant to alkali, light and weather
 - b. Unaffected by cement and free of water soluble salts.
8. Cold Weather Additive: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C494, Type C or ASTM C1384 and recommended by the manufacturer for use in masonry mortar of composition indicated.

B. Proprietary Mortar Cement: Conform to ASTM C91, containing hydrated lime.

1. Certification: Submit certified laboratory data substantiating conformance with structural requirements for mortars as specified; and that no adverse chemical reaction will occur with the specified masonry accessories and reinforcing. Certification must be received and approved by Architect prior to mortar use.
2. Suitable products are acceptable from the following manufacturers:
 - a. MIAMI
 - b. LEHIGH HANSON
 - c. ESSROC MATERIALS, INC. (Brixment)
 - d. QUIKRETE
 - e. CEMEX INC.

C. Mixes - Unit Masonry

1. Provide water repellent admixture in all mortar used for exterior CMU masonry work. Add to mix in accordance with manufacturer's recommendations.
2. Type M Mortar
 - a. Use: Provide for CMU work below grade or in contact with earth.
 - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 2,500 psi.
 - c. Color: Natural color.
3. Type S Mortar
 - a. Use: Provide for all CMU work.

- b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 1,800 psi.
 - c. Colors
 - 1) Concealed work and natural colored concrete masonry units: Natural color.
 - 2) Colored concrete masonry units: As selected by Architect.
 - 4. Type N Mortar
 - a. Use: Provide for brick veneer
 - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 750 psi.
 - c. Colors: As selected by Architect.

2.04 GROUT

A. Masonry Grout - Mix

- 1. Fine Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
 - a. Portland Cement: 1 part
 - b. Hydrated Lime: 0 to 1/10 part
 - c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials
- 2. Coarse Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
 - a. Portland Cement: 1 part
 - b. Hydrated Lime: 0 to 1/10 part
 - c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.
 - d. Coarse Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.
- 3. Hand Mixing: Not acceptable.

2.05 REINFORCING

- A. Manufacturers: DUR-O-WALL; HECKMANN BUILDING PRODUCTS; HOHMANN & BARNARD; MASONRY REINFORCING CORPORATION OF AMERICA (WIREBOND). Where products are specified referencing a particular manufacturer, equal products from the manufacturers listed are acceptable providing the product meets the requirements indicated.

- 1. Where a manufacturer is listed below for a specific product, it is to establish a level of quality. Similar products of equal quality from the above listed manufacturers are acceptable.

B. Horizontal Joint Reinforcement

- 1. General

- a. Type: Ladder type, standard weight, galvanized.
 - b. Width: Approximately 2 in. less than nominal wall thickness.
 - c. Spacing: Continuous along horizontal joint, spaced 16 inches on center vertically, unless otherwise indicated.
- 2. Longitudinal Wire
 - a. Single Wythe Walls: 2 wires.
 - b. Multi-wythe Walls:
 - 1) Each wythe less than 6 inches wide: 1 wire.
 - 2) Each wythe 6 inches and wider: 2 wires.
- C. Metal "Z" Ties: 3/16" galvanized steel "Z" shaped wire ties, 2" narrower than wall width. For use in block wythes at control joints.
- D. Adjustable Veneer Anchor
 - 1. Steel Stud or Structural Steel Back-Up: Two piece, adjustable loop type anchor and tie. Anchors and ties shall be carbon steel, devices, hot dip galvanized after fabrication, coating conforming to ASTM A153, Class B2, 1.5 ounce coating per square foot. Manufacturer to provide oversized hole as required to accommodate diameter of screws without abrasion of zinc coating.
 - a. Anchor: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
 - 1) Steel Stud/ Sheathing Back-Up: Screw-on galvanized steel strap anchor with stand-off legs for insulation sheathing board in depths required. X-SEAL by HOHMANN & BARNARD or similar type design manufactured by HECKMANN, AA WIRE PRODUCTS, DUR-O-WAL, INC., NATIONAL WIRE PRODUCTS INDUSTRIES. Seal insulation face with reinforced polyolefin base, laminated to a polypropylene layer tape. Alternate design attachment must be specifically designed for insulated sheathing in depths required.
 - 2) Fasteners: Hot-dipped galvanized steel bolt, nut and washer.
 - 3) Depth: Provide engineered analysis of anchors over 4 1/2".
 - b. Ties: Triangular tie, fabricated from 3/16" diameter galvanized cold drawn steel wire. Provide ties long enough to engage the anchor and be embedded not less than 2" into the bed joint of the masonry veneer. HECKMANN 316 Series.
 - 2. Concrete Masonry Back-Up (Tie and Anchor): Ladder type reinforcing with double eye ties welded at each cross wire 15" o.c. to extend into cavity of the two wythe wall. A two pronged hook tie shall be inserted into the eye holes creating a positive connection to restrain compression and tension. Lox All Adjustable Eye Wire HOHMANN & BARNARD.
- F. Wire Mesh: Wire Mesh: 1/4" mesh of galvanized steel wire (min. 16 gage) or galvanized metal lath, cut into strips 1-1/2" narrower than wall width where used.

For use at intersection of masonry walls.

- G. Reinforcing Steel - Bond Beam and Wall Reinforcement: Uncoated steel reinforcing bars; ASTM A615/A; ASTM A616, including Supplement 1; or ASTM A617/A, Grade 60.
- H. Partition Top Anchors: 12 gage galvanized steel plate with 7/16-inch diameter holes. HOHMANN & BARNARD PTA 422 or equal.

2.07 MISCELLANEOUS ITEMS

- A. Through-Wall Flashing: Provide one of the following types:
 - 1. Copper Composite
 - a. Characteristics:
 - 1) Type: Copper core with polymer fabric laminated to copper face on both sides with non-asphalt adhesive.
 - 2) Copper: ASTM B370, CDA Alloy 110
 - 3) Weight: 5 oz
 - 4) Fabric: polymer fabric; laminated both faces of copper core.
 - b. Mastic/sealant: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920, Type S, Grade NS, Class 50.
 - c. Termination Strip: Provide metal type recommended by flashing manufacturer. Seal top edge.
 - d. Manufacturers/Products
 - 1) YORK MANUFACTURING, INC.; Multi-Flash
 - 2) STS COATINGS, INC.; Gorilla Flash GF-500
 - 3) WIRE-BOND, INC.; Copper Seal
 - 4) ADVANCED BUILDING PRODUCT; Copper Sealtite
 - 2. Rubber Sheet
 - a. Material: Self-adhesive, cold-applied sheet consisting of 32 mil rubberized asphalt bonded to 8 mil polyethylene film. Provide with release film.
 - b. Mastic: Rubberized asphalt-based mastic.
 - c. Surface Primer (Conditioner): Type as recommended by manufacturer.
 - d. Termination Strip: Provide metal type recommended by flashing manufacturer. Seal top edge.
 - e. Manufacturer: Perm-A-Barrier by W. R. GRACE, IPCO Wall Flashing; ILLINOIS PRODUCTS CORPORATION, CCW 705 TWF; CARLISLE COATINGS AND WATERPROOFING, POLYGUARD 400 TWF, ADVANCED BUILDING PRODUCTS Strip -N -Flash
 - 3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy. Tensile Strength - ASTM D412C 14%, Puncture Resistance - ASTM E154 300 lbs. minimum
 - a. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 40 mil thick with thick coating of adhesive.

- b. Manufacturer: DUPONT; HOHMANN & BARNARD, INC; MORTAR NET SOLUTIONS; WIRE-BOND.
 - 4. Stainless Steel Core Flexible Flashing with Drainage Fabric (SSCFF).
 - a. Material: Composite with stainless steel with adhesive polymer fabric laminated to one stainless steel and non-woven drainage fabric laminated to opposing face with adhesive.
 - 1) Stainless steel: type 304, ASTM A240
 - 2) Polymer fabric; laminated back face to stainless steel core.
 - 3) Non-woven drainage fabric: Fabric laminated to front face stainless steel core.
 - b. Manufacturer: YORK MANUFACTURING, INC.; York Flash-Vent SS, STS COATINGS, INC.; Wall Guardian Venting Stainless Steel TWF, BUILDING MATERIALS WEST COMPANY, INC.; Evacu-Flash SS
 - c. Note: Eliminate cavity protection material if SSCFF used.
 - d. Note: Eliminate drip edge by terminating at brick face and sealing down the flashing if SSCFF used. However, provide drip edges above windows and doors for replacement ease.
- B. Sheet Metal Drip Edge: Fabricated from 0.015" thick by minimum 3" wide stainless steel with hemmed edge. Comply with requirements specified in Section 07 62 00 - Flashing and Sheet Metal.
 - 1. Product: HECKMAN BUILDING PRODUCTS, IPCO stainless steel drip edge, ILLINOIS PRODUCTS CORPORATION or HOHMANN & BARNARD, INC.
- C. Preformed Masonry Control Joint Filler
 - 1. General: Extruded rubber complying with ASTM D2240, general purpose grade.
 - 2. Flange: Where applicable, locate as required for the particular joint configuration.
 - 3. Manufacturer: Rapid Regular Control Joint by DUR-O-WALL; HOHMANN & BARNARD, or equal.
- D. Brick Cleaning Compound: PROSOCO Sure Klean 600 Detergent; or equal commercial cleaning solution by NATIONAL CHEMSEARCH or AMERICAN CALMAL that will not harm masonry or adjacent materials and is acceptable to the masonry manufacturer. Cleaners containing muriatic acid are not acceptable.
- E. Cell Vent: Polypropylene Model #QV Quadro Vent by HOHMANN & BARNARD; Model D/A 1006 by DUR-O-WALL or equal by HECKMANN. Color as selected by Architect.
- F. Isolation Liners: Locate between steel columns and masonry. Asphalt impregnated cellular paper, similar to WILLIAMS PRODUCTS Columns Boxboard, 1/4" single thickness or 1/2" double thickness. Use double thickness except where wall dimensions do not permit, then use single thickness.

- G. 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 0.142" steel wire, hot-dipped galvanized after fabrication.
 - 1. D/A 811 DUR-O-WALL
 - 2. D/A 816 DUR-O-WALL
 - 3. No. 376 Rebar Positioner HECKMAN
 - 4. #RB Rebar Positioner HOHMANN & BARNARD
 - 5. #RB-Twin Rebar Positioner HOHMANN & BARNARD
 - 6. Double O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA
 - 7. O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA

- H. Adhesive Anchor Bolts
 - 1. In hollow CMU: Adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors with 4-1/4 inch embedment. (Minimum allowable shear 900 pounds; minimum allowable tension 250 pounds/anchor.)
 - 2. In solid grouted CMU: Adhesive anchor systems. Use 1/2 inch diameter anchors with 4-1/4 inch embedment; (minimum allowable shear 2600 pounds; minimum allowable tension 2000 pounds/anchor).

- I. Cavity Protection Material: Minimum 1" thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings.
 - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mortar Net; MORTAR NET USA, LTD.
 - b. Mortar Break; ADVANCE BUILDING PRODUCTS
 - c. Mortar Net; MASONRY REINFORCING CORPORATION OF AMERICA.
 - d. Mortar Net; HOHMANN & BARNARD, INC.
 - e. CavClear Masonry Mat; ARCHOVATIONS
 - f. Mortar Stop; POLYTITE MANUFACTURING CORP.
 - g. Mortar Grab: IPCO PRODUCTS.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the substrates, structure, and installation conditions. Do not proceed with unit masonry work until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Brick
 - 1. Wet brick having ASTM C67 absorption rates greater than 0.025 oz. per square inch per minute. Use wetting methods which ensure that each masonry unit is nearly saturated, but surface dry when laid. During freezing weather, comply with the recommendations of BIA.
 - 2. Except for absorbent units specified to be wetted, lay masonry units dry.
- B. Concrete Masonry Units: Lay masonry units dry. Do not wet concrete masonry units.
- C. Establish lines, levels, and coursing.
- D. Coordination: Identify items that are to be built-in to masonry wall as specified in other section of these specifications. Verify that these items are available prior to commencing masonry work in these areas. Coordinate sizes of required openings. Items include, but are not necessarily limited too:
 - 1. Access doors
 - 2. Recessed fire extinguisher cabinets
 - 3. Recessed toilet accessories

3.03 INSTALLATION - GENERAL

- A. Build walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Cut masonry units using motor-driven masonry saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full-size units without cutting wherever possible. Provide 100% solid units where webs would be exposed.
- C. Construction Tolerance: Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
 - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than $\frac{1}{4}$ " in 20 feet, nor $\frac{1}{2}$ " maximum.
 - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than $\frac{1}{4}$ " in 10 feet, nor $\frac{1}{2}$ " maximum.
 - 3. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than $\frac{1}{4}$ " in 20 feet, nor $\frac{1}{2}$ " maximum.
 - 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus $\frac{1}{8}$ ", with a maximum thickness limited to $\frac{1}{2}$ ". Do not vary from bed-joint thickness of adjacent courses by more than $\frac{1}{8}$ ".
 - 5. For exposed head joints, do not vary from thickness by more than plus or

minus 1/8". Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8".

- D. Openings: Form all chases and openings required for piping and other trades. After work is completed, close openings with masonry and seal around penetration.
- E. Seal all anchor penetrations and tears in the vapor barrier as a result of the work installed under this section.

3.04 ERECTION - BRICK AND CONCRETE MASONRY

A. Masonry

1. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths, and to properly locate returns and offsets. Avoid the use of less than half-size units at corners, jambs and other locations.
2. Lay up walls plumb and true to comply with specified tolerance. Provide courses level, accurately spaced and coordinated with other work.
3. Pattern Bond: Lay exposed masonry in running bond with vertical joint in each course centered on units in courses above and below. Bond and interlock each course of each wythe at corners. Do not use units with less than 4" of horizontal face dimensions at corners.
4. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and slabs. Maintain 3/8" joint widths, except for minor variations required to maintain bond alignment.
5. Joints
 - a. Exposed: Cut flush and finish (tool) with hardened metal tool to form a concave compressed joint. Same methods and types of tools to be used by all masons working on project.
 - b. Concealed: Cut flush and trowel point.
6. Compress and cut joints flush for masonry foundation walls.
7. Lay brick masonry units with completely filled bed and head joints. Butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

- B. Horizontal Wall Reinforcement: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
 - a. Reinforcement above is in addition to continuous reinforcement.
4. Cut or interrupt joint reinforcement at control and expansion joints, unless

- otherwise indicated.
5. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
 6. Provide additional reinforcement continuous in first joint above openings and in first joint below openings not extending to floor. Extend additional reinforcement a minimum of 4'-0" beyond opening.
- C. Brick Veneer/Metal Stud Wall Ties: Install in accordance with manufacturer's instructions. Locate one tie per every two square feet of wall surface and in accordance to BIA Technical Notes No. 44B.
- D. Cavity Wall Construction
1. Keep the air space clear and clean of all mortar droppings and other debris.
 2. Provide weeps spaced 24 inches apart.
 3. Provide cavity drainage protection or similar methods to ensure that weeps are clear of mortar droppings and drain to the building exterior.
 4. Make weep holes by methods subject to Architect's approval
 - a. Gray Mortar: Louvered PVC weep, similar to HOHMANN & BARNARD #343 located in brick head joints.
 - b. Colored Mortar: Cellular weep vents located in brick head joints.
 - c. Tube and Cotton Wick: Medium Density Polyethylene
 5. Provide top of wall weep ventilation with cellular vent at 24 inches apart.
- E. Bearing Points: Where a lintel, bar joist or similar member bears directly on concrete masonry, fill the cores of the two blocks courses directly under the member with grout to a limit of 16 inches beyond the end of the member.
- G. Control and Expansion Joints: Provide control joints for exterior and interior masonry construction in accordance with NCMA-TEK Bulletins 10-1A and 10-2B and BIA Technical Notes 18A. Verify control
1. Unless otherwise indicated, provide control joints in masonry walls at maximum 24 foot intervals for exterior walls, maximum 30 foot intervals for interior walls, and at intersections of walls, except corners.
 - a. Exact locations as determined by the Architect if not specifically dimensioned. Verify locations do not conflict with structural shear wall requirements.
 - b. If drawings do not indicate all control joints based on these maximums, allow for additional joints to be determined by the Architect prior to commencement of masonry work.
 - c. Locate control at steel columns.
 2. Provide 3/8" wide control joints, unless otherwise indicated. For joints in exterior walls, build in control joint filler strips as masonry wall is laid up allowing 3/4" for sealant and backup on each side of wall. For interior control joints, no filler is required; rake joint approximately 3/4" deep and install sealant and backup. See Section 07 92 00, Sealants.

3. Do not carry horizontal joint reinforcement through control joint.
4. Maintain lateral support of continuous wall at control joint in concrete block backup walls by using control joint filler, tongue and groove type control joint block, or similar type approved method. In cavity walls, place metal "Z" wall ties 16" on-center vertically in brick on each side of control joint.
5. Maintain lateral support of intersecting interior masonry walls with wire mesh ties placed across joint between walls, spaced 16" on-center vertically.

H. Thru-Wall Flashing

1. Provide at the following locations:
 - a. In first course above steel supports and shelf angles.
 - b. In first course above lintels at louvers, windows and doors.
 - c. In first course above grade around entire building perimeter.
 - d. In exterior walls that project above adjacent lower roof.
 - e. Below sills of window, louver and similar type wall openings.
 - f. Below parapet wall caps.
 - g. Other through wall flashing conditions where indicated.
2. Ensure that flashings drain to exterior.
3. Prepare masonry surfaces smooth and free of projections which could puncture flashing.
4. Lay on slurry of fresh mortar and cover with mortar.
5. End Dams: Provide end dams at all locations where flashing terminates within a wall. Over openings, carry minimum 6" beyond end of steel lintel and turn up edges to form pan. All corners folded, not cut.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
7. Top Edge Concealed Terminations: 8 inch minimum above drainage plane.
8. Seal around all penetrations with mastic before covering with mortar.
9. Joints
 - a. Install in longest lengths and with fewest joints possible but not less than 20 feet between joints.
 - b. Lap ends minimum 6 inches and seal with full bed of mastic.
10. Continue flashings around corners and other gaps in shelf angles to prevent discontinuity.
11. Continue flashing through expansion joints.
12. Provide weeps at all thru-wall flashing locations. Space weeps as specified hereinbefore.

J. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material specified herein.

K. Masonry, non-bearing walls carried to structure above: Terminate at normal joint width below surface and leave joint open for sealants.

1. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Section 07 84 00,

Firestopping.

- L. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-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 before laying fresh masonry.
- M. 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.
- N. Steel Lintels: Install steel lintels at all masonry opening, whether indicated on the drawings or not. Provide minimum bearing of 8" on each jamb, unless otherwise indicated.

3.05 MORTAR

A. General

- 1. Batch Size: Controlled so that all material used within two (2) hours.
- 2. Mortar on Board
 - a. Keep well tempered with water so long as its cementing material has not started to set.
 - b. Do not retemper if initial set of cementing material has been reached, or if mortar has stiffened greatly.
- 3. Anti-freeze Admixture: Not permitted.
- 4. Water Repellent Admixture: Use with brick and concrete block exposed to exterior, mix as recommended by manufacturer.

B. Mixing

- 1. Machine mix dry in a batch mixer with care taken in adding water to mix to avoid overwetting.
- 2. Do not retamper in mixer at any time.
- 3. Continue mixing for a minimum of five (5) minutes after all materials are in mixer.

- C. Recharging: Completely empty and clean mixer before recharging.

3.06 PROTECTION

- A. Brace all walls while in green condition.

- B. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

- 1. Extend cover a minimum of 24 inches down both sides and hold cover

- securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

3.07 REINFORCED MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
 1. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both horizontal directions.
 3. Use "Coarse Grout" per ASTM C 476 for filling spaces 4" to 10" in both horizontal directions.
 4. Use 3000 psi concrete for filling spaces 10" or larger in both horizontal directions.
- C. Bond Beams: Reinforce as indicated and fill with grout. Position reinforcement accurately at the spacing indicated. Place horizontal reinforcement as the masonry work progresses.
- D. Reinforced Concrete Masonry Walls: Install and align grout block units to provide continuous vertical voids in walls. Install reinforcing steel as work progresses. Use horizontal bars to position vertical bars. Fill grout block units cores solid with concrete fill.
 1. Place concrete fill in maximum 4'-0" vertical lifts. Recess top of fill minimum 1-1/2" below top of course to form a key with the following lift. Comply with NCMA TEK Bulletins 3-2, 3-3A and 14-2 recommendations.
 2. Coordinate placement of reinforcement and concrete fill with cast-in-place concrete and precast concrete work to provide continuous vertical and horizontal reinforcement full height of indicated walls.

3.09 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged. Provide new units to match adjoining units and install in fresh

mortar pointed to eliminate evidence of replacement.

- B. During the tooling of joints, enlarge all voids or holes, and completely fill with mortar. Point up all joints at corners to provide a neat, uniform appearance.
- C. Cleaning - Brick Masonry: Clean all exposed brick masonry. Cleaning agents and methods subject to Architect's approval. Protect all stone. Damaged materials and work replaced at Contractor's expense.
 - 1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each masonry cleaner to test panel areas to determine dilution rates, dwell times, number of applications, compatibility, effectiveness, application procedures, effects of pressure rinsing, and desired results.
 - 2. Apply masonry cleaners and stain removers to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the Architect.
 - 3. Test Area Requirements:
 - a. Size: Minimum 5 feet by 4 feet each.
 - b. Locations: As determined by the Architect.
 - c. Masonry Cleaners: Number of test panels as required to completely test each masonry cleaner with each type of substrate to be cleaned.
 - 4. Test all cleaning effluents generated by the masonry cleaning of the test panels to determine any hazardous characteristics. Comply with applicable federal, state, and local environmental regulations including testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes.
 - 5. Muratic acid cleaning of brick masonry not permitted. Install and protect installed brick masonry so that acid cleaning is not required at completion of the work.
- D. Cleaning – Concrete Masonry: During construction of exposed CMU, minimize mortar and grout smears on exposed surfaces. Dry brush CMU surfaces at the end of each days work and after final pointing. Remove mortar stains and dirt from exposed surfaces.
 - 1. Cleaning Solutions: Where cleaning solutions are required, they shall be provided at no additional cost to the Owner. Cleaning solutions must be approved by Architect and spot tested prior to use.
- E. Area Cleaning: Clean floors of all mortar droppings, including floor surfaces of accessible chases.

END OF SECTION

SECTION 04 72 00

CAST STONE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Design and fabricate cast stone elements as indicated on the drawings. Work includes, but is not necessarily limited to the following:
 - 1. Wall caps.
 - 2. Other shapes as indicated.
 - 3. Non-staining setting mortar and joint sealant.
 - 4. Accessories to complete the work.

1.02 RELATED SECTIONS

- A. Mortar: Section 04 00 00.
- B. Sealant: Section 07 92 00.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Submit for all items; include the following as applicable:
 - 1. Details and sizes of stones.
 - 2. Arrangement of joints.
 - 3. Connection details.
 - 4. Bonding.
- C. Samples: Submit samples representative of finished stone pieces showing full range of color and texture. Resubmit until acceptance by the Architect. Approved samples will be used in the field as a basis of quality for cast stonework submitted on the project.
- D. Qualification Data: For manufacturer.

1.04 QUALITY ASSURANCE

- A. Acceptable Manufacturers: Minimum of five (5) years continuous production experience in cast stone work of quality and scope required on this project , and is a plant certified by the Cast Stone Institute.
- B. Installer Qualifications: Experienced mason regularly engaged for at least five (5) years in installation of cast stone elements similar to those required on this project.

- C. Comply with ASTM C1364.

1.05 JOB MOCK-UP

A. General

1. After standard samples are accepted for color and texture, submit full scale pieces meeting design requirements.
2. A mock-up panel for the exterior masonry is to be built on the site, as specified in Section 04 00 00.
 - a. Wall Caps: Submit full size samples of shapes that will be utilized in the finished work. Samples of water table band and wall cap will be used in constructing the sample panel specified in Section 04 00 00.
3. Mock-up to be standard quality for cast stone work when accepted by the Architect.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling

1. Transport and handle cast stone with equipment to protect units from dirt and damage.
2. Do not place on ground.
3. Place nonstaining resilient spacers of even thickness between each element.
4. Support cast stone during shipment on expanded polystyrene or similar nonstaining shock-absorbing material.

B. Storage

1. Store to protect from contact with soil and from other damage.
2. Store in same position as transported with nonstaining resilient supports located in same position as when transported.
3. Store on firm, level and smooth surfaces.
4. Place stored cast stone so that identification marks are discernible.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: White Portland Cement, ASTM C150, Type I or III containing not more than 0.60 percent total alkali when tested according to ASTM C114. .
 1. Use same brand, type and source of supply throughout.
- B. Fine Aggregate: Graded and washed manufactured limestone sand meeting ASTM C33; gradation and colors as needed to produce required cast stone

textures and colors.

1. Use same type and source of supply throughout.
- C. Course Aggregate: Graded and washed crushed limestone meeting ASTM C33; gradation and colors as needed to produce required cast stone textures and colors.
1. Use same type and source of supply throughout.
- D. Color: Inorganic, natural or inorganic iron oxide pigments meeting ASTM C979 excluding the use of a cement grade of carbon black pigment.
1. Pigment manufacturer must certify that pigment is lime-proof.
 2. Amount: Not to exceed 10% by weight of cement.
 3. Manufacturer: SGS Colors by SOLOMON GRIND CHEM SERVICE; DAVIS COLORS or equal.
 4. Color: Where required, as selected by Architect.
 - a. Match existing stone. Color match will be determined after cleaning the existing stone.
- E. Admixtures: Use only admixtures specified or approved in writing by Architect.
1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
 3. Water Repellent Admixture: MASTERBUILDERS Rheomix 235, EUCLID CHEMICAL, SONNEBORN. Cast stone fabricator must submit certification that proposed water repellent admixture has been used in cast stone work similar to that used on this project.
 4. Air-Entraining Admixture: ASTM C260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
 5. Water-Reducing Admixture: ASTM C494, Type A.
- F. Water: Potable.
- G. Mortar: Type N; see Section 04 00 00.
- H. Anchors (Embedded in Cast Stone): Stainless steel, AISI Type 302/304 of type and size determined by fabricator to provide permanent anchorage. Minimum capacity 3 kips.
- I. Reinforcing
1. Bars: ASTM A615, Grade 40 or Grade 60, when required, as determined

by manufacturer, for safe handling, setting and structural stress. Provide galvanized or epoxy coated.

- a. Fiber reinforced polymer bars or fiber reinforcement is acceptable per ASTM D7957/D7957M.
2. Wire: ASTM A82 Cold-drawn steel wire, ASTM A185 or ASTM A497 welded wire fabric reinforcement, or ASTM A184 steel bar or rod mat reinforcement may be used.
3. Cast Stone Panels: Reinforce as required for handling and to allow for temperature changes and structural stress. Provide a minimum steel reinforcement of 1/4% of the sectional area of the panel; place temperature in both directions when panel is greater than 12" in any direction.

2.02 MIXES

- A. Manufacturer: Responsible for mix design as required to achieve strength and surface finish desired.
- B. Compressive Strength - 28 Day: Minimum of 6500 psi per ASTM C1194.
 1. Tests: Perform in accordance with ASTM C31, ASTM C39 and ASTM C642, except that 2" cube specimens shall be used, oven dried in accordance with ASTM C97.
 2. Results: Determined by averaging three specimens per test.
 3. Divide compression test results by a factor of 0.8 when saw-cut or core drilled specimens are used.
- C. Water Absorption - Average: Maximum 6% dry weight per ASTM C1195.
- D. Air Content - ASTM C173 or C 231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.
- E. Freeze-thaw - ASTM C666 as modified by ASTM C1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing.
- F. Linear Shrinkage - ASTM C 426: Shrinkage shall not exceed 0.065%.

2.03 COLOR AND FINISH

- A. Color and Texture: Submit cast stone samples for final selection of color and texture.
 1. Color: Match existing building stone as approved by Architect.
 2. Finish: Match existing stone as approved by Architect.

2.04 CAST STONE UNITS

- A. Provide cast stone units complying with ASTM C1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C1364.
- B. Fabricate units with sharp arrise and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 1. Provide suitable washes on all exterior copings, projecting courses and pieces with exposed top surfaces.
 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 3. Provide drips on projecting elements unless otherwise indicated.
- C. Fabrication Tolerances:
 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- D. Cure units as follows:
 1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
 2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F or above.
 - d. No fewer than eight days at mean daily temperature of 45 deg F or above.
- F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive cast stone and do not proceed until defects detrimental to the finished work are corrected, including the moisture protection, structural supports, provisions for expansion, or any other conditions which might affect the finished work in appearance, watertightness or integrity of the complete installation.
- B. Verify all measurements and dimensions; coordinate the installation of inserts for this work; and coordinate and schedule this work with the work of other trades.
- C. Review shop drawings of items or assemblies related to the support or anchorage of cast stone work, including requirements for clearances for proper installation.

3.02 INSTALLATION

- A. Do not use cast stone with chips, cracks, voids, stains or other defects which would be visible in the finished work. The setting of any damaged or defective stone is at Contractor's risk of removal.
- B. Set cast stone work accurately, straight, level, plumb and square in accordance with Shop Drawings.
- C. Unless otherwise indicated, set stone in full mortar bed with vertical joints flushed full. Anchors and dowels shall be firmly placed and all anchor holes and dowel holes and similar holes filled completely with mortar.
 - 1. Copings, projecting belt courses, and in general, all stone areas either partially or totally horizontal: Set with unfilled vertical joints. After setting, insert back-up material or backer rod, prime stone ends and seal, all in accordance with Section 07 92 00.
 - 2. Joints Between Cast Stone and Masonry: Rake joints $\frac{3}{4}$ " deep and seal with non-staining joint sealant in accordance with Section 07 92 00. This requirement takes precedence over joint conditions indicated on drawings.
- D. Thoroughly wet stones prior to setting.
- E. At sealed or pointed joints, rake joints to a depth of $\frac{3}{4}$ ". Sponge off face of stones to remove excess mortar.

3.03 TOLERANCES

- A. Variation from Plumb: Do not exceed $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- B. Variation from Level: Do not exceed $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than $\frac{1}{8}$ inch in 36 inches or one-fourth of nominal joint width, whichever is less.

- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.04 PATCHING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect. Repair of cast stone shall be done only by mechanics skilled in this type of repair work, with materials furnished by manufacturer and under manufacturer's direction
- B. Before pointing, clean face of cast stone with a fiber brush, soap powder and water, and thoroughly rinse with clean running water.
 - 1. Remove excess mortar from face of stone.
 - 2. No acids or prepared cleaners are permitted without the approval of cast stone manufacturer and Architect.

3.05 POINTING AND SEALING

- A. Dampen joints prior to pointing.
- B. Point stone joints to a concave surface with pointing mortar. See Section 04 00 00 for mortar.
 - 1. Pointing in freezing weather or in locations exposed to hot sun, unless properly protected, is not permitted.
- C. Seal head joints, where left open for sealing, with sealant in accordance with Section 07 92 00.

3.05 INSPECTION AND ACCEPTANCE

- A. Cast stone shall show no obvious repairs or imperfections other than normal color variations when viewed with the unaided eye at a 20 foot distance in good typical daylight illumination.
- B. Applicable Standards for Inspection and Quality Control: ACI Committee 311 Manual of Concrete Inspection and PCI MNL-117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

3.07 PROTECTION

- B. Protect cast stone at all times from drippings, welding spatter and damage by other trades during construction. Where necessary or directed, substantial non-staining wooden or other approved covering shall be placed to protect the work. Heavy polyethylene film or similar type material shall be used between cast stone and

wood. Maintain all protection until removed to permit final cleaning of cast stone work.

1. Protect cast stone during brick cleaning operations, unless cleaning solution has been approved for cast stone and tested in the field on actual cast stone samples.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.02 DESCRIPTION

- A. Work included: All labor and materials required to furnish and install structural steel work shown on the Drawings and required by these Specifications, including that shown on Mechanical or Electrical Drawings, or required in their Specification sections.
- B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.
- C. Work furnished but not installed under other Sections: Anchor rods, loose bearing and base plates, loose lintels, and connection hardware to be cast into concrete, masonry, or precast concrete.
- D. Work affected by others: Mechanical equipment support framing, equipment loads, framing around openings, and structure in any way related to mechanical requirements is shown for bidding purposes only. Responsibility for coordinating the work of this Section with these requirements is solely that of the Contractor. Contractor's review of shop drawings will be taken to indicate that this coordination has been completed.

1.03 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. By the American Institute of Steel Construction (AISC):
 - a. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - b. Specification for Structural Joints Using High-Strength Bolts.
 - c. Code of Standard Practice for Steel Buildings and Bridges.
 - d. Seismic Provisions for Structural Steel Buildings.
 - 2. By the American Welding Society (ANSI/AWS):
 - a. Structural Welding Code-Steel (AWS D1.1)
 - b. Symbols for Welding, Brazing, and Non-Destructive Testing (A2.4).

B. Fabricator's qualifications:

1. Minimum five years' continuous experience in the fabrication of steel for projects of similar quality and scope.
2. Membership in the American Institute of Steel Construction (AISC).
3. If Fabricator is not a member of AISC, in accordance with chapter M and N of the AISC manual, the following minimum shop inspections for structural steel fabrication are required:
 - a. Shop welding, high-strength bolting, and details.
 - b. Shop cut and finished surfaces.
 - c. Shop heating for straightening, cambering, and curving.
 - d. Tolerances for shop fabrication.
4. These inspections and certifications are to be paid for at the Contractor's expense and are treated as an additional item in fulfillment of project Special Inspections set forth by the Jurisdiction's requirements. Inspection Agency must be qualified to perform shop inspection with knowledge and experience of steel construction. Submit Inspector qualifications for approval by Architect.

C. Erector's qualifications: Minimum five years' continuous experience in similar steel erection.

D. Welders' qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.

1.04 PERFORMANCE REQUIREMENTS

A. Connections: Select or design connections per AISC standards for forces and moments provided on the Drawings.

1. AISC Code of Standard Practice Connection Design Option 2 (connection selected by and experienced steel detailer utilizing standard AISC connection tables) shall be used where only shear reactions are provided and the geometry complies with the limitations of the tables in the AISC Manual of Steel Construction.
2. Reactions provided are service level forces (ASD). Minimum shear reaction to be 15 kips. Shear reactions below 15 kips are not necessarily listed on the Drawings.
3. Minimum bolt diameter and grade is 3/4 inch diameter A325. Connection shall extend a minimum of one half the beam's 'T' dimension.

1.05 SUBMITTALS

A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the Fabricator, Erector, and Welder.

B. Shop Drawings: Provide dimensioned erection plans with appropriate sections and details including member piece details that include the following:

1. Include all shop and erection details, including cuts, copes, cambers, connections, holes, threaded fastener types, sizes and lengths, washers, and weld types, sizes, and lengths.
2. Include embedment layout drawings.
3. Include material specifications and finishes.
4. Indicate shop and field welds with symbols per ANSI/AWS A2.4

C. Certification: Submit, on request only, the following:

1. Certified copies of mill test reports with properly identified material.
2. Certificates of Compliance for:
 - a. Structural steel shapes.
 - b. Shear studs.
 - c. High-Strength threaded fasteners.
 - d. Direct-tension indicators.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Members to be hot-dip galvanized shall retain compliance with ASTM A6 after the galvanizing process. Non-compliance will be cause for rejection.
2. Deliver anchor rods and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions required for the installation of such items.

B. Storage:

1. Store steel at the site above ground on platforms, skids, or other supports.
2. Protect steel from corrosion.
3. Store packaged materials in their original unbroken packages.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural steel wide flange, W shapes:

1. $F_y = 50$ ksi, ASTM A992.

B. Structural steel M, S, HP shapes, Channels, Angles, plates, bars, etc.:

1. $F_y = 36$ ksi, ASTM A36.
2. $F_y = 50$ ksi, ASTM A572.

C. Structural steel tubing:

1. Round steel pipe: $F_y = 35$ ksi, ASTM A53, Type E or S, Grade B.
2. Square and Rectangular HSS: $F_y = 50$ ksi, ASTM A500, Grade C.

- 3. Round HSS: $F_y = 46$ ksi, ASTM A500 Grade C.
- D. Anchor Rods: Provide heavy washers for anchor rods.
 - 1. Threaded and nutted: ASTM F1554, Grade 36
 - 2. Hooked anchors: ASTM A307.
- E. High-Strength Bolts: ASTM A325 or A490.
- F. Post-Installed Anchors:
 - 1. Install post-installed anchors in accordance with the Manufacturer's installation instructions.
- G. Welding Electrodes: Conform to the requirements of ANSI/AWS D1.1, using Series E70 electrodes, appropriate for the materials being welded.
- H. Shop Paint Primer:
 - 1. Primer to be compatible with finish paint.
 - 2. Interior exposure, normally dry conditions (SSPC Environmental Zone 1A) or Exterior exposure, normally dry conditions (SSPC Environmental Zone 1B): SSPC Paint 25.
- I. Galvanizing Repair Paint: High zinc-dust-content paint for re-galvanizing field welds and repairs containing not less than 93 percent zinc dust by weight: SSPC Paint 20.

2.02 FABRICATION

- A. Conform to applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.
 - 1. Connection type is to be:
 - a. Snug-tight unless noted otherwise.
 - 2. Bolted connections shall be made with High-Strength bolts (A325 or A490). Standard bolts and nuts are permitted only where specified on the Drawings.
- B. Camber: Provide camber in beams as indicated on the drawings.
- C. Finishing: Ends of members in direct contact bearing, such as columns at their bases and splices, are to be "finished", as defined in the Code of Standard Practice.
- D. Bearing and base plates: Column base plates are to be shop attached. Beam bearing plates may be attached or loose.
- E. Holes: Drill or punch holes in members as required for passage of conduit and piping, and attachment of joists, nailers, etc. burning such holes is not permitted

without prior approval of the Architect. If opening is not shown on structural Drawings, obtain prior approval.

F. Cleaning:

1. Remove oil, dirt, loose mill scale, or other material that would impair welding performance of friction-type connections or adherence of concrete or sprayed-on fireproofing.
2. For steel that is to be painted, cleaning techniques are to be as required by the appropriate SSPC paint specification.

G. Shop Priming: Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar.
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.
6. Surfaces enclosed in interior; dry construction not exposed to view in finished structure.

H. Painting:

1. Steel not exposed to view in the finished structure need not be painted.
2. Steel exposed to view, except that to be galvanized is to be painted as follows:
 - a. Other interior exposure: Apply one-coat shop paint system in accordance with SSPC-PS 7.01. Apply two coats to surfaces inaccessible after assembly.

I. Galvanizing: Where required, galvanizing is to conform to ASTM A123 and A153. Except for bolts, nuts, and anchors, all galvanizing is to be done after fabrication.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section. This includes locations of anchor rods, bearing plates, bearing areas, and finished elevations of concrete and concrete masonry.
- B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.02 ERECTION

- A. Conform to the applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.

- B. The structure is designed to be self-supporting and stable after the building is fully completed. It is solely the Contractor's responsibility to determine erection procedure and sequence; and to ensure the stability of the building and its components and parts, and of the adequacy of temporary or incomplete connections during erection. This includes the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the Drawings. If applied, they shall be removed as conditions permit, and shall remain the Contractor's property.
- C. Safety: It is the Contractor's responsibility to follow all applicable safety codes and regulations governing this work.
- D. Clean bearing surfaces and other surfaces in permanent contact with each other prior to assembly.
- E. Splices are permitted only where indicated.
- F. Tolerances: Per AISC Code of Standard Practice.
- G. Field corrections of fabrication errors by gas cutting is not permitted in major members without prior approval of the Architect.
- H. Welds that are subject to foot traffic or are exposed to view in the finished structure are to be ground smooth and flush with adjacent surfaces.
- I. Touch-up painting: After erection, touch-up field connections and abrasions in the shop coat with same paint used for shop coat. Do not paint welds until they have been cleaned in accordance with AWS D1.1.

3.03 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 21 00

STEEL JOISTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. Work included: All labor and materials required to furnish and install steel joist work shown on the Drawings and required by these Specifications. Include all bridging, ceiling extensions, anchors, extended ends, bearing plates, and other accessories required for a complete installation.
- B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

1.03 QUALITY ASSURANCE

- A. Reference Standards, by the Steel Joist Institute (SJI) and the American Institute of Steel Construction (AISC):
 - 1. Standard Specifications for Open Web Steel Joists (K-series).
 - 2. Standard Specifications for Joist Girders
- B. Manufacturer's qualifications: A manufacturer certified by Steel Joist Institute (SJI) to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications".
- C. Welders' qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.
- D. Tolerances:
 - 1. Sweep: Maximum 1/480 of joist length.
 - 2. Spacing: Maximum 1" variation, throughout full joist length.
 - 3. Plumbness: 1/4 inch per foot of joist depth.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Provide a dimensioned layout or erection drawing that indicates mark, number, type, and location of all joists.

2. Indicated all bridging, including size, attachment to the joists, and anchorage of bridging at the ends of each line.
3. Indicate connection details including locations and details of bearing plates.
4. Indicate paint type, and all accessories required for the proper and complete installation of joists. Include handling and erection instructions.
5. For K-series special joists, provide load diagrams stating all distributed and concentrated loads applied to the joist. These loads shall correspond to the loads shown on the structural contract drawing.
6. Shop Drawings are to be sealed by a Professional Engineer registered in the same state as the project site.

B. Certification: Submit, on request only, the following:

1. Certified copies of mill test reports.
2. Inspection reports for field connections, including splices.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJl's "Specifications".
- B. Deliver anchor rods, bearing plates, and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions for the installation of such items.
- C. Provide tags on joists for ready identification.
- D. Store joists off ground, in upright position. Protect from corrosion and keep free of dirt and other detrimental substances.
- E. Store and handle joists to avoid damage. Repair or replace damaged joists.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Joist: Comply with the requirements of SJl "Specifications".
- B. Bearing Plates, Bridging, and Accessories: ASTM A36, $F_y = 36$ ksi.
- C. Anchor Rods: ASTM A307.
- D. Paint: SSPC-Paint 15, or manufacturer's standard red oxide or gray complying with performance requirements of SSPC-Paint 15, except that black asphalt is not permitted. Do not paint steel to receive fire-proofing.
- E. Welding electrodes: Conforms to requirements of ANSI/AWS D1.1 using Series E70 electrodes, appropriate for the material being welded.

2.02 DESIGN CRITERIA

- A. Round bar chords are not permitted.
- B. Extended ends are to be designed for loads on Drawings. If none are given, design for the same load (lbs./lin. ft.) as the joist.
- C. Provide ceiling extensions in areas scheduled to receive contract or suspended ceilings.
- D. Bridging:
 - 1. For K-Series joists, use horizontal bridging, except where diagonal bridging is specifically shown on Drawings. Connections to joists and to each other at points of intersection to be welded.
 - 2. Bridging shown on the drawings is schematically indicated. Detail, fabricate, and install bridging in accordance with SJI requirements. Provide additional bridging as required for stability.
 - 3. Design roof joists and bridging for a net uplift (ASD) of 10 psf unless higher loading is indicated on plans. Provide additional bridging as required.

2.03 FABRICATION

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section.
- B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.02 ERECTION

- A. General: Install joists and accessories plumb, square and true to line and in conformance with the requirements of SJI "Specifications".
- B. Install temporary and permanent bridging with joist erection before joist support construction loads. Comply with Erection Stability and Erection requirements of SJI "Specifications".
- C. Concentrated loads: Provide reinforcing for chords or webs as required at points of concentrated loads.
- D. Touch-up painting: after installation, touch-up unpainted areas, connections, and abrasions in the shop coat with the same paint used for the shop coat.

3.03 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 31 00

METAL DECKING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. Work included: All labor and materials required to furnish and install metal decking and accessories including closures, hanger tabs, edge filler plates, ridge and valley plates, end enclosure angles, and roof sump pans were shown on the Drawings and or required for a complete installation.
- B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

1.03 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Specification for the Design of Cold-Formed steel Structural Members, current edition, by the American Iron and Steel Institute.
 - 2. Design Manual for Floor Decks and Roof Decks, by the Steel Deck Institute (SDI)
- B. Manufacturer's qualifications: Regularly engaged in the manufacture of similar decking.
- C. Erector's qualifications: Minimum five years' experience in installation of similar decking.
- D. Welder's qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society as given in AWS D1.1.

1.04 SUBMITTALS

- A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the manufacturer, erector, and welders.
- B. Shop Drawings:

1. Provide a deck placement plan that indicates mark, number, type, finish, dimensions, and location of deck units. Include details and locations of sump pans, openings, and all accessories.
2. Indicated method of attachment to supporting members.
3. Indicate details and installation instructions for all types of decking and all accessories.
4. Indicate sequence of installation, where critical.

C. Manufacturer's Certification:

1. Certify compliance with structural criteria. Published load tables and literature are usually acceptable. Provide design calculations on request only.
2. Certify compliance with finish criteria with test reports as required.
3. Furnish evidence of listing in Underwriter's Laboratory for the specified U.L. Design Assembly.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Prevent damage to deck or finish during delivery, handling, and storage. Store on blocking or platforms, off the ground, with one end elevated for drainage.
- B. Protect from rusting with waterproof covering, or storage under roof. Follow manufacturer's instructions for storage and protection of deck surfaces that are not painted or galvanized.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Roof deck [without lightweight fill]:
 1. Type: 1½" inches deep, 20 ga. Minimum, wide rib (per SDI).
 2. Finish: Galvanized.
- B. Metal Form Deck (Conform/Centering):
 1. Type: 0.6 inches deep, 26 ga. Minimum, wide rib, corrugated.
 2. Finish: Galvanized.

2.02 MATERIALS AND FINISHES:

- A. Materials: Steel sheet conforming to ASTM A653 or A611 with minimum yield strength of 33 ksi.
- B. Finishes:
 1. Galvanized: Conform to ASTM A653, G60.
 2. Phosphatized/Painted: After sheet is phosphatized, apply flexible primer paint, baked on the underside. Minimum dry film thickness to be 0.5 mil. Painted: Clean units of scale and rust, phosphatize or bonderize, then

apply a coat of enamel, vinyl, or epoxy paint. Paint to meet the following criteria:

- a. Exposure to salt spray per ASTM B117 for 72 hours. After exposure, there is to be no evidence of rusting, the degree of blistering is to be not worse than No. 8F per ASTM D714, and undercutting at the scribe to be not worse than No. 10 per ASTM D1654.
 - b. Water immersion per ASTM D870 for 250 hours. After immersion, degree of blistering is to be not worse than No. 8 per ASTM D714.
- C. Accessories: Same material and finish as deck units, except that interior closures may be of compressible material.
- D. Sound insulation: Glass fiber type. Required in areas with acoustical roof deck.
- E. Field touch-up paint:
1. For painted deck: use air-drying paint similar to shop coat.
 2. For galvanized deck: use zinc chromate paint.

2.03 FABRICATION

- A. Units are to be continuous over at least three spans, where possible. Where units are single or double-span, use heavier gauge if required for stress or deflection control. End laps are to occur over supports.
- B. Units are to have nested side laps, except for metal centering units.
- C. Decking shall be finished such that field paint or sprayed fireproofing can be applied without further preparation.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section.
- B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.02 ERECTION

- A. Install decking in accordance with approved Placement Drawings.
- B. Tolerance: Align adjacent units with 1/4 inch in 40 feet.
- C. Attach metal deck to supports as indicated in the Structural Drawings and should resist the following:

1. Welding: Attach supports by welding from topside only. Any welds that burn hole in decking or supporting member will be rejected. Minimum size and spacing of welds to be as recommended by the manufacturer or as shown on the Drawings. Additional requirements are as follows:
 - a. Roof Deck: Attach to resist the required gross uplift force, but not less than 45 pounds per square foot in eave overhang areas; and not less than 30 pounds per square foot in all other areas
Minimum attachment is to be 5/8-inch diameter fusion welds spaced at 6-inches at end laps and at 12-inches at intermediate supports, including side laps.
 - b. Metal Form Deck: Use manufacturer's standard welding washers. Minimum attachment is to be 5/8-inch diameter fusion welds spaced at 15-inches at end laps and at 30-inches at intermediate supports.
 2. Direct Fastening: Attach to supports by direct fastening from topside only. If direct fastening is preferred as an alternate by the Contractor, submit signed and sealed shop drawings indicating fastener size and spacings that meet or exceed the welded connection capacity of the deck as indicated in the structural drawings.
- D. Sidelap Fastening: Method as recommended by manufacturer. Spacing not to exceed 3-feet.
- E. Closures: Install in deck flutes over supports or other construction at building perimeter and a perimeter of interior rooms. Set in a true even line, flush with construction below, eliminating any shelf or pocket. Closure are to be accurately shaped and installed, to provide a tight fit.
- F. Openings: Field cut small openings, bevels, miters, etc. as required. Provide additional support for openings exceeding 9-inches in width.
- G. Hanging Loads: Do not hang items other than suspended ceilings from the underside of metal decks, unless specifically approved by the Architect.
- H. Construction Loads:
1. Do not use deck as storage or working platform until it has been permanently attached to supports. Assure that construction loads do not exceed the carrying capacity of the deck.
 2. Deck as formwork: In metal deck applications which receive concrete fill, the deck is designed to support the self-weight of deck, concrete and a uniform construction live load of 20 psf which is considered adequate for typical construction applications that consist of concrete transport and placement by hose and concrete finishing hand tools. Bulk dumping of concrete using buckets, chutes, hand carts, or the use of heavier motorized finishing equipment such as power screeds may require redesign of the deck. Notify the Engineer-of-Record once means-and-methods of concrete placement are established to determine what deck or framing modifications are required.

I. Repair and Touch-up:

1. At areas where deck will be exposed to view, remove and replace any units with damage or defect that cannot be concealed by painting.
2. Where deck will not be exposed to view, repair any cuts and holes with plate of same gauge as deck.
3. Touch-up all damaged areas of finish, on both top and bottom sides of deck.

3.03 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. All labor and materials required to design, furnish and install the light gage metal framing as shown on the drawings and required by these specifications. Light gage metal framing includes:
 - 1. C-shaped, load-bearing steel studs.
 - a. Exterior walls.
 - b. Interior partitions to receive equipment system specified elsewhere.
 - 2. Exterior soffits.
 - 3. Related accessories and necessary fasteners to complete the system.
- B. Provide openings and special framing required by other trades. Equipment framing, loads, openings and structure are shown for bidding purposes only. Obtain approval of other trades before proceeding with such work. Coordinate work with mechanical and electrical requirements.
- C. Field measure existing construction to ensure proper coordination and fit of new work.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Interior partition wall metal studs: Section 09 21 16.
- C. Adult Changing Station: Section 10 28 13.

1.03 REFERENCES

- A. Standards
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A653 "Steel Sheet, Zinc-Coated (Galvanized) or Zinc—Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process".
 - b. ASTM C955 "Standard Specification for Cold Formed Steel Structural Framing Members.
 - c. ASTM C1007 "Standard Specification for installation of Load Bearing (Traverse and Axial) Steel Studs and Accessories".
 - d. ASTM A1003 "Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing

Member

2. American Welding Society (AWS):
 - a. AWS A2.4 "Symbols for Welding and Nondestructive Testing."
 - b. AWS D1.1/D1.1M "Structural Welding Code - Steel."
 - c. AWS D1.3/D1.1M "Structural Welding Code - Sheet Steel."
3. Association of Wall and Ceiling Industries - International (AWCI):
 - a. EMLA-920.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of cold-formed metal framing and accessory required.
- B. Shop Drawings: Submit placement drawings for framing members showing size and gage designations, number, type, locations and spacing. Indicate supplemental strapping, bracing, bridging accessories and details required for proper installation.
 1. Include fully dimensioned and detail drawings of special components not covered by Product Data.
 2. Indicate number of fasteners and/or size and length of weld.
 3. Include identification code for different gage studs, if any.
- C. Stud sizes and details shown on Drawings indicate general installation and connection methods. Complete detailing of components for all loads and forces is to be shown on the Shop Drawings. Design of any non-standard conditions not detailed on the Drawings shall be provided by a registered professional Engineer licensed in the state of Ohio, employed by the light gage metal framing contractor. No changes from sizes and installation methods shown will be permitted without the express written agreement of the Architect.
- E. Manufacturer's Certification: Submit written evidence of having a minimum of 5 years' experience on projects of similar type and scope, including a description of physical facilities, quality control, methods, personnel experience and erection capabilities.
- F. Research Reports:
 1. For cold-formed metal framing. Steel framing manufacturer to have a third-party evaluation report for its products that are reviewed to the local building code or its model code

1.05 QUALITY ASSURANCE

- A. Component Design Standards: Comply with American Iron and Steel Institute (AISI S100) "Specification for the Design of Cold-Formed Structural Steel Members", except as otherwise indicated.
 1. Manufacturer to confirm size and gage of materials suitable for application indicated and loaded as follows:

- a. Dead Load, Vertical: Attached materials.
 - b. Wind Load, horizontal (vertical for soffits), positive and negative:
 - 1) Exterior Walls: As indicated on Structural Drawings.
 - 2) Exterior Soffits: 40 psf.
 - 3) Interior: 5 psf.
 - c. Deflection
 - 1) Interior Gypsum Wallboard Applications: Not to exceed L/240.
 - 2) Soffit Applications: Not to exceed L/360.
 - 3) At Masonry Veneer Applications: Not to Exceed L/720.
 - 4) Rafter Application: Not to exceed L/240.
 - 5) Joist Application: Not to exceed L/240.
- B. Welding: Comply with American Welding Society (AWS) "Structural Welding Code." Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
 - 1. All welding of lightgage metal components shall be performed only by operators qualified per AWS D1.1, for the gage of materials being used.
- C. Provide each type of cold-formed metal framing required produced by one manufacturer.
- D. Manufacturer Qualifications: Member in good standing of the Steel Framing Industry Association (SFIA) or be a part of a similar organization that provides verifiable code compliance program.
 - 1. Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agency.
- E. 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-steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- F. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association (SFIA), or be a part of a similar organization that provides verifiable code compliance program.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.
- B. Protect metal framing members and accessories from rusting, damage and deterioration when stored at job site. Store metal framing off the ground on pallets, platforms or other supports, with suitable waterproof covering. Keep metal framing

free of dirt and other foreign material.

1.07 PROJECT CONDITIONS

- A. Coordinate metal frame positioning with trades furnishing items which attach to built-in members.
- B. Furnish in ample time, anchors, bolts, inserts, clips and other items furnished under this section but built in with work of other trades.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide materials manufactured by one of the following:
 - 1. CLARK/DIETRICH
 - 2. MARINO INDUSTRIES CORPORATION
 - 3. STEEL NETWORK

2.02 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100 and AISI S200 and ASTM C955 Section 8.

2.03 MATERIALS

- A. System Components: Provide manufacturer's standard steel runners, blocking, lintels, clip angles, shoes, reinforcements, fasteners and accessories with each type of metal framing required, as recommended by the manufacturer for the applications indicated, and as needed to provide a complete metal framing system.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Framing Members: Steel members conforming to ASTM A653 in the following grades:
 - a. 0.0538" 16 gauge and heavier: Grade 50, Class 1; minimum Fy = 50,000 psi.
 - b. 0.0428": 18 gauge and lighter: Grade 33; minimum Fy = 33,000 psi.
 - 2. Coating: CP 60
 - 3. All thicknesses above are minimum base metal.
- C. Steel Sheet for Vertical Deflection Drift Clips: ASTM A 1003/A 1003M, ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
- D. Framing Members: Provide punched members in types, depths and gages as

indicated. Provide "C" studs, minimum 1-5/8" flange with return typical unless otherwise specified.

1. Studs: Minimum 0.0428" unless otherwise indicated on drawings or recommended by manufacturer. 6" depth unless otherwise indicated.
 2. Exterior Soffit Framing (Main Runners and Hangers): 3-5/8" depth, 0.0428" unless otherwise indicated.
 3. Rafters and Joists: Minimum 0.0538" unless otherwise indicated on drawings or recommended by manufacturer. Depth as indicated.
 4. Tracks: Unpunched steel to match stud quality and finish.
 - a. Standard Leg: 1 1/4" minimum, 0.0428" minimum.
 - b. Slotted Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; punched with vertical slots in both legs. Studs should be positively attached to deep-leg track using vertical slots while allowing free vertical movement. Legs designed to support horizontal and lateral loads and transfer them to the primary structure.
 6. Bridging: Cold rolled channel, 1-1/2" minimum, 0.0538".
 7. Vertical Slide Clips: 12 gage galvanized steel to secure studs to structure and permit vertical movement of structure without loading stud.
- E. Galvanizing Repair Paint: Minimum 79% zinc dust by weight in dried film. TNEMEC COMPANY, INC., No. 92 Tneme-Zinc; ZRC Cold Galvanizing Compound by ZRC.
- F. Fasteners
1. Manufacturer's recommended self-drilling, self-tapping screws, bolts, nuts and washers. Hot-dip galvanized finished. Size suitable for conditions; per ASTM C1513.
 2. Anchorage Devices: Power actuated fasteners, drilled expansion bolts or screws with sleeves.
 3. Welding: Comply with AWS D1.1 when applicable, and AWS D1.3 for welding base metals less than 1/8" thick.

2.03 FABRICATION

- A. General: Framing components may be prefabricated into panels or similar items prior to erection. Fabricate panels or items plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels or items in a manner to prevent damage or distortion.
- B. Welding equipment and welder's qualifications to meet the requirements of AWS D1.1.
1. Qualify all welders.
 2. Evidence of questionable weld quality will be cause to reject all welding and require certification of all weld by an independent testing laboratory.
 3. Cost of testing to be borne by Contractor.

- C. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting or screw fasteners, as standard with manufacturer, if not otherwise specifically indicated.
- D. Wire tying of framing components is NOT permitted.

PART 3 EXECUTION

3.01 INSPECTION

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

3.02 ERECTION - WALLS AND PARTITIONS

- A. General
 - 1. Install cold-formed steel framing in accordance with ASTM C 1007 and AISI S200 "North American Standard for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.
 - 2. Erect all components in accurate locations as indicated, true to line, level and plumb in accordance with applicable standard specifications and manufacturer's published details.
 - 3. Install top and bottom tracks in accurate locations and anchor securely to structure.
 - 4. Seat studs in tracks with webs and flanges abutting track web.
 - 5. Erect studs plumb and aligned at centers indicated or specified and securely attach to flanges or web of both top and bottom tracks.
 - 6. Provide tracks in as long lengths as practicable; butt weld or splice where necessary.
 - 7. Leave ready to receive finish materials.
- B. Stud Spacing: 16" unless otherwise indicated.
- C. Multiple Studs: Provide double studs at all control joint locations and multiple at all openings wider than 2'-0". Provide additional studs where indicated on drawings or if indicated in manufacturer's instructions.
 - 1. Studs to be full height, unbroken between supporting structure.
 - 2. Secure multiple studs at openings together to properly transfer wind load.
 - 3. Number of studs at opening to be equal or greater than the number of studs displaced by the opening; heavier gage studs as approved by the

- Architect may be substituted to reduce the number of studs.
4. Provide back-to-back studs where indicated; screw stud webs together at 3'-0" intervals.
- D. Bridging: Install with bridging clips attached to studs with screws or weld as follows:
1. Walls from 6' to 10' high: One row at mid span.
 2. Walls over 10' to 14' high: Two rows equally spaced.
 3. Walls over 14': Rows spaced at 4'-0" On center.
 4. Walls with floating track condition: One additional row within 8" of top of studs.
- E. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight for loading resulting from item supported.
1. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
 2. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.
 3. Install two studs on each side of hollow metal jambs, the stud next to the jamb being a 16-gage reinforcing stud. A section of stud track shall be cut, fitted into the head jamb and screwed to the jamb studs. Short intermediate studs shall be erected between the stud track in the head jamb.
Run 1-1/2" channels horizontally at approximately mid-height of door frames, engaging the two studs at the door jamb, and the next two studs away from the jamb.
Channels shall be run through studs and either wedged or tied to provide a secure permanent stiffener.
 4. Provide extra studs, tracks, headers, etc., as required to frame the perimeter of all openings.
 5. At each portion of wall over 8 feet long between corner, intersections or openings, install 3/4" cold rolled channel stiffener horizontally through the center of the height of the studs, wedged or tied securely in place.
 6. Splices on load-bearing studs not permitted.
- F. Deflection: Install vertical slide clips or heavy gage top track at all attachments to structure subject to live load deflection in accordance with manufacturer's standard details.
1. Studs in "floating" track condition are to be cut 1" short in length to allow for vertical movement and not be rigidly attached to track, studs must engage track 3/4".
 2. Structure subject to live load deflection include roof beams and floor

systems above grade. Note additional bridging requirement.

G. Connections

1. All metal-to-metal connections screwed unless otherwise shown on drawings or required by conditions.
2. Welded connections, where required, to be as specified under "Fabrication". Attach metal studs to steel frame of building with a 3" of 1/2" fillet weld at each stud or equivalent capacity.
3. Track: Attach to concrete or masonry with 5/8" diameter anchor bolts at 4'-0" on center or equal.
4. Detail all connections on shop drawings.

3.03 ERECTION - EXTERIOR SOFFITS

A. General

1. Erect components in accurate locations as indicated, true to line, level and plumb in accordance with applicable standard specifications and manufacturer's published details.
2. Provide main runners suspended from rigid hangers in horizontal plane; system to be suitable to receive cross-furring or secondary framing systems specified with finish materials.

B. Main Runners

1. Install at 4'-0" centers with long web vertical.
2. Attach runners to hangers. Connection to hanger to support load indicated under "hanger" below.
3. Runners to run continuously over minimum 3 hanger supports.

C. Hangers

1. Install hangers at minimum 4'-0" centers, both directions and within 1'-0" of perimeter walls.
2. Attach hangers to structure above using methods approved by Architect. Note the following requirements:
 - a. Metal Deck: Made by approved metal fasteners into concrete slab; welding not permitted due to gage of decking; power actuated fasteners not permitted.
3. Brace hangers together at intervals of not more than 12 feet by attaching additional framing member on top of and perpendicular to the main runners.

D. Level system and leave ready to receive cross furring or secondary framing system provided with finish system.

E. Connections

1. All connections (runners to hanger, and hanger to structure) must support load of 500 pounds in tension and compression.
2. All metal-to-metal connections screwed, bolted or welded as required by conditions.
3. Power actuated fasteners not permitted.
4. Welded connections where required, to be as specified under "Fabrication".
5. Detail all connections on shop drawings.

3.04 FIELD PAINTING

- A. Touch-up shop-applied galvanized coating damaged during handling, installation and welding.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide miscellaneous metals as indicated on the drawings and specified herein. Work includes, but is not limited to:
1. Ladders.
 2. Stairs; work includes design.
 3. Loose steel lintels.
 4. Steel railings and handrails; work includes design.
 5. Loose leveling and bearing plates.
 6. Stair nosing.
 7. Miscellaneous steel framing and supports which are not indicated as part of structural steel work.
 8. Miscellaneous steel members to be embedded in concrete.
 9. Concrete filled steel pipe protection posts (pipe bollards).
 10. Curb and floor opening angles.
 11. Elevator sill angles and elevator intermediate structural supports.
 12. Counter supports.
 13. Supports above ceilings for ceiling hung items
 14. Anchors and fasteners.

1.02 RELATED SECTIONS

- A. Structural Steel: Section 05 12 00.
- B. Cold-Formed Metal Framing: Section 05 40 00.
- C. Painting: Section 09 90 00.
- D. Decorative Metals: Section 05 70 00.

1.03 REFERENCES

- A. Steel Construction Manual: American Institute of Steel Construction (AISC).
- B. American Welding Society (AWS).
1. AWS D1.1 - Structural Welding Code - Steel.
 2. AWS D1.3 – Structural Welding Code – Sheet Steel.
 3. AWS D1.2 – Structural Welding Code – Aluminum.
 4. AWS D1.6 – Structural Welding Code – Stainless Steel

C. American Society for Testing and Materials (ASTM).

1. ASTM A36 - Structural Steel.
2. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
3. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.
6. ASTM A307 - Carbon Steel Bolts and Studs Externally and Internally Threaded Fasteners, 60,000 PSI Tensile Strength.
7. ASTM A325 – Structural Bolts, Steel, Heat Strengthened, 120/105 KSI Minimum Tensile Strength.
8. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. ASTM A510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
11. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
13. ASTM A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
14. ASTM A611 - Steel Sheet, Carbon, Cold-Rolled, Structural Quality.
15. ASTM A780 - Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
16. ASTM A786 - Rolled Steel Floor Plates.
17. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
18. ASTM A276 - Stainless and Heat-Resisting Steel Bars and Shapes.
19. ASTM A48 - Gray Iron Castings.
20. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.
21. ASTM B308 – Aluminum-Alloy 6061-T6 Standard Structural Profiles.
22. ASTM B429 – Aluminum-Alloy Extruded Structural Pipe and Tube.
23. ASTM B632 – Aluminum-Alloy Rolled Tread Plate.

D. American National Standards Institute (ANSI)

1. ANSI A14.3 - Safety Requirements for Fixed Ladders
2. ANSI Z49.1 – Safety in Welding, Cutting and Allied Processes

E. National Association of Architectural Metal Manufacturers, (NAAMM).

F. Society for Protective Coatings (SSPC)

1. SSPC-SP1 - Solvent Cleaning

2. SSPC-SP2 - Hand Tool Cleaning
3. SSPC-SP3 - Power Tool Cleaning
4. SSPC-SP6 - Commercial Blast Cleaning
5. SSPC-SP11 - Power Tool Cleaning to Bare Metal

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs and railings and ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. 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, ambient; 180 deg F, material surfaces.

1.05 SUBMITTALS

- A. Shop Drawings - General: Submit for all items.
- B. Shop Drawings – Stairs and Handrails: Indicate in detail construction, gages of metals, jointing, methods of installation, fastening and supports, location and sizes of welds, anchors, hangers and other pertinent information and data.
 1. In addition, submit plans and details of stairs and handrails, drawn to scale not less than 1/4 inch per foot.
 2. Shop drawings shall contain design, type of steel and load assumption, bearing the seal of a licensed professional engineer registered in the State of Ohio.
- C. Samples: Submit samples of materials or workmanship, if requested by the Architect.
- D. Stair manufacturer's certificate of compliance with the Architectural Products Division of the National Association of Architectural Metal Manufacturer's AMP 510 Metal Stairs Manual materials, construction and installation specification.

1.06 QUALITY ASSURANCE

- A. Fabricate and install metal items in accordance with applicable standards of AISC and NAAMM. Welding and related procedures in accordance with AWS.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1 - Structural Welding Code - Steel.
 2. AWS D1.2 - Structural Welding Code - Aluminum.

- C. 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. Clearly mark units for reassembly and coordinated installation.
- D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

1.08 COORDINATION

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.09 STORAGE AND HANDLING

- A. Protect from corrosion.
- B. Store materials in a weathertight and dry place until ready for use in the work.
- C. Store packaged materials in their original unbroken package or container.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ferrous Metals
 - 1. Steel Shapes, Bars and Plates: ASTM A36.
 - 2. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.
 - 3. Steel Pipe: ASTM A53, Type E or S, Grade B, black standard weight.
 - a. Pipe Bollards: Heavy weight, schedule 80.
 - 4. Steel for Gratings: ASTM A569 or A36.
 - a. Wire Cross Bars for Gratings: ASTM A510.
 - 5. Steel Tubing: ASTM A500, Grade A, cold-formed; or ASTM A501, hot-formed.
 - 6. Steel Sheets: Hot-rolled ASTM A570, Class 1, Grade 36; or cold-rolled ASTM A611, Grade C, Type 1.

- 7. Galvanized Steel Sheets: ASTM A653 Grade 33, G90 coating.
- B. Gray Iron Castings: ASTM A48, minimum Class 30B.
- C. End Welded Studs
 - 1. Material: Compatible with material to which it is attached.
 - 2. Type: Automatically end welded in the shop or field, head or bent top.
 - 3. Welding Procedures: In strict conformance with manufacturer's recommendations.
 - 4. Size: Diameter and length as indicated.
- D. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded

2.02 FASTENERS

- A. General
 - 1. Provide fasteners of types as required for assembly and installation of fabricated items.
 - 2. Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941; Class Fe/Zn 5; at exterior walls.
- B. Bolts, Nuts and Washers: Regular hexagon head type, externally and internally threaded fasteners; include necessary nuts and plain hardened washers. Provide the following materials/finishes:
 - 1. Steel: ASTM A307 Grade A bolts; A563 nuts. For members for support of structural members or connection thereto, provide ASTM A325 bolts.
 - 2. Stainless Steel: ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1
- C. Expansion Anchors: Stainless steel "DH Bolts" or "Ankr Tite" devices by WEJ-IT or similar by REDHEAD, HILTI or SIMPSON. Length as required to provide minimum 2-1/2" embedment into sound masonry.
- D. Adhesive Type Anchor Bolts – In Hollow CMU: Chemically grouted adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors, unless otherwise noted.
 - 1. HIT HY-70 Adhesive Anchors, HILTI, INC.
 - 2. EPCON System, ITW/RAMSET/RED HEAD
 - 3. Chem-Stud Adhesive Anchors, RAWLPLUG COMPANY, INC.
 - 4. Simpson Set Epoxy- Tie Adhesive Anchors, SIMPSON STRONG- TIE COMPANY, INC.

- E. Adhesive Type Anchor Bolts - In solid grouted CMU and Concrete: Chemically grouted adhesive anchor systems. Use $\frac{3}{4}$ inch diameter anchors, unless otherwise noted.
 - 1. HIT HY 200 or RE-500 V "Safe Set System" Adhesive Anchors, HILTI, INC.
 - 2. EPCON System, ITW/RAMSET/REDHEAD
 - 3. Chem-Stud Adhesive Anchors, POWERS FASTENERS, INC.
 - 4. Simpson Set Epoxy-Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.

- F. Cast-In Place Anchors: Steel internally threaded headed cast-in inserts which receive threaded insert elements such as threaded rods and bolts $\frac{1}{2}$ -inch, $\frac{3}{8}$ -inch, $\frac{1}{2}$ -inch, $\frac{5}{8}$ -inch and $\frac{3}{4}$ -inch diameters.
 - 1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating equivalent to minimum 5.1 μm (.0002 inch) zinc coating.

- G. Miscellaneous Fasteners
 - 1. Lag Bolts: ANSI B18.2.1.
 - 2. Machine Screws: Cadmium plated steel, ANSI B18.6.3.
 - 3. Wood Screws: Flat head carbon steel, ANSI B18.6.1.
 - 4. Plain Washers: Round, carbon steel, ANSI B18.22.1
 - 5. Toggle Bolts: Tumble-wing or spring wing type, FS FF-B-588, type, class, and style as required.
 - 6. Lock Washers: Helical spring type carbon steel, ANSI B18.21.1.

2.03 MANUFACTURED ITEMS

- A. Concrete Stair Nosings
 - 1. Use: Concrete panfilled treads and cast-in-place concrete stairs.
 - 2. Type: Extruded aluminum with aluminum oxide/silicone carbide abrasion anti-slip filler strips and integral anchor.
 - 3. Size: 3" wide by $\frac{1}{4}$ " thick by full length of tread for panfilled and 6" less than width of tread for cast-in-place (3" each end).
 - 4. Color: Concrete Gray, WOOSTER CG-1.
 - 5. Manufacturer: WOOSTER PRODUCTS, Type 231BF for panfilled and cast-in-place; AMERICAN ABRASIVE METALS COMPANY; BALCO; NYSTROM.

2.04 FABRICATION

- A. General
 - 1. Workmanship
 - a. Construct all items to ensure ease of installation and minimal field

adjustment.

- b. Use materials of size and thickness shown, or, if not shown, of required size and thickness to produce strength and durability in finished product. Ease exposed edges to a radius of approximately 1/32 inch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- c. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Grind crotches to 1/8" radius.
- d. Form exposed connections with hairline joints, flush and smooth.
- 2. Field Measuring: Field measure all items required to obtain proper fit.
- 3. Exposed mill names and logos not permitted in finished work.

B. Steel Stairs

- 1. General: Construct stairs to conform to sizes and arrangements shown: Join pieces together by welding unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, railings, struts, clip brackets, bearing plates and other components for the support of stairs and platforms and as required to anchor and contain the stairs on supporting structure.
- 2. Design: Comply with all applicable building laws and ordinances. Stairs to be designed to sustain a live load of 100 psf and a concentrated load of 300 lbs. Sizes of members shown on drawings are minimums. Furnish heavier members if necessary to meet design requirements.
- 3. Stair Framing: Fabricate stringers of structural steel channels. Provide closures for exposed ends of stringers. Construct platforms (landings) of structural steel channel headers and miscellaneous framing members as shown. Bolt or weld headers to stringers and framing members to strings and headers; fabricate and join so bolts, if used, do not appear on finish surfaces.
- 4. Pan-Filled Stairs
 - a. Metal Pan Risers, Subtreads, and Subplatforms (Landings): 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. Form metal pans of hot-rolled or cold-rolled carbon steel sheet, unless otherwise indicated.
 - b. Attach risers and subtreads to stringers by means of brackets made of steel angles. Weld brackets to strings and weld metal pans to brackets.
 - c. Provide subplatforms of configuration and constructions indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

C. Ladders

1. Fabricate ladders for the locations shown with dimensions, spacings, details and anchorages as indicated. Comply with the requirements of ANSI A14.3 and OSHA, except as otherwise indicated.
 - a. Unless otherwise shown on the drawings, provide 1/2 inch x 2-1/2 inch continuous structural steel flat bar stringers with eased edges, spaced 18 inches apart.
 - b. Provide 1 inch diameter solid structural steel bar rungs, spaced maximum 12 inches on center.
2. Center rungs on stringers, plug weld and grind smooth on outer rail faces.
3. Coat top of each rung with aluminum oxide granules set in epoxy adhesive to provide non-slip surface.
4. Finish: Hot-dip galvanize after fabrication.
5. Provide semi-circular safety cages with flared bottom where ladders height exceeds 20'-0". The back of the cage must extend between 27 and 30 inches from each ladder rung, measured from the center of the rung. Cage shall be connected to the ladder, or to the structure to which the ladder is fixed, by horizontal bands, and there shall be a horizontal band at least every 4 feet. Provide vertical bars, no more than 9.5 inches from each other, connecting the horizontal bands. The vertical bars must also be connected to the inside of the horizontal bands. Locate bottom of cage between 7'-0" and 8'-0".
6. At public access locations and where indicated, provide expanded metal hinged security gate at gate bottom with lockable hasp.

D. Handrail/Guardrail: Fabricate as indicated on the drawings.

1. Material: Steel pipe or shapes as detailed; meeting the requirements specified herein for the specific material.
2. Loadings: Steel guardrails and handrails shall meet the following load requirements:
 - a. Welded construction, fabricated, complete with connectors to structure designed for a concentrated load of 200 pounds applied at any point and in any direction on the handrail and at the top of the guardrail and in compliance with OBC.
 - b. Guardrails: Designed and constructed for a load of 50 pounds per lineal foot applied horizontally at the required guardrail height and a simultaneous load of 100 pounds per lineal foot applied vertically downward at the top of the guardrail.
 - c. Guardrails: Designed and constructed to resist a 200 pound concentrated horizontal load applied on a one foot square area at any point in the system including intermediate rails or other elements serving this purpose.
 - d. Handrails: Designed and constructed for a load of 50 pounds per lineal foot applied in any direction and in compliance with the OBC.
 - e. Loading conditions in paragraphs a, b, c and d shall not be applied simultaneously, but each shall be applied to produce maximum stress in each of the respective components or any of the supporting components.
3. Verify dimensions on site prior to shop fabrication.

4. Railing system shall be assembled in a shop in largest sizes for delivery to site and for installation; to minimize field-splicing and assembly.
 - a. Rails shall be disassembled only as necessary for shipping and handling.
 - b. Rails shall be marked for re-assembly and coordinated installations.
 5. Close open ends of railings, not scheduled to be closed with finials, with close fitting steel plates welded in place and ground smooth.
 6. Welded Connection: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings, or use welding connections at fabricator's option.
 7. Form simple and compound curves by bending pipes in jigs to produce uniform curves.
 - a. Maintain profile of pipes throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces.
 8. Space posts and wall brackets as indicated. If not indicated, 7'-0" maximum center to center.
 9. Brackets, Flanges and Anchors: Provide for railing posts and handrail supports. Provide inserts and sleeves as required for anchorage to concrete or masonry.
 10. Provide wall returns at ends of wall mounted rails.
 11. For Exterior Installations: Provide weepholes or other means for evacuation of water trapped in pipe rails.
 12. Expansion Joints: Provide expansion joints at locations indicated. If not indicated, locate at intervals not to exceed 40 feet.
 - a. Provide slip-joint interval sleeve extending beyond joint on each side; secure sleeve to one side.
 - b. Do not locate expansion joints closer than 6" from post.
 13. Toe Boards: Where indicated, provide toe boards around openings and at edge of open-sided floors and platforms.
 - a. Fabricate to dimensions and details shown.
- E. Miscellaneous Steel Lintels: Provide sizes and shapes as indicated with 8" minimum bearing each jamb, unless otherwise noted. When lintel is fabricated of two or more members to accommodate thickness of wall, weld adjacent members to form a single unit.
1. Unless otherwise indicated, provide one 3-1/2" wide angle leg for each nominal 4" wythe of masonry.
- F. Miscellaneous Embedded Items: Provide steel members of shapes and size required per drawings. Equip members to be anchored into concrete or masonry with welded on anchor straps or weld studs as shown or required. Spacing and location of anchors per drawings, but if not otherwise detailed, provide at ends and at maximum intervals of 12" with minimum two per member.
- G. Miscellaneous Framing and Supports
1. Provide as indicated on drawings.
 2. Fabricate members and assemblies to size, shape and dimensions detailed

with provisions to receive adjacent construction supported by such items.

- H. Miscellaneous Loose Steel Items: Provide steel shapes such as channels, angles, plates, protection posts, etc., as indicated on drawings.
- J. Accessories: Provide all clips, bolts, anchors, fasteners, etc., as required for completion of miscellaneous metal work. Type, size and strength as noted or as suitable for conditions and construction involved.
- K. Stair Nosings: Provide single length sections; no joints permitted within the width of a stair tread. Provide only on treads not to receive floor finishes.
- L. Counter Supports:
 - 1. Surface Mounted: 1/8" steel with 45 degree notch that allows for wall cleat and wire run clearance.
 - a. Load to Deformation: 1500 lbf/pair minimum.
 - b. Finish: Powder coated paint.
 - c. Manufacturer: A&M HARDWARE or approved equal
 - 2. In-Wall Mounted (Concealed): Fabricate from steel angles and welded in sizes indicated or as required.
 - a. Load to Deformation: 650 lbf/pair minimum.
 - b. Finish: Powder coated paint.
 - 3. Accessories: Provide all required fasteners to structure type provided.

2.05 FINISHES

- A. Preparation: Grind all exposed cut surfaces as required to remove burrs and sharp edges.
- B. Galvanizing
 - 1. Galvanize all ferrous metal items exposed to weather, embedded in masonry or concrete, and where indicated.
 - 2. Hot-dip galvanize after fabrication in accordance with ASTM A123; provide minimum of 2 oz. of galvanizing (Grade 85) per sq. ft. of subsurface. Prepare and pretreat surfaces as recommended by galvanizer. Do not weld after galvanizing.
 - 3. Galvanizing Repair Paint: Minimum 79% zinc dust by weight in dried film. TNEMEC COMPANY, INC., No. 92 Tneme-Zinc; Zinc-rich Galvax by ALVIN PRODUCTS. Provide ZRC Cold Galvanizing Compound by ZRC. where galvanizing is not to receive finish primer or paint.
 - 4. Do not use stainless steel or other non-galvanized fasteners in the assembly of galvanized components.
- C. Shop Painting (Non-galvanized Ferrous Metal)
 - 1. Cleaning: After fabrication, clean all items of loose scale, rust, oil, dirt or other foreign matter.

2. Minimum Surface Preparation: Hand tool cleaning SSPC SP-2 or SP-11. Where required, blast clean in accordance with SP-6.
3. Solvent Cleaning (SSPC Spec. No. SP-1): Perform where necessary.
4. Paint: One shop coat of paint compatible with the finish paint system. Section 09 91 00.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate and furnish anchorages, settings drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.02 INSTALLATION

- A. General
 1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
 2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and level. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
 3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. 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.
 4. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work. Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 5. Protection from Dissimilar Materials: Coat all aluminum surfaces in contact with steel, concrete or masonry with one coat of heavy bodied bituminous

paint. Where aluminum contacts steel surfaces, and only where specifically approved, the painting required on the steel surface may be substituted for the bituminous paint.

B. Handrail

1. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or specified herein. Plumb posts in each direction. Secure posts in each direction. Secure posts and railing ends to building construction as follows.
2. Anchor posts to concrete as indicated on the drawings.
3. Weld posts to channels as indicated.
4. Secure handrails to wall with wall brackets. Provide brackets with not less than 1-1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required for design loading. Secure wall brackets and wall return fittings to concrete or masonry with expansion bolts.

- C. Stair Nosings: Use on all concrete and concrete pan filled treads where not scheduled to receive floor finishes.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION

SECTION 05 51 34

ALTERNATING TREAD METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated steel stairs with integral handrails.

1.02 RELATED SECTIONS

- A. Metal Stairs (Conventional prefabricated metal stairs): Section 05 50 00
- B. Painting: Section 09 91 00.

1.03 REFERENCES

- A. ASTM A 307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- B. ASTM A 563: Standard Specification for Carbon and Alloy Steel Nuts.
- C. ASTM A 513: Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
- D. ASTM A 569: Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.

1.04 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Provide pre-engineered stairs designed to withstand the following loading conditions:
 - 1. Stair treads: Capable of withstanding a concentrated 1,000 pound load without deformation.
 - 2. Handrail: Capable of withstanding a load of 200 pounds applied in any direction at any point on the rail.
- B. Provide stairs with the following design features:
 - 1. Alternating treads with center stringer.
 - 2. Risers spaced equally to within 3/16 inch for adjacent risers and to within 3/8 inch for any two non-adjacent risers.
 - 3. Handrails contoured for body guidance and underarm support.
- C. Stair angle: 56 degrees from horizontal or as indicated.

- D. Vertical Drop (Distance between upper finished floor surface where top landing will be attached and lower finished floor surface): As indicated on Drawings.

1.05 SUBMITTALS

- A. Product Data: Submit for all items, include manufacturer's installation instructions.
- B. Shop Drawings: Submit dimensioned prints showing critical dimensions, jointing and connections, and fasteners provided by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Provide pre-engineered alternating tread metal stairs fabricated by LAPEYRE STAIR or equal.

2.02 MATERIALS

- A. Structural Steel Components: 1010/15, per ASTM A569, size and gage to meet performance requirements and project dimensions.
 - 1. Treads: 13 gage HRPO.
 - 2. Stair Landings and Foot Stampings: 11 gage.
 - 3. Stringers: 2 in. by 1-3/4 in. by 11 gage.
- B. Steel Handrails: 1010/15 CS per ASTM A569, cold drawn, fully annealed tube per ASTM A 513, 1-1/2 inches OD by 0.083 in.
- C. Miscellaneous Materials
 - 1. Rubber spine: Hollow neoprene.
 - 2. Rubber foot divider: Solid neoprene.
 - 3. Bolts: ASTM A307.
 - 4. Nuts: ASTM A563.

2.03 FABRICATION

- A. Fabricate components to comply with performance and design requirements specified and in accordance with approved shop drawings. Fabricate to minimize field assembly.
- B. Steel Stairs: Fabricate by gas metal arc welding, with stamped steel treads spot-welded to stringers.
 - 1. Provide custom-fabricated steel handrails for field bolting to prefabricated stair unit.
 - 2. Provide handrail design to accommodate field conditions indicated on

Drawings.

2.04 FINISHES

- A. Paint: Baked enamel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that dimensions are correct and substrate is in proper condition for installation of metal stair components. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Install handrails to stair unit, using bolts furnished with stair unit by manufacturer.
- B. Install bumper on central stringer, following manufacturer's instructions and using glue supplied with stair unit.
- C. Prepare mounting holes, using drawings supplied by stair manufacturer.

3.03 INSTALLATION

- A. Position stair units with top tread at same elevation as finished floor surface.
- B. Verify that stairs are properly aligned with building construction, at correct angle, and free from distortion. Secure in position using not fewer than two bolts or studs at top and two at bottom.
- C. Do not field cut or alter members.

3.04 ADJUST AND CLEAN

- A. Touch up abraded areas on shop paint immediately after erection, using matching paint.
- B. Clean work area of debris associated with installation of alternating tread metal stairs.

END OF SECTION

SECTION 05 70 00

DECORATIVE METALS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all miscellaneous ornamental metal items specified hereunder, including all design, materials, fabrication, fastenings and accessories required for finished installations, where indicated on drawings or otherwise necessary for completion of the project. Work includes the following:
1. Decorative steel framework and stainless steel cable infill at interior stair.
 2. Decorative guardrail and perforated panel systems at exterior.

1.02 REFERENCE STANDARDS

- A. The following publications of the issues listed below, but referred to hereinafter by basic designation only, form a part of this specification to the extent indicated by the references thereto.
1. Aluminum Association
 - a. Aluminum Standards and Data.
 - b. Designation System for Aluminum Finishes.
 - c. Standards for Anodic Finishes.
 2. American Society for Testing and Materials (ASTM): Specifications listed herein.
 - a. A167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - b. A743 Castings, Iron Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
 - c. A312 Seamless and Welded Austenitic Stainless Steel Pipe.
 3. National Association of Architectural Metal Manufacturers.
 4. American Welding Society (AWS)
 - a. D1.1 Structural Welding Code - Steel.
 - b. D1.3 Structural Welding Code - Sheet Steel.
 5. American Institute of Steel Construction (AISC): "Manual of Steel Construction".
 6. NOMMA: National Ornamental and Miscellaneous Metals Association.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's literature may be submitted for standard proprietary products in lieu of shop drawings. Data to fully explain product indicating materials, sizes and finishes, and installation procedures.

- B. Samples: Samples to be reviewed for color, texture and reflectivity and general appearance. Compliance with all other requirements is the responsibility of the Contractor.
 - 1. Finish: Submit for approval minimum 6" x 6" or 12" length of each required metal finish.
 - 2. Weld: Submit samples of welded joint showing quality of work. Samples to be of same form, alloy, temper and hardness to be used in the work.
 - 3. Sample: Submit a 2'-0" long sample of completed rail system.
- C. Shop Drawings: Show details of fabrication and installation. Indicate materials, alloys and tempers, thicknesses of materials, gages, sizes, dimensions, methods of joining and fastening, welds, finishes, details of reinforcement and embedment, attachments, anchorages, miscellaneous metal items incidental to basic fabrication shown, provisions for work of other trades and other pertinent information as requested by the Architect.
- D. Maintenance Instructions: Submit manufacturers'/fabricators' recommendations for maintenance of exposed finishes.
- E. Certifications: Submit certifications that products comply with applicable design loadings.
- F. Welder Certifications: Qualify welding process and welders in accordance AWS Codes referenced herein.
 - 1. Certify that each welder has successfully passed AWS qualification tests for the welding processing involved and, if pertinent, has undergone recertification.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabricator must have a minimum of 5 years experience and be regularly engaged in type of work specified. Must employ only skilled personnel using proper equipment to produce the work in high quality. Must be approved by Architect.
- B. Installer Qualifications: Fabricator of products.
- C. Single Source Responsibility: Handrails and railing systems shall be designed, fabricated and installed by the same source.
- D. Perform all work in strict accordance with applicable local, state and federal codes.
 - 1. Completed railing to withstand the following loads applied to top railing:
 - a. 200 pounds applied at any point in any direction.
 - b. 50 pound per linear foot horizontal and vertical load.
 - 2. Infill of Guards

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- E. Design, fabricate, and test handrail/guardrail assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide materials which have been selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces which exhibit pitting, seam marks, roller marks, "oil-canning", stains, discolorations or other imperfections on finished units will not be acceptable.
- B. Aluminum
 - 1. Structural Shapes, Plates and Bars: ASTM B209, 6061-T5.
 - 2. Non-Structural Plates: ASTM B209, 3003.
 - 3. Extruded Structural Pipe and Tube: ASTM B429, 6063-T5 and ASTM B221, alloy 6061-T6/T62, Fy = 35 ksi.
 - 4. Aluminum Extrusions: ASTM B221, Alloy 6063-T6
- C. Stainless Steel
 - 1. Type: Type 302/304 except items exposed to exterior or high moisture conditions to be Type 304.
 - 2. Bar Stock: ASTM A743
 - 3. Plate: ASTM A666 Type 304.
 - 4. Tubing: ASTM A269, seamless steel tubing.
- D. Welding: Electrodes and filler metal to be of type and alloy as recommended by producer of metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
- E. Fasteners: Provide fasteners of types as required for assembly and installation of fabricated items. In general, fasteners to be concealed from view. Exposed fasteners, where permitted or required, to conform to the following:
 - 1. Fasteners to be of basic metal and alloy, matching finished color and texture as metal being fastened, unless otherwise indicated.
 - 2. Provide Phillips flat head screw/bolts for exposed fasteners.
- F. Miscellaneous Materials: Provide all incidental accessory materials, tools, methods and equipment required for fabrication and installation of metal items as indicated on drawings, and not furnished by other sections.

G. Guardrail and Terminal Fittings:

1. Provide stud adjusters, tensioners and other type fittings, washers and nuts as required; stainless steel, ASTM A 666 Type 316.
2. Basis of Design Manufacturer: SECO SOUTH SPI 2000 or equal by JACOB, LOOS AND COMPANY, or DÉCOR CABLE.
3. Wire Rope: Wire complying with ASTM A 492, Type 316.
 - a. Size: 3/16" diameter.

H. Perforated Panel Infill: ASTM B209 - Aluminum 1/8" thick with perforations. See finish schedule for types.

2.02 FABRICATION

A. Preliminary: Verify dimensions prior to fabrication.

B. Forming: Form metal items to accurate sizes and configurations as indicated on drawings and otherwise required for proper installation. Make with all lines straight and angles sharp, clean and true. Drill, countersink, tap and otherwise prepare items for connections with work of other trades as required.

C. Fasteners: Make permanent connections with work of other trades, as required. Avoid using exposed bolts or screws unless specifically indicated or approved.

D. Joints: Construct items with joints milled to a tight, hairline fit. Cope or miter corner joints. Where exposed to weather, form to exclude water.

E. Welding: Comply with AWS for recommended practices in shop welding.

1. Provide welds behind finished surfaces without distortion or discoloration of exposed side.
2. Clean exposed welded joints of all welding flux and dress on all exposed and contact surfaces to match adjacent surfaces.

F. Cut, reinforce, drill and tap miscellaneous metal as indicated to receive hardware, screws, and similar items. Countersunk screw holes to set screw heads flush, unless indicated otherwise.

2.03 ASSEMBLIES

A. Railings

1. Design to meet NAAMM standards and requirements of applicable codes, but not less than 200 lbs. applied at any point in any direction.
2. Shop fabricated with minimum field splicing allowed.
 - a) All construction welded per AWS.
 - b) Welds, where shown, to be continuous. Grind and add weld as required to provide uniform and smooth transition between pieces.

Buff, polish and blend as required to match finish of railing.

3. Interior Railing: Quality of welds to meet National Ornamental & Miscellaneous Metals Association - NOMMA Guideline #1, Joint Finish #2.
4. Finish: As specified under Shop Finish herein.

- B. Accessories: Provide all clips, bolts, anchors, fasteners, etc., as required for completion of miscellaneous metal work. Type, size and strength as noted or as suitable for conditions and construction involved.

2.04 SHOP FINISHES

- A. Protect mechanical finishes on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are not acceptable if they are noticeable variations in the same piece. Variations in appearance of other components are acceptable, subject to Architect's approval.
- C. Stainless Steel Surfaces (Interior)
 1. Exposed Surfaces: #4 satin finish.
 2. Concealed Surfaces: No requirements.
- D. Aluminum Surfaces (Exterior)
 1. Mica – Metallic High-Performance Finish, complying with AAMA 2605 Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions
 2. Colors: As selected by Architect.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set handrail and railing work accurately as measured from established building lines and levels, plumb and in true alignment with previously completed work. Brace temporarily or anchor securely in formwork where work is to be built into concrete, masonry or similar construction.
- B. Anchor securely in place in the manner shown, using concealed anchorage wherever possible.
- C. Fit mechanical joints together accurately to form tight joints and uniform reveals and spaces for joint fillers and sealants. Restore any finishes that have been damaged by shipment and installation.
- D. Do not cut or abrade finishes which cannot be completely restored in the field, including special finishes. Return units with special finishes that cannot be field

restored to the shop for required alterations, followed by complete refinishing.

- F. Remove protective coverings when there is no longer any danger of damage to the railing work from other work yet to be performed in the same location. Restore protective coverings which have been removed or damaged during shipment or installation of the work, if such other work is yet to be performed.

END OF SECTION

SECTION 06 10 50

WOOD BLOCKING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Roof blocking, cants and nailers.
- B. Concealed blocking for support of accessories, equipment, specialty items, cabinets, fixtures, trim, facing materials and similar type items.

1.02 REFERENCES

- A. Standards
 - 1. American Wood Protection Association (AWPA): Treatment Standards.
 - a. AWP A U1 - Use Category System: User Specification for Treated Wood
 - 2. American Society for Testing and Materials (ASTM)
 - a. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - b. D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
 - c. D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
 - d. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 3. American Plywood Association (APA): Grades and Standards

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Preservative Treated Wood: Submit certification by treating plant stating chemical and process used and conformance with applicable standards.
- C. Fire Retardant Treatment: Submit certification by treating plant that fire retardant treatment materials comply with governing ordinances and that treatment will not bleed through finish surfaces.

1.04 QUALITY ASSURANCE

- A. Softwood Lumber: Grading rules and wood species shall conform with the

voluntary Product Standards PS 20 including grading rules of the following associations, as applicable:

1. Southern Pine: Standard Grading Rules for Southern Pine Lumber, published by Southern Pine Inspection Bureau (SPIB).
 2. Douglas Fir, Western Larch and Hemlock: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), Standard Grading and Dressing Rules for West Coast Lumber Inspection Bureau (WCLIB) or National Lumber Grades Authority (NLGA).
 3. Western Spruce, Pine and Fir: Western Spruce-Pine-Fir Association (WSPFA) and current Canadian Grading Rules by National Grades Association, Canada.
- B. Softwood Plywood: Grading rules and wood species shall conform with Product Standard PS 1.
- C. Grade Marks
1. General: Identify all lumber and plywood by official grade mark.
 2. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping, or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
 3. Softwood Plywood: Appropriate grade trademark of the American Plywood Association.
 - a. Type, grade, class and identification index.
 - b. Inspection and testing agency mark.

1.05 STORAGE AND HANDLING

- A. Store off the ground.
- B. Protect from direct contact with the weather.
- C. Provide proper ventilation.

PART 2 PRODUCTS

2.01 SOFTWOOD LUMBER

- A. Species: Any commercial softwood.
- B. Moisture Content: Maximum 19% at time of manufacture.
 1. Fire Retardant Treated Materials: Kiln-dry all materials after treatment to maximum 15% moisture content.
- C. Dimensions

1. Specified lumber dimensions are nominal unless otherwise indicated.
2. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.

D. Surfaces: Surface four sides (S4S) unless specified otherwise.

E. Grading: Construction grade.

2.02 PLYWOOD

A. Plywood Blocking: Provide exterior grade plywood for exterior use and interior type with exterior glue for interior use. Formaldehyde free.

1. Exterior: APA-CD-EXT.
2. Interior: APA-CD-EXPOSURE I, with exterior glue.

2.03 FIRE-RETARDANT WOOD TREATMENT

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. 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.

C. After treatment, kiln-dry lumber to maximum 19% moisture content and plywood to maximum 15% moisture content. Inspect each piece of lumber and plywood after drying and discard damaged or defective pieces.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

2.04 PRESERVATIVE WOOD TREATMENT

A. Preservative Treatment by Pressure Process: AWP A U1:

1. Use Category UC3b for replaceable exterior construction not in contact with the ground.
 2. Use Category UC4a or UC4b for items in contact with the ground or non - replaceable not in contact with the ground
 - a. Framing members.
 - b. Roof nailers and blocking.
 3. Use Category UC4b for posts in contact with the ground and below grade.
 4. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 5. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each piece of treated lumber with AWPB Quality Mark designation denoting conformance to the appropriate specification.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.05 ROUGH HARDWARE

- A. General: Provide all necessary spikes, screws, nails, bolts and other hardware for satisfactory erection of work. Except where noted to be stainless steel, provide hot-dipped galvanized finish complying with ASTM A153 for hardware exposed to exterior, located in toilet rooms, in contact with treated wood or in contact with roofing or flashing.
1. Nails: ASTM F1667. Common wire nails, except where noted otherwise on drawings; sizes as noted or specified herein.
 2. Attachment to Concrete or Masonry: Metal expansion type shields or inserts; sizes as required to accommodate applied fastener; spacing as indicated on drawings.
 - a. "DH" or "Ankr-Tight" by WEJ-IT or equal by RED HEAD or HILTI.
 - b. Sleeve type for masonry.
 - c. Wedge type for concrete.
 3. Adhesive Type Anchor Bolts – In Hollow CMU: Chemically grouted

adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors, unless otherwise noted.

- a. HIT HY20 Adhesive Anchors, HILTI, INC.
 - b. EPCON System, ITW/RAMSET/RED HEAD
 - c. Chem-Stud Adhesive Anchors, RAWLPLUG COMPANY, INC.
 - d. Simpson Set Epoxy- Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
4. Adhesive Type Anchor Bolts - In solid grouted CMU and Concrete: Chemically grouted adhesive anchor systems. Use 3/4 inch diameter anchors, unless otherwise noted.
- a. HIT HY200A Adhesive Anchors, HILTI, INC.
 - b. EPCON System, ITW/RAMSET/REDHEAD
 - c. Chem-Stud Adhesive Anchors, POWERS FASTENERS, INC.
 - d. Simpson Set Epoxy-Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
5. Attachment to Steel Studs: Self tapping screws of sufficient length and strength to perform the functions for which they are used.
6. Roof Construction
- a. Wood-to-Wood Attachment: 300 Series stainless steel, flat head.
 - 1) Plywood to Nailers: Minimum #8 x 1-3/4".
 - b. Wood-to-Metal Deck Attachment: Hot dip galvanized in accordance with ASTM A153; machine bolts, locknuts and washers; minimum 3/8" diameter.
 - c. Wood-to-Concrete Attachment: 300 Series stainless steel expansion anchors as specified above. Minimum 3/8" diameter, length as required for minimum 2" concrete embedment.

2.06 ADHESIVE

- A. Adhesives: Low VOC type. Water- and mold-resistant formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 EXECUTION

3.01 CONDITIONS OF SURFACES

- A. General: Verify that surfaces to receive blocking are prepared to exact grades and dimensions.

3.02 INSTALLATION

- A. Align and anchor blocking with countersunk bolts, washers, nuts, or nails, as applicable.
- B. Locate blocking to facilitate installation of finishing materials, fixtures, specialty items and trim.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

3.03 WOOD TREATMENT

- A. Preservative Treated Wood Products: Provide pressure treatment for all lumber and plywood as specified hereinbefore.
 - 1. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - a. Use inorganic boron for items that are continuously protected from liquid water.
 - b. Use copper naphthenate for items not continuously protected from liquid water.
- B. Fire Retardant Treated Wood Products: Provide fire retardant treatment on all lumber and plywood as specified hereinbefore.

3.04 CLEAN UP

- A. Clean up debris and cuttings on a regular daily basis. Remove and dispose of excess materials and debris created by wood blocking.
- B. Maintain the building and site free of accumulations of cutting and waste materials in a neat orderly condition acceptable to the Architect.

3.05 WASTE MANAGEMENT

- A. Do not burn scraps of treated wood. Do not mix treated wood scraps with untreated wood. Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

END OF SECTION

SECTION 06 16 00

SHEATHING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide sheathing work as shown and specified. Work includes:

1. Exterior wall sheathing.
 - a. Gypsum

1.02 RELATED SECTIONS

- A. Cold Formed Framing: Section 05 40 00
- B. Air Barrier: Section 07 27 26.

1.03 REFERENCES

- A. Standards
 1. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
 2. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating framing connection details, fastener connections and dimensions.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- C. Submit manufacturer's certification that fire-rated assemblies proposed meet project requirements, including evidence of approved test reports acceptable to governing building code enforcing authorities, that assemblies when installed with proposed materials, will meet or exceed fire ratings required.

1.05 QUALITY ASSURANCE

- A. Gypsum Board Systems: Comply with ASTM C840 "Application and Finishing of

Gypsum Board", and as specified.

- B. Fire-Rated Construction: Comply with fire resistance ratings indicated on drawings and as required by governing authorities and codes. Provide materials, accessories and application procedures that have been listed by Underwriters Laboratories or tested in accordance with ASTM E119 for the type of construction shown.

1.06 STORAGE AND HANDLING

- A. Store off the ground.
- B. Protect from direct contact with the weather.
- C. Provide proper ventilation.

1.07 JOB CONDITIONS

- A. Time delivery and installation of carpentry work to avoid delaying trades whose work is dependent on, or affected by, the carpentry work and to comply with protection and storage requirements.
- B. Installer must examine the surfaces and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- C. Correlate location of furring, nailers, blocking, grounds and similar supports so that attached work will comply with design requirements.

PART 2 PRODUCTS

2.01 EXTERIOR GYPSUM BOARD AND SHEATHING

- A. Exterior Sheathing: Use for exterior sheathing and where indicated on drawings. Provide in conformance with ASTM C1177, water repellent treated core and fiberglass face sheets.
 - 1. Thickness: 5/8" thickness unless otherwise indicated.
 - 2. Fire Rating: Type "C" or "X" (special fire retardant) to meet fire ratings for construction shown..
 - 3. Acceptable Products: Dens-Glas by GEORGIA-PACIFIC, GlasRoc by CERTAINTEED, Weather Defense by CONTINENTAL BUILDING PRODUCTS, EXP Sheathing by NATIONAL, or Secure Rock by USG.
 - 4. Roof Parapets and Similar Roof Conditions:
 - a. Where used as roofing substrate, provide high density, water repellent treated core with fiberglass mat and specifically designed for roofing membrane adhesion. Dens-Deck Prime Roof Board by

GEORGIA-PACIFIC, USG Gypsum Fiber or equal by other gypsum board manufacturers listed in 2.01A. Coordinate with roofing assembly.

5. Exterior Joint Treatment Materials: ASTM C475. As recommended by sheathing board manufacturer. Provide materials compatible with air barriers required.

2.02 HARDWARE AND ACCESSORIES

- A. Provide all necessary screws, nails, bolts and other hardware for satisfactory installation of work.
 1. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
- B. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting and tested as part of an assembly meeting performance requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Examine substrates and installation conditions. Do not proceed with sheathing work until unsatisfactory conditions have been corrected.
 1. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of sheathing is started.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 GYPSUM EXTERIOR SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
 1. Install exterior sheathing board perpendicular to supports, stagger end joints over supports, use maximum lengths possible to minimize joints.
 2. Install with 1/4 inch open space where boards abut other work.
 3. Space screws 4 inches o.c. around perimeter of board and 8 inches o.c. on intermediate framing members and on diagonal braces. Locate fasteners minimum 3/8 inches from edges and ends of sheathing panels. Drive fasteners to bear tight against and flush with sheathing surface. Do not countersink.
 4. Apply sealant around sheathing perimeter at interface with other materials.
 5. Board Joints: Provide seam sealing tape or joint sealant at Contractor's option, as follows:
 - a. Seam Sealing Tape, Horizontal Applications.
 - 1) Apply primer to joints and fasteners, allow to dry.

- 2) Seal joints using tape specified herein or other similar type method recommended by board manufacturers for application indicated. Apply at time of sheathing, to sealed, dry, dust-free joints. Apply seam sealing tape along all edges, overlapping at intersections by width of tape.
 - 3) Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
 - 4) Seal other penetrations and openings.
 - 5) Coordinate sheathing and placement of through-wall flashing. Tape top of through-wall sealant to sheathing to provide a water-tight joint.
- b. Sealant
- 1) Apply minimum 3/8" bead of sealant to joints and trowel to provide a layer approximately 2" wide by 1/16" thick spanning the joint. Apply enough to each fastener to cover completely when troweled flat. Use backer rod for openings larger than 1/8".
 - 2) Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
 - 3) Seal other penetrations and openings.
 - 4) Coordinate sheathing and placement of through-wall flashing. Tape top of through-wall flashing to sheathing to provide a water-tight joint.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide architectural woodwork as indicated and specified. Work includes:
 - 1. Custom Casework. Include the following:
 - a. Reception Circulation Desk: Formed seamless solid surface components as detailed.
 - b. Custom integral type plastic laminate clad casework components as detailed on the drawings.
 - c. All other modular plastic laminate casework: Section 12 33 55 for modular type plastic laminate clad casework and components. Work includes fabrication and installation of standard base and wall cabinet components, shelving, fillers and panels.
 - 2. Solid surfacing countertops
 - 3. Plastic laminate paneling
 - 4. Miscellaneous fasteners and hardware.

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50
- B. Solid Surface Components: Section 06 61 16.
- C. Plastic Laminate Casework: Section 12 33 55.

1.03 REFERENCES

- A. Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard:
 - 1. ANSI: American National Standards Institute.
 - 2. AWI: Architectural Woodwork Institute.
 - 3. NEMA: National Electrical Manufacturer's Association.
 - 4. P.S.: U.S. Product Standard.

1.04 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Provide large scale details.
 2. Indicate methods of fabrication, edging, location and construction of joints.
 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections
- C. AWI Quality Standards: A photo-copy of the applicable portions of the AWI publication "Architectural Woodwork Quality Standards", latest edition, shall be submitted with each set of shop drawings.
1. Each copy must be marked to clearly show all details, specifications and finishes proposed for this work.
- D. Submit samples of all finish materials, including the following:
1. Plastic laminate for texture and color selections. (8" x 10").
 2. Cabinet hardware (1 of each type).
 3. Lumber with transparent finish for each species and cut. (12")
 4. Solid or quartz surface material.
- E. Manufacturer's product data describing type and quality of the following:
1. Plastic laminate (face grade and liner grade).
 2. Cabinet hardware (each type).
- F. Submit certification that fire-retardant treatment materials comply with governing ordinances and meet or exceed ASTM E84 tests. Include certification by treating plant that treatment will not bleed through finish surfaces. Materials shall bear UL label showing Flame Spread 25 or less and smoke developed 40 or less. Mill certification is not acceptable.

1.05 DEFINITIONS

- A. Exposed Portions of Casework: Include surfaces visible when doors and drawers are closed. Bottoms of casework more than 4 feet above floor and tops less than 6 feet 6 inches above floor shall be considered as exposed. Visible members in open cases or behind glass doors also shall be considered as exposed portions.
- B. Semi-Exposed Portions of Casework: Includes those members behind opaque doors, such as shelves, divisions, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors. Tops of casework 6 feet 6 inches or more above floor shall be considered semi-exposed.
- C. Concealed Portions of Casework: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

1.06 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of millwork with a minimum of 5 years experience and a satisfactory record of performance on projects of comparable size and quality. Shop is in compliance with all AWI's Quality Certification Program requirements.
- B. Installation: Performed only by skilled finish carpenters with a minimum of 3 years experience in installing custom millwork similar to that required for this project.
- C. All solid surface material type work shall be performed by a Manufacturer Certified fabricator.
- D. Provide lumber factory marked with type, grade, mill and grading agency identification on concealed surfaces. Omit marking and submit mill certificates for materials to receive transparent finishes that cannot be marked on a concealed surface.
- E. Quality Grade: Materials and fabrication shall be "custom grade" unless otherwise indicated on the drawings or specified herein as "premium grade", both in accordance with "Quality Standard Illustrated," of the AWI conforming to the following sections:
 - 1. Section 100: Solid wood members.
 - 2. Section 200: Plywood and particleboard.
 - 3. Section 400: Casework and tops.
 - 4. Section 500: Paneling.
 - 5. Section 1700: Installation of architectural woodwork.
- F. Mock-up: Before beginning panel construct full scale corner condition extending 8'-0" (minimum) each direction, demonstrating joint construction and general workmanship, including trim work.
 - 1. Approved mock-up will establish minimum standards of quality and workmanship for Architectural Woodwork.
 - 2. Mock-up shall remain on site until completion and acceptance of paneling work. When coordinated with Architect, mock-up may be incorporated into the final work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect woodwork materials and items during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver woodwork materials and items until concrete, masonry, painting, grinding and other similar wet work has been completed and is thoroughly dry, outside door openings are permanently watertight, exterior windows are glazed and, in case of temperature dropping below 60° F., until temporary heating and ventilating systems are in operation.
- C. Store materials in dry, well-ventilated spaces with constant minimum temperature

of 60° F., and maximum relative humidity of 55%.

1. Do not store adhesives with materials that have a high capacity to absorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpets, textiles, etc.).
2. Do not store adhesives in occupied spaces.

1.08 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.09 COORDINATION

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

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber
 1. Provide lumber surfaced four sides (S4S) and worked to profiles and patterns shown. Nominal sizes are as shown, except where detailed dimensions are indicated.
 2. Moisture Content: Provide materials kiln-dried to maximum moisture content of 6% complying with AWI Standards, Section 100-G-3.
 3. Softwood Lumber: Comply with PS-20, "American Softwood Lumber Standard," and with applicable rules of grading and inspection agency for species indicated.
 - a. Western Red Cedar, Ponderosa Pine, White Pine: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), or Standard Grading Rules for West Coast Lumber, No.

- 16, published by West Coast Lumber Inspection Bureau (WCLIB).
 4. Species: Fabricator's option.
- B. Softwood Plywood: Thickness as indicated. Formaldehyde free.
1. Concealed Use: APA-BB-EXPOSURE I, with exterior glue (Plyform).
 2. Comply with PS-1, "Construction and Industrial Plywood".
- C. Particle Board (Substrate for Laminate Surfaces): High density industrial grade with a minimum density of 45 pounds per cubic foot and a moisture content between 12% maximum and 8% minimum, meeting or exceeding ANSI A208.1 grade M-2 minimum or ASTM D1037; formaldehyde-free. ASTM E84, Class A.
1. ARAUCO Vesta FR Particleboard
 2. SIERRAPINE Encore FR
 3. PANEL SOURCE INTERNATIONAL Pyroblock Platinum Particleboard
- D. Medium Density Fiberboard (MDF): Thickness as specified unless otherwise indicated on Drawings. Moisture content between 12% maximum and 7% minimum. Formaldehyde free. Meets ANSI A208.2 and the following minimum standards:
1. Internal Bond: 90 psi.
 2. Modulus of Rupture: 2,500 psi.
 3. Screw Holding Power: 325 pounds.
 4. Density: Minimum 40 pounds per cubic foot.
 5. Fire Rating: ASTM E84 Class A
 - a. Smoke Developed: 95
 - b. Flame Spread: 15
 6. Manufacturers
 - a. ARAUCO Vesta FR MDF
 - b. ROSEBURG FOREST PRODUCTS Medite FR
 - c. PANEL SOURCE INTERNATIONAL Pyroblock Platinum MDF
- E. Thermoset Decorative Overlay: Particle board or MDF with surface of thermally fused, melamine impregnated decorative paper complying with Laminating Materials Association (LMA) SAT-1 and NEMA LD 3, Grade VGL. Formaldehyde free.
- F. Plastic Laminate: Conform to the requirements of the National Electrical Manufacturer's Association (NEMA) Publication Number LD-3. Colors, patterns and finishes as indicated.
1. General Purpose Grade: 0.05 inches thick.
 2. Backing Sheet Grade: 0.02 inches thick.
 3. Post-Forming Grade: 0.042 inches thick.
 4. Cabinet Liner: 0.02 inches thick.
 5. Provide solid color type where indicated on drawings.
 6. Fill and seal plastic laminate joints with Seamfil by KAMPEL

ENTERPRISES, INC. or equal. Colors to match plastic laminate.

7. Manufacturer and Color: As indicated
8. Other Acceptable Manufacturers: Solid surface manufactured by the following companies are acceptable providing they meet the requirements specified herein and the colors and pattern are an acceptable match as determined by the Architect.
 - a. FORMICA
 - b. PIONITE
 - c. NEVAMAR
 - d. WILSONART.
 - e. LAMINART

G. Hardware Items:

1. Drawer Slides: Self-closing, side mounting type with nylon tire, steel ball-bearing rollers. Manufactured by BLUM, GRASS, AMEROCK, KNAPE & VOGT; ACCURIDE. Load capacity as follows:
 - a. 75 pounds: Drawers up to 3-1/2 inches deep: Similar to ACCURIDE Series 2132.
 - b. 100 pounds: Drawers up to 8 inches deep: Similar to ACCURIDE Series 2832.
 - c. 150 pounds: Drawers over 8 inches deep, all file drawers: Similar to ACCURIDE Series 4034.
2. Drawer and Door locks: 5-pin tumbler, dead bolt. KENSTAN; BEST; COMPTON NATIONAL; CORBIN. Provide 2 keys per cylinder.
3. Concealed Hinges: European style, self-closing, type as required for construction. HAFELE; GRASS; PRAMET; BLUM.
4. Drawer and Door Pulls: As indicated.
5. Adjustable Cabinet Shelf Supports – Spoon Type: 5mm; nickel plated.
6. Catches: Magnetic, STANLEY #45 or equal by NATIONAL LOCK or EPCO.

H. Nails

1. Provide steel nails with diamond point for soft woods and blunt point for hardwoods.
2. Interior Work - Finishing Nails: 6d for 3/4" material; 9d or 10d for 5/4" material; and 12d for 1-1/2" material.

J. Adhesive: Low-VOC, FS MMM-A-125C, Type II, water- and mold-resistant; complying with required VOC regulations.

K. Solid Surface Material: 1/2" or 3/4" inch thick sheets.

1. Provide thicknesses as indicated on the drawings.
2. Surface burning characteristics in accordance with ASTM E 84: Class I or A, and as follows:
 - a. Flame spread: <25.
 - b. Smoke developed: <25.

3. Joints: Provide watertight, fused joints as recommended by manufacturer.
 - a. Joint Adhesive: Manufacturer's recommended adhesive to create inconspicuous, nonporous joints, with chemical bond.
 4. Edge Treatment: As detailed on drawings. Ease all exposed edges not otherwise detailed.
 5. Make field cut-outs as required to install plumbing items and toilet accessories. See Division 22 and Section 10 28 13.
 6. Manufacturer and Color: As indicated
 7. Other Acceptable Manufacturers: Solid surface manufactured by the following companies are acceptable providing they meet the requirements specified herein and the patterns and colors are an acceptable match as determined by the Architect.
 - a. DU PONT Corian
 - b. FORMICA
 - c. WILSONART
- L. Paneling System: Provide system consisting of system design, panels, metal mounting system and trim, and accessories for a complete installation.
1. Panel Plastic Laminate: As indicated on the drawings.
 2. Molding and Trim: Extruded aluminum; pre-finished at the factory; types and shapes as indicated and recommended by manufacturer for installation system specified and substrate conditions.

2.02 FABRICATION

- A. General: Except as specified hereinafter, fabricate all work in accordance with AWI quality standards as specified. Work not specified with a level of quality shall be not less than "Custom" quality per AWI. All particle board panels to be balanced construction.
- B. Custom Casework
1. Quality Standard: Custom Grade per AWI Section 400.
 2. "Flush Overlay" design as shown in AWI Architectural Casework Details.
 3. Core Materials
 - a. Partical Board: Typical for plastic laminated finish materials.
 - b. Plywood Core: Typical for wood veneered surfaces.
 - c. Solid Hardwood: Typical for all drawer construction, except drawer faces.
 - d. Hardboard or Luan Plywood: Drawer bottoms.
 4. Plastic Laminate Facing
 - a. All exposed surfaces: Plastic laminate, general purpose grade. Include on exposed face and edges of all cabinets except where detailed otherwise on the drawings. Apply to all edges of doors and drawer fronts. Doors shall have laminate on both faces. Cabinet elements (tops, counters, face panels, end panels, rails, etc.) that are finished with laminate on the exposed surfaces shall have laminate balancing sheets on the concealed or semi-

concealed faces.

- 1) Back Panels: Standard 1/4" prefinished hardboard. Install in housed joints in surrounding panels.
- b. A vinyl catalyzed factory finish (AWI Finish System No. 4) shall be applied to all semi-concealed surfaces that do not have a pressure laminate finish or a balancing sheet finish. This includes drawer interior and drawer sides, ends, edges and adjustable semi-concealed shelving.
- c. At Contractor's option, the use of .025" thick cabinet Liner Grade laminate and .030" thick Backing sheet grade laminate may be used in lieu of AWI Finish System No. 4.
5. All casework material in 3/4" thick, excluding facing material thickness, unless otherwise detailed, required for stability, or doors in excess of 48" in any dimension. Drawer sides to be 1/2" thick; front and back 3/4"; bottom 1/4" thick.
6. Adjustable Shelves: Install supports at each end of all shelves and intermediate supports at all shelves over 30".
7. Design
 - a. Configuration of casework is indicated on drawings.
 - b. Detailing and design required to provide rigid, solid and structurally adequate casework is the responsibility of the fabricator; all within parameters of AWI specifications and as approved by the Architect.
 - c. The following conditions require special attention:
 - 1) Casework exceeding 42" in width between supports.
 - 2) Sink and/or equipment cutouts and supports.
 - 3) Countertops exceeding 24" unsupported.
 - 4) Wall and Ceiling Mounted Casework: Provide integral framing in casework of size, strength, and in locations which allow unit to be screw attached to proper substrate and remain rigidly in place.
- C. Solid Surface Material Countertops and Components: Fabricate to profiles, sizes and edge conditions indicated on drawings and as directed by manufacturers requirements.
 1. Solid Surface: Back and side splashes, where indicated, to be fused to top to ensure watertight joint.
 2. Fabricate with openings and mortises precut, where possible to receive fixtures, accessories and other similar items of work.
 3. Ease edges as indicated on the drawings.
 4. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid surface manufacturer requirements.
 5. Where countertops do not have a continuous substrate, locate and provide closure strips to prevent openings from countertop underside to top of support casework.
 6. Where joint design intent indicated is to be seamless, provide manufacturers recommended adhesive to create inconspicuous, nonporous joints, with chemical bond.

7. Provide counter supports at 42" maximum or as recommended by manufacturer.
 8. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 9. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 10. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.
 11. Butt Seams: Provide tight seams with well prepared sharp edges and manufacturers recommended matching adhesive for minimized appearance. Reinforce as recommended.
- D. Plastic Laminate Paneling: Mill and assemble pieces to conform to the profiles and shapes indicated on the drawings.
1. Quality Standard: Custom Grade per AWI Section 400.
 2. Core: Construct of 3/4" thick particle board core typical
 - a. General purpose
 - b. Balance underside of backing sheets, 0.020".
 3. Edges: matching laminate edge.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition architectural woodwork materials, items and products to average prevailing humidity conditions in installation areas before installing.
- B. Install blocking and anchoring devices built into substrates for anchorage of architectural woodwork.
- C. Deliver inserts and anchoring devices to be built into substrates well in advance of time substrates are to be built.
- D. Before installing woodwork, examine shop-fabricated work for completion and back priming.
- E. Ventilation for Adhesives: Comply, at a minimum, with the adhesive manufacturers' recommendations for space ventilation during and after installation. Maintain the following ventilation conditions during the adhesive curing period or for 72 hours after installation (whichever is longer): 1) supply 100% outside air 24 hours a day; 2) supply airflow at a rate of 6 air changes per hour, when outside air temperatures are between 55° F and 85° F and humidity is between 30% and 60%; and 3) supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in the previous item 2.

3.02 INSTALLATION

- A. Quality: Comply with AWI Section 1700.
- B. Install woodwork materials and products plumb, level, true and straight with no distortion. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops, window stools and shelves), and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offsets in revealed adjoining surfaces.
- C. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Install countertops level, true to alignment, accurately fit to wall conditions and securely fastened to base units and other support systems as indicated.
 - 1. Solid Surface Type Countertops: Form joints using tinted adhesive as recommended by top manufacturer.
- E. Casework: Install without distortion so that doors and drawers will fit openings properly and be 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.
- F. 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 a complete installation. Use fine finishing nail for exposed nailings, countersunk and filled flush with woodwork.

3.03 CLEANING AND PROTECTION

- A. Repair damaged and defective millwork to eliminate functional and visual defects. Where not possible to repair properly, replace millwork as directed by the Architect.
 - 1. Chipped, scratched or patched plastic laminate will not be accepted and must be replaced.
- B. Clean hardware, lubricate and make final adjustments for proper operation.
- C. Protect installed work during remaining construction operations.
- D. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.
- E. Cover completed casework with 4-mil polyethylene film protective enclosure, applied in a manner that will allow easy removal and without damage to woodwork or adjoining work. Remove cover immediately before the time of final acceptance.

END OF SECTION

SECTION 06 83 16

FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fiber glass reinforced composite wall panels.
- B. Trim and installation accessories.

1.02 RELATED SECTIONS

- A. Joint Sealants: Section 07 92 00.

1.03 REFERENCES

- A. Conform to the following standards of the American Standards for Testing and Materials (ASTM)
 - 1. ASTM D 149 - Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 - 2. ASTM D 256 - Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
 - 3. ASTM D 543 - Standard Test Method for Resistance of Plastics to Chemical Reagents.
 - 4. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
 - 5. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
 - 6. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C.
 - 7. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 8. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 9. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - 10. ASTM D 3841 - Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels.
 - 11. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards. Provide installation

instructions.

B. Samples

1. Submit 6 x 6-inch samples of each surface and color required.
2. Submit 6-inch samples of each trim profile and trim color required.

1.05 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Method of test for surface burning characteristics of building Materials) Wall Required Rating – Class A.

B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products indoors and protect from moisture, construction traffic, and damage.
- B. Store panels flat on clean, dry surface. Do not stand on edge or stack on fresh concrete or other surfaces that emit moisture.
- C. Store panels at least 24 hours temperature and humidity conditions approximating the average environment of the finish room.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to requirements, products manufactured by CRANE COMPOSITES, NUDO PRODUCTS, INC., MARLITE, SEQUENTIA, INC. or KEMLITE are acceptable.

2.02 PANEL MATERIALS

A. General:

1. Composite plastic panels of random chopped fiber glass roving, modified polyester copolymer, inorganic fillers, and pigments.
2. Resistant to rot, corrosion, staining, denting, peeling, and splintering.
3. USDA accepted.
4. Comply with ASTM D 3841, Type II.

B. Panel:

1. Typical Standard Panel Physical Properties:
2. Surface burning classification: Class A.
 - a. Flame spread (ASTM E 84): 25 or less.
 - b. Smoke developed (ASTM E 84): 450 or less.
3. Flexural strength (ASTM D 790): 8,830 psi.
4. Flexural modulus (ASTM D 790): $0.26 \times 10(6)$ psi.
5. Tensile strength (ASTM D 638): 5,700 psi.
6. Tensile modulus (ASTM D 638): $0.50 \times 10(6)$ psi.
7. Impact strength, IZOD (ASTM D 256): 7.7 ft.lb./in.
8. Thermal Conductivity (ASTM C 17): 0.50 BTU/in./hr./sq.ft. deg.F.
9. Water absorption (ASTM D 570): 0.16% in 24 hrs. @ 77 deg.F.
10. Chemical resistance (ASTM D 543):

Distilled water	0.59	0.19	No change.
Ethyl alcohol, 95%	0.92	0.18	Some fibers showing.
Sulfuric acid, 3%	0.43	0.08	Some fibers showing.
Sulfuric acid, 30%	0.28	0.13	Some fibers showing.
Sodium hydroxide, 1%	0.63	0.12	Some fibers showing.
Sodium hydroxide, 10%	0.26	0.17	Some fibers exposed, reduction in glass.
Toluene	0.14	0.13	Few fibers showing.
Sodium chloride, 1%	0.43	0.18	No change.
Hydrochloric acid, 10%	0.24	0.01	Few fibers showing.
Chlorine Gas	NC	NC	No change (NC).
Hydrogen sulfide	NC	NC	No change (NC).
No dimensional change under any of the listed reagents.			

C. Size

1. Wall panel width: 48 inches.
2. Wall panel length: Provide full-length panels unless substrate dimensions exceed available fabricated size.

D. Thickness: 0.09 inch.

E. Dimensional Tolerances:

1. Width and length: +/- 1/8 inch.
2. Thickness: +/- 10%.
3. Squareness: Not more than 1/8 inch out of square.

2.03 FINISHES

A. Exposed Surface: Pebble-like embossed finish. [Smooth] [Tile pattern]

B. Back Surface: Smooth. Imperfections that do not affect functional properties are

not cause for rejection.

- C. Colors: As selected by Architect; uniform throughout.

2.04 TRIM ACCESSORIES

- A. Provide panel manufacturer's standard vinyl moldings to meet project conditions. Provide types as required by layouts and wall conditions indicated on the drawings.
- B. Fasteners: Non-staining nylon drive rivets.
 - 1. Match panel colors.
 - 2. Length to suite project conditions.
- C. Adhesive: Structural construction adhesive as recommended by manufacturer.
 - 1. Adhesive shall have a VOC content of not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Sealant: Clear silicone sealant. See Section 07 92 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to receive panels to ensure surfaces are smooth, dry, true, and free of dirt, dust, oil, or grease.
- B. Remove high spots. Fill low spots.
- C. Verify that substrate construction is completed and approved.
- D. Correct deficiencies in substrate before installing panels.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's printed installation instructions, using both mechanical fasteners and adhesive.
- B. Cutting Panels
 - 1. Cut panels with carbide-tipped saw blade or swivel head shear.
 - 2. Allow 1/2-inch clearance in length per 8-foot panel length.
 - 3. Allow 1/8-inch clearance at cut-outs for penetrations.
- C. Pre-drill fastener holes before applying adhesive. Use carbide-tipped drill. Space as recommended by manufacturer.
- D. Apply adhesive between 50 and 90 degrees F, unless otherwise approved.

1. Spread adhesive 1/4-inch deep over entire back side of panel to achieve 100% coverage.
2. Do not use beads of adhesive.
3. Do not use mechanical fasteners or adhesive alone.
4. Roll panel surface to ensure complete contact.
5. If necessary, install bracing to maintain intimate contact until adhesive cures in accordance with manufacturer's instructions.

E. Panel Fasteners

1. Apply silicone sealant in pre-drilled fastener holes.
2. Drive fasteners for snug fit. Do not over-tighten.
3. Fasten leading edge of each panel after installing moldings.

F. Moldings: Install as recommended by panel manufacturer. Apply sealant within all trim pieces.

G. Sealants: Seal corner seams, ceiling and base junctures, around door frames and other openings, and between penetrating items and panel cut-outs.

3.03 ADJUST AND CLEAN

- A. Remove scraps and debris from the site, and leave in a neat and clean condition.

END OF SECTION

SECTION 07 10 00.13

WATERPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Section includes
 - 1. Hot applied rubberized waterproof system - (HARW).
 - 2. Self-adhered sheet waterproofing system - (SASW).
- B. Provide waterproofing in the following applications and areas:
 - 1. Planter walls; on plant side of wall: HARW or SASW, Contractor's option.
 - 2. Elevator pit walls: HARW or SASW, Contractor's option.
 - 3. Other areas where indicated.
- C. Surface preparation, primers, and protective covering.

1.02 RELATED SECTIONS

- A. Sealants: Section 07 92 00.
- B. Fluid-Applied Membrane Air Barriers: Section 07 27 26:

1.03 SUBMITTALS

- A. Shop Drawings: Submit details of special joint or termination conditions and conditions of interface with other materials. Edge terminations, flashing details, treatment of joint penetrations or projections at large scale. Details shall reference each material, sequence of placement and application procedure.
 - 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- B. Product Data: Submit for all items. Include construction details, material descriptions, and tested physical and performance properties of waterproofing and manufacturer's written instructions for evaluating, preparing, and treating substrate..
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch square of waterproofing and flashing sheet.
 - 2. 8-by-8-inch square of insulation.

- 3. 4-by-4-inch square of drainage panel.
- D. Statement of Application: Submit statement signed by Contractor and installer, stating that work complies with these specifications and that the installation methods complied with the manufacturer's printed specifications and instructions for the conditions of installation and use on this project.
- E. Applicator's License Certificate: Copy of "Certificate of License" issued to system applicator by manufacturer.
- F. Sample warranty.
- G. Contamination Profile: Manufacturer shall provide the Installer, Contractor and Owner with a tabular profile of chemicals, solutions, oils, compounds or materials which are injurious to the fluid-applied membrane system. This profile shall be established by generic (or trade name) basis, including those materials normally found to exist in the work environment or likely to occur on this work. The system should not be exposed to materials (directly or indirectly) as established by the Contamination Schedule during application or after completion of the work.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in the manufacture of specific type of waterproofing membrane systems specified with ten years minimum experience.
- B. Installer/Applicator: Company specializing in application of specified waterproofing with five years minimum experience and trained and approved by waterproofing manufacturer.
- C. Obtain primary materials for each waterproofing type required from single manufacturer. Provide secondary materials only as recommended and approved by manufacturer of primary materials.
- D. Pre-Waterproofing Conference
 - 1. Contractor: Prior to installation of waterproofing and associated work, schedule and administer a pre-installation meeting at the project site to review the material selections, installation procedure, special details, flashings, coordination, inspection procedures, and protection and repairs.
 - a. Attendance: Architect, Contractor, Installer, manufacturers' representatives and trades requiring coordination with the work.
 - b. Contractor: Take minutes and provide copies to all attendees.
- E. Manufacturer's Representative (primary material manufacturer): Furnish services of manufacturer's technical representative at the job site at the start of installation, periodically as work progresses and after completion as necessary to advise on every phase of the waterproofing work.

1. Install entire system in accordance with the manufacturer's instructions except where more stringent requirements are indicated or specified, then the more stringent requirements shall govern.

F. Contractor: Notify Architect 72 hours in advance of scheduled waterproofing work.

G. Installer to advise General Contractor of finish and curing requirements of concrete surfaces, as relates to application of the waterproofing materials, prior to installation of those substrates.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original, unopened packaging fully identified with brands, type, grade, class and other qualifying information including instruction for use and identifying numbers.

B. Storage waterproofing materials in a dry area away from high heat, flames or sparks. Provide weatherproof covering on top and all sides, allowing for adequate ventilation.

C. Store protection board flat and off the ground, preferably on a wood platform. Provide weatherproof covering on top and all sides.

D. Store only as much material at point of use as required for each day's work.

E. Handling: Handle all materials in a manner to prevent damage of any kind. Remove damaged material from the site and replace with new specified material.

1.06 JOB CONDITIONS

A. Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Surfaces to receive membrane shall be free of water, dew, frost, snow and ice.

B. Ventilation: Provide positive ventilation for enclosed areas continuously throughout the application and for a minimum of 8 hours afterward or until coatings have completely cured.

C. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, etc.) to come in contact with the membrane. Exposures to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine impact on membrane. See "Contamination Profile" specified under paragraph 1.03G herein.

D. Special Precautions: Allow no open fires or spark-producing equipment in the application area until vapors and fumes have dissipated. Post "No Smoking" signs

in area during application and maintain for at least 8 hours following application.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Installer's Special Warranty: Provide warranty for two (2) years against leaks, failures and defects. Upon notification of such defects, within the warranty period, make necessary repairs and replacements at the convenience of the Owner without additional cost to the Owner.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Hot Applied Rubberized System (HARW)
 - 1. Membrane: Elasticized rubberized asphaltic compound, self-bonding to normal substrates, hot poured, quick setting.
 - 2. Physical Properties
 - a. Water Vapor Permeability - ASTM E96, Procedure E: 0.027 perms.
 - b. Water Resistance - CGSB 37-GP-50M: No delamination, blistering, emulsification or deterioration.
 - c. Water Absorption - CGSB 37-GP-50M: Gain in weight 0.35 g maximum. Loss in weight 0.18 g maximum.
 - d. Penetration - ASTM D5329: At 77 degrees F, maximum 110; at 122 degrees F, maximum 200.
 - e. Elongation - ASTM D5329: 1000% minimum.
 - f. Low Temperature Crack Bridging Capability - CGSB 37-GP-50M: No cracking, adhesion loss, or splitting.
 - 3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
 - a. Primer: Solvent type conforming to ASTM D41.
 - b. Reinforcing Flashing and Protection Course: 60 mil, uncured neoprene sheet in uncut rolls.
 - c. Modified Asphalt Flashing and Protection Course: Alternative to uncured neoprene, 80-90-mil polyester or polyester and glass-reinforced modified asphalt sheet.
 - d. Termination Sealant or Mastic: Moisture-curing or bituminous type.

- e. Termination Bar: Stainless steel or high-strength plastic.
- 4. Miscellaneous: As required to complete installation.
- 5. Manufacturers
 - a. Liquid Membrane 6125 by AMERICAN HYDROTECH
 - b. TremProof 6100 by TREMCO
 - c. CCW-500R by CARLISLE
 - d. 790-11 by HENRY
 - e. STRATASEAL HR by CETCO
 - f. HRM 714 by W.R. MEADOWS

B. Self - Adhered Sheet Membrane System (SASW)

- 1. Membrane: Self-adhering laminated sheet comprised of rubberized asphalt and polyethylene film; minimum 60 mil thickness. Furnish in 36" wide x 60' long rolls with release paper.
- 2. Physical Properties
 - a. Tensile Strength, Film - ASTM D882: 5000 psi.
 - b. Tensile Strength, Membrane - ASTM D412: 325 psi.
 - c. Pliability, 180 degree bend over 1" mandrel - ASTM D1970: -25 degrees F.
 - d. Cycling over 1/4" crack, 100 cycles - ASTM C836: At -25 degrees, no effect.
 - e. Permeance - ASTM E96, Method B: 0.05 perm.
 - f. Water Absorption: ASTM D570: 0.1% (weight/72 hours).
- 3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
- 4. Cants: At all inside corners; minimum face 3/4".
- 5. Miscellaneous: As required for complete installation.
- 6. Manufacturers
 - a. Bituthene 4000 by GPC APPLIED TECHNOLOGIES
 - b. Mel-Rol System by W.R. MEADOWS
 - c. CCW MiraDri 860/861 by CARLISLE
 - d. WP-200 by HENRY
 - e. ENVIROSHEET by CETCO

C. Accessories

- 1. Vertical Protection Board
 - a. Vertical Protection Board - At Elevator Pit Walls: Asphaltic hardboards "Protection Course" PC-3 by W.R. MEADOWS or GCP APPLIED TECHNOLOGIES Protection 03; 1/8" thick; two layers required.
 - b. Vertical Protection/Drainage – All Other Locations
 - 1) Description: 3/8" thick high impact polystyrene drainage core with filter fabric adhered to core.
 - 2) Adhesive and Tape: Types as recommended by drainage board manufacturer.

- 3) Manufacturer: Hydroduct HSF by GCP APPLIED TECHNOLOGIES; Amerdrain 650 by AMERICAN WICK DRAIN CORPORATION; CCW Miradrain 6200XL by CARLISLE; Hydrodrain by HYDROTECH; PolyFlow 15 by POLYGUARD PRODUCTS, Mel-Drain 7955 and Mel-Drain Total Drain by W. R. MEADOWS.
- c. Insulation Protection Board: Rigid insulation. See Section 07 21 00. Provide in addition to drainage board at all location except elevator pit walls.
2. Horizontal Protection/Drainage Board
 - a. Description: 3/8" thick high impact polystyrene drainage core with filter fabric adhered to core.
 - b. Adhesive and Tape: Types as recommended by drainage board manufacturer.
 - c. Manufacturer: Hydroduct HSF by GCP APPLIED TECHNOLOGIES; Amerdrain 650 by AMERICAN WICK DRAIN CORPORATION; CCW Miradrain 6200XL by CARLISLE; Hydrodrain by HYDROTECH; PolyFlow 18 by POLYGUARD PRODUCTS, AQUADRAIN 30H by CETCO Mel-Drain by W. R. MEADOWS.
3. Expansion Joint Fillers: Provide membrane support and additional membrane length at joints.
 - a. Above Grade: Closed cell foam tubing, size and properties as recommended by waterproofing membrane manufacturer.
 - b. Below Grade: Closed cell neoprene gaskets; ASTM D1056 Class SC (oil resistant and medium swell), 2 to 5 psi compression deflection.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION OF SUBSTRATES

- A. Prepare, fill, prime, and treat substrates to receive waterproofing membrane, including joints, cracks, corners and penetrations according to manufacturer's written instructions and recommendations. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction. Mask termination elevations to prevent application of waterproofing materials on surfaces exposed to view.
- C. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Semi-Liquid Membrane: Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- F. Outside Corners: Bevel or round outside corners of substrate by grinding to produce a minimum 3/4" face or radius if not provided under Division 03 or use other means to treat outside corners approved by waterproofing manufacturer.
- G. Inside Corners: Prepare and treat using methods recommended by manufacturer.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to manufacturer's written instructions and recommendations and ASTM D 6135 (for sheet membrane).

3.03 INSTALLATION – HOT APPLIED RUBBERIZED SYSTEM (HARW)

- A. General
 - 1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
 - 2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately 1/2").
- B. Flashing
 - 1. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
 - 2. Prime substrate with surface conditioner.
 - 3. Install elastomeric flashing sheet and adhere to deck and wall substrates in a 125 mil layer of hot – applied rubberized asphalt.

4. Extend elastomeric flashing sheet up walls or parapets a minimum of 8 inches above and 6 inches onto deck to be waterproofed.
5. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

C. Hot Applied Membrane

1. Apply surface conditioner, at manufacturer's recommended rate, over prepared substrate and allow to dry.
2. Heat and apply rubberized asphalt according to manufacturer's written instructions.
 - a. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
3. Start application with manufacturer's authorized representative present.
4. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping all side and end laps 2"; broom or brush fabric to embed fabric into membrane and remove all wrinkles.
5. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.
6. Cover waterproofing with protection course with overlapped joints while membrane is still hot to ensure good bond.

3.04 INSTALLATION – SELF ADHERED SHEET SYSTEM (SASW)

A. General

1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately 1/2").

B. Comply with ASTM D6135.

C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

D. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- 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 deg F, install self-adhering, modified bituminous sheets produced for low-

temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

- E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- G. Seal edges of sheet-waterproofing terminations with mastic or termination sealant.
- H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions. Seal all sides of patched areas with termination sealant or mastic
- J. Immediately install protection course with butted joints over waterproofing membrane.

3.05 INSTALLATION – UNDER SLAB SHEET MEMBRANE

- A. Preparation: As recommended by membrane manufacturer. Compact substrate as specified in Division 31, Earthwork. Remove loose aggregate or sharp protrusions. Fill gaps or voids greater than 1/2". Remove standing water prior to membrane applications.
- B. Installation: In accordance with manufacturer's instructions.

3.07 INSTALLATION OF DRAINAGE AND PROTECTION ASSEMBLY

- A. Exposed Waterproofing System: Provide protection assemblies as follows:
 - 1. Horizontal Surfaces: After all curing, testing and repair work is complete, install protection/drainage board assembly as follows:
 - a. Install drainage panels over membrane, with tight butt joints and completely covering membrane. Adhere with adhesive as recommended by panel manufacturer.
 - b. Overlap fabric onto previous panel. Adhere overlapped filter fabric with tape or mastic as recommended by manufacturer.
 - 2. Vertical Surfaces
 - a. Elevator Pit Walls: After all curing and repair work is complete and prior to backfilling, install one layer of 1/4" thick protection board over membrane, placing boards with tight butt joints and completely covering membrane.

- b. All Other Walls
 - 1) After all curing and repair work is complete and prior to backfilling, install one layer of drainage/protection board over membrane, placing boards as recommended by manufacturer with tight butt joints and completely covering membrane.
 - 2) Rigid Insulation: Provide rigid insulation in addition to drainage/protection board. See Section 07 21 00.
- c. Do not nail or otherwise penetrate membrane to attach protection boards. Use suitable adhesive compatible with membrane.

3.08 CLEANING, PROTECTION AND REPAIR

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. Protect installed [board insulation] [and] [insulation drainage panels] from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Insulated sheathing at masonry veneer walls.
- B. Perimeter and under slab insulation.
- C. Spray polyurethane foam insulation.
- D. Glass fiber blanket wall and ceiling insulation.

1.02 RELATED SECTIONS

- A. Wood Nailers: Section 06 10 50
- B. Roof Insulation: Section 07 54 23.
- C. Firestopping (Safing): Section 07 84 00.
- D. Nailable Roof Insulation: Section 07 22 19.

1.03 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Spray Foam Insulation Qualification Data: For qualified installer.

1.04 QUALITY ASSURANCE

- A. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
 - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation materials in manufacturer's original, unopened, and labeled packages.
- B. Store insulation materials at the site inside storage trailers or the building in a dry, ventilated place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
- C. Remove fibrous batt insulation that has become wet before or after installation. Replace with new, dry insulation.
- D. Protect plastic insulation from excessive exposure to sunlight. Protect at all times against ignition. Complete installation and covering of plastic insulation materials as rapidly as possible in each area of work.

PART 2 PRODUCTS

2.01 RIGID BOARD INSULATION - POLYSTYRENE

- A. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 25 psi, 1.6 p/cf.; maximum flame-spread and smoke-developed indexes of 25 and 165, respectively, per ASTM E84.
- B. Thicknesses: Provide the following unless otherwise indicated on the drawings.
 - 1. Perimeter/Under Slab Application: 2 inch.
- C. Adhesive: Types as recommended by insulation manufacturer for substrates and substrate coating materials where applicable.
- D. Manufacturer: Subject to compliance with requirements, provide products by DUPONT - DOW CHEMICAL Styrofoam; OWENS CORNING Foamular; KINGSPAN GreenGuard; DIVERSIFOAM PRODUCTS Certifoam

2.02 GLASS-FIBER BLANKET INSULATION

- A. Type: Glass fiber blanket designed to friction fit with metal. Manufacturers standard lengths; widths as required to fit framing conditions. Provide facings as follows:
 - 1. Unfaced: Conform to ASTM C665 Type I, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E 136 for combustion characteristics.
 - 2. Kraft Facing: Areas where insulation is not exposed (concealed behind gypsum board). Conform to ASTM C665 Type II, Class C, Category 1.
 - 3. Flame Resistant Foil Facing: Areas where insulation is exposed (not covered by gypsum board or concealed interstitial space between faced insulation and gypsum wall board face). Conform to ASTM C665 Type III,

Class A, Category 1; flame-spread index of 25 or less.

- B. Thickness: As indicated.
- C. Manufacturer: Subject to compliance with requirements, provide products by JOHNS MANVILLE, OWENS-CORNING FIBERGLASS, CERTAINTEED, GUARDIAN BUILDING PRODUCTS or KNAUF INSULATION.
- D. Tape: Type as approved by insulation manufacturer.

2.03 SPANDREL GLASS/CURTAINWALL INSULATION

- A. Manufacturer: Subject to compliance with requirements, provide products by JOHNS MANVILLE, OWENS-CORNING FIBERGLAS, CERTAINTEED, GUARDIAN BUILDING PRODUCTS or KNAUF INSULATION; fiberglass insulation with factory-applied facing.
- B. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84, passing ASTM E136 for combustion characteristics.
 - 1. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - 2. Thickness: As indicated on drawings.
- C. Foil-Faced, Glass-Fiber Board Insulation: ASTM C612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.
 - 1. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - 2. Thickness: As indicated on drawings.
- D. Dark-Surfaced, Glass-Fiber Board Insulation: ASTM C612, Type IA; faced on one side with black glass-fiber mat or black polymer finish; maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.
 - 1. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
 - 2. Thickness: As indicated on drawings.

2.04 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Type
 - 1. Material: ASTM C1029, Type II minimum, closed cell polyurethane foam insulation containing no CFC's, HCFC's and VOC's.
 - 2. Physical Properties

- a. Density (ASTM D1622): Minimum 2.0 pcf
- b. Closed cell content (ASTM D6226): >90%
- c. Thermal Conductivity: R-Value = 6.4/inch. R-values are "aged" thermal values in accordance with PIMA Bulletin #101 and RIC/TIMA Bulletin #281-1 conditioning procedures
- d. Water Absorption (ASTM D2842): Maximum 1.0% volume.
- e. Water Vapor Transmission Permeability (perm-inch) (ASTM E96): 2.2.
- f. Fire performance in accordance with ASTM E84 and UL 723 flame spread 25 or less and smoke development 450.
- g. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- 3. Thickness: As indicated or as required to fill voids where applicable.
- 4. Primer: Type as recommended by insulation manufacturer for adjacent and substrate surfaces. Ensure adjacent wall framing members are not deflected after installation and cure.
- 5. Thermal Barrier: Where foam insulation is left exposed to building interior, provide approved 15 minute thermal or ignition barrier meeting the requirements of ASTM E 119, UL 1715, UL 1040 or NFPA 286 and IBC Section 2603.4 (minimum ½" gypsum board, intumescent coating or similar code complying material).
 - a. Bonding Agent: Provide suitable agent to ensure adequate bond between spray foam insulation and thermal barrier.
- 6. Manufacturers: Subject to compliance with specified requirements, provide products by HENRY, DUPONT - DOW CHEMICAL, JOHNS MANVILLE, BASF, CERTAINTEED, GACO-WESTERN, PREFERRED SOLUTIONS, INC. or ICYNENE.

2.05 INSULATED SHEATHING

- A. Material: Polyisocyanurate, foil faced, conforming to ASTM C1289, Type I, Class 1 or 2, minimum density 1.9 pcf.; foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.
 - 1. Compressive Strength – ASTM D1621: 25 psi.
 - 2. Flexural Strength – ASTM C203: 40 psi.
 - 3. Water Absorption – ASTM C206: Maximum 0.05% by volume.
 - 4. Water Vapor Permeance – ASTM E96: <0.03 perms.
- B. Thickness: As indicated
- C. "R" Value: Minimum 5.6 per inch.
- D. Fasteners and Adhesive: Types as recommended by insulation manufacturer.
- E. Manufacturer: Thermax by DUPONT - DOW CHEMICAL; Energy Shield by ATLAS ROOFING; Isoshield Silver by APACHE PRODUCTS; AP Foil by JOHNS MANVILLE; R-MAX Ecomax: Xci by HUNTER.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected.
- B. Verify substrate surfaces are dry and free of irregularities or substances harmful to insulation. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.
- C. Verify mechanical and electrical services within walls have been installed and tested.
- D. Fill miscellaneous voids and spaces in wall framing and at window and door framing with batt insulation loosely stuffed in place.
- E. Spray-On and Spray Foam Insulations: Provide masking, drop cloths or other satisfactory coverings for all materials/ surfaces which are not to receive insulation to prevent damage from overspray.

3.02 INSTALLATION OF RIGID BOARD INSULATION - CAVITY WALL

- A. Place insulation horizontally within cavity where indicated. Fit boards tightly together and around penetrations.
- B. Place to ensure tight joints between all insulation panels installed.
- C. Use manufacturer's suggested adhesive and or mechanical fasteners to bond the insulation panel to substrate. Keep perimeter fasteners 3/8" from edges and ends of boards
- D. CMU Backup Cavity: Place insulation panels to clear wall ties, yet maintain a tight joint between the panels.

3.03 INSTALLATION OF RIGID BOARD INSULATION - PERIMETER INSULATION

- A. Place at all slab-on-grade conditions at building perimeter.
- B. Adhere to substrate as required to maintain insulation in final location prior to backfilling.
- C. Coordinate placement of insulation with placement of vapor barrier. See Section 07 26 00.

3.04 INSTALLATION OF BLANKET/BATT INSULATION

- A. Install blanket type insulation with tight fitting butt joints. Provide supplementary support at vertical and horizontal installations when required to maintain insulation in permanent proper location.
 - 1. Spot adhere insulation to inside face of exterior sheathing or similar back-up material as required to maintain insulation in it's proper location.
- B. Fit insulation between members. Do not over-compress.
- C. Locate facing to room side, where applicable.
- D. Install interior wall sound attenuation at interior partitions where indicated on floor plans or wall types.

3.05 INSTALLATION SPANDREL GLASS/CURTAINWALL INSULATION

- A. In Curtainwall Frames at Spandrel Glass
 - 1. Install insulation board behind spandrel glass. Leave 2" space between glass and insulation, unless otherwise detailed.
 - 2. Screw-attach aluminum clip angles to storefront frames at 16" on centers.
 - 3. Friction-fit the insulation between curtainwall frames against the clip-angles.
 - 4. After insulation is properly fitted, apply a continuous piece of foil-scrim tape against insulation board and storefront frame.
 - 5. Apply continuous tape over spliced joints in insulation (if any).
- B. Coordinate with placement of perimeter fire safing. See Section 07 84 00.

3.06 SPRAY FOAM INSULATION

- A. Prepare surfaces as recommended by insulation manufacturer. Remove substances from metal deck or other metal surfaces that will prohibit insulation/metal bond. Apply primer where required by manufacturer.
- B. Spray-Applied Insulation: Install Spray-application of polyurethane foam in accordance with ULC S705.2 and the manufacturer's instructions. Install in areas where indicated on the drawings. Fill all voids for a complete solid installation.
- C. Trim, as needed, any excess thickness that would interfere with the application of cladding/covering system by other trades.
- D. Clean-up all overspray from adjacent surfaces and floor.

END OF SECTION

SECTION 07 22 19

NAILABLE ROOF INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide nailable roof insulation.

1. Note: Multiple layers in varying thicknesses of roof insulation may be required for a consistent roof profile in configurations indicated. Top layer of insulation to be nailable type for shingle installation/attachment. Segmented roof substrate is not acceptable. Coordination with Architect is required for desired result.

1.02 RELATED SECTIONS

- A. Metal Shingles: 07 31 35
- B. Roof Insulation (below nailable): Section 07 54 23.

1.02 REFERENCES

A. Reference Standards

1. ASTM C1289-11 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
2. FM: Factory Mutual.
3. U.L.: Underwriters' Laboratories.

1.03 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include as a minimum the following:
 1. Layout of roof showing sheet sizes and field joint locations.
 2. Location and type of penetrations.
 3. Perimeter, penetration and special details.
 4. Description of all materials.

1.04 QUALITY ASSURANCE

- A. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75° F., mean temperature.

1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by C1289-11.
 - B. Installer Qualifications: An experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (3) years of successful experience installing thermoplastic membrane roofing systems similar to those required for this project.
 - C. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.
 - D. Roofing Conference: Before starting green roofing construction, conduct conference at Project site. Meet with the Construction manager, Architect and Manufacturer to review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.
 - E. Wind Uplift: Conform to requirements of IBC 1609 – 2017 and ASCE 7-10.
- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Deliver insulation materials in manufacturer's original, unopened, and labeled packages.
 - B. Store insulation materials at the site inside storage trailers or the building in a dry, ventilated place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
 - C. Protect plastic insulation from excessive exposure to sunlight. Protect at all times against ignition. Complete installation and covering of plastic insulation materials as rapidly as possible in each area of work.

PART 2 PRODUCTS

2.01 NAILABLE ROOF INSULATION

- A. Provide nailable insulating roof sheathing meeting the requirements of ASTM C1289 Type V. Assembly is comprised of two thicknesses as follows.
 1. Top Layer: Composite insulation board consisting of polyisocyanurate core bonded to CDX plywood top facing and glass reinforced inorganic bottom facer.

B. Assembly Thickness - Overall: As indicated

1. Note: Multiple layers in varying thicknesses of roof insulation may be required for a consistent roof profile in configurations indicated. Top layer of insulation to be nailable type for shingle installation/attachment. Segmented roof substrate is not acceptable. Coordination with Architect is required for desired result.

C. Foam Core Physical Properties

1. Compressive Strength - ASTM D1621: Minimum 20 psi top layer; minimum 25 psi bottom layer.
2. Density: 2 pounds per cubic foot.
3. Flame Spread - ASTM E84: 25 or less.
4. Foam Plastic: Conform to FM 4450, UL 790 and UL 1256.

D. Manufacturers: Subject to compliance with specified requirements, provide products by one of the following:

1. ATLAS ROOFING COMPANY
2. GAF
3. JOHNS MANVILLE
4. HUNTER PANELS
5. RMAX

2.02 FASTENERS

- A. Provide roofing membrane manufacturer's recommended type mechanical fastener for deck. Type, size and spacing shall be as required to maintain manufacturer's system required warranty and wind uplift criteria.

PART 3 EXECUTION

3.01 GENERAL

- A. Coordinate installation of insulation with installation of substrate board, vapor barrier, roofing felts or underlayment and roofing shingles so insulation is not exposed to precipitation or left exposed at the end of the workday.

3.02 PREPARATION

- A. Examine substrate and installation conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Install nailable roof insulation assembly in accordance with manufacturer's recommendations and instructions.

- B. Install insulation in two layers. Install top layer of insulation with joints staggered from joints of previous layer a minimum of 12" in each direction. Mechanically fasten insulation to metal deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
- C. Install insulation with long joints of insulation with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

END OF SECTION

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Fluid applied vapor permeable air barrier.

1.02 RELATED SECTIONS

- A. Gypsum Board Assemblies joint-and-penetration treatments: Section 09 21 16.
- B. Building Insulation for foam-plastic board insulation: Section 07 21 00.
- C. Joint Sealants for joint-sealant materials and installation: Section 07 92 00.
- D. Through-Wall –Flashing Membrane: Section 04 00 00.

1.03 DEFINITIONS

- A. ABAA: Air Barrier Association of America.
- B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.04 REFERENCES

- A. The following standards are applicable to this section:
 - 1. ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
 - 2. ASTM E283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 3. ASTM E1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
 - 4. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 5. ASTM E96: Water Vapor Transmission of Materials.
 - 6. CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.

1.05 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction. Include details of interfaces with other materials that form part of air barrier. Include details of mockups.
- C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- D. Qualification Data: For Applicator.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Before beginning installation of air barrier, [apply air barrier to masonry mock-up constructed under section 04 00 00] [build mockups cold-formed metal framing and sheathing construction indicated and apply air barrier] to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by testing agency of air barrier before external insulation and cladding is installed.
 - 2. Include junction with foundation wall intersection.
 - 3. If Architect determines air barrier applications to mockups do not comply with requirements, reapply air barrier until approved.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
 - 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

- D. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations and where applicable, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- E. Statement of Application: Submit statement signed by Contractor and installer, stating that work complies with these specifications and that the installation methods complied with the manufacturer's printed specifications and instructions for the conditions of installation and use on this project.
 - 1. Contamination Profile: Manufacturer shall provide the Installer, Contractor and Owner with a tabular profile of chemicals, solutions, oils, compounds or materials which are injurious to the system. This profile shall be established by generic (or trade name) basis, including those materials normally found to exist in the work environment or likely to occur on this work. The system should not be exposed to materials (directly or indirectly) as established by the Contamination Schedule during application or after completion of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Store rolls according to manufacturer's written instructions.
- D. Protect stored materials from direct sunlight.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.09 WARRANTY

- A. Submit manufacturer's 10 year material warranty.

PART 2 PRODUCTS

2.01 FLUID-APPLIED MEMBRANE VAPOR/AIR BARRIER

- A. Fluid-Applied, Vapor Permeable Membrane Air Barrier: Cold-applied, elastomeric membrane.
 - 1. Products: Subject to compliance with requirements, provide either synthetic polymer or modified bituminous from one of the following:
 - a. HENRY COMPANY
 - b. CARLISLE COATINGS & WATERPROOFING
 - c. MEADOWS, W. R., INC.
 - d. STO CORPORATION
 - e. MOMENTIVE – GE
 - f. RUBBER POLYMER CORP.
 - g. MASTER BUILDERS SOLUTIONS
 - h. DOW - DUPONT
 - i. Subject to compliance with the specified performance requirements, products manufactured by others are acceptable upon Architects approval.
 - 2. Physical and Performance Properties
 - a. Air Permeability ASTM E2178: 0.004 cfm / ft² @ 1.57 lbs / ft² and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft² for 1 hour and gust wind load pressure of 62.8 lbs/ft² for 10 seconds when tested at 1.6 lbs/ft² to ASTM E331
 - b. Water vapor permeance: 10 - 14 perms to ASTM E96 Method B
 - c. Wet Film Thickness: Per manufacturer as required to achieve performance and code compliance.
 - d. Surface Burning: ASTM E 84 Class A flame spread and smoke developed.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. Adhesion to Substrate: Minimum 20 lbf/sq. in. when tested according to ASTM D 4541
- B. Self-adhering transition membrane: Vapor permeable air barrier membrane consisting of a microporous film laminate, backed with adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:
 - 1. Air leakage: <0.002 CFM/ft² @ 1.6 lbs/ft² to ASTM E283
 - 2. Membrane Thickness: 17 mils
 - 3. Low temperature flexibility -40 degrees F: Pass to ASTM D3111

2.02 AUXILIARY MATERIALS

- A. Primer and block filler: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.
- B. Through-Wall Flashing and Transition Membrane (Self-Adhering): SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. Membrane shall have the following physical properties:
 - 1. Membrane Thickness: 0.0394 inches (40 mils)

2. Film Thickness: 4.0 mils
 3. Flow (ASTM D5147): Pass @ 212 degrees F
 4. Puncture Resistance: 134 lbf to ASTM E154
 5. Tensile Strength (film): 5723 psi ASTM D882
 6. Tear Resistance: 13lbs. MD to ASTM D1004
 7. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M
- C. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- D. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- E. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- F. Stainless-Steel Sheet: ASTM A240, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
- G. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E162; with primer and non-corrosive substrate cleaner recommended by foam sealant manufacturer.
- H. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
- I. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 92 00.
- J. Other materials as recommended by barrier manufacturer for a complete air and water tight barrier.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 4. Verify that masonry joints are flush and completely filled with mortar.
 5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier 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.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
 - 1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.04 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with

- roofing membrane.
 2. Install transition strip so that a minimum of 3 inches of coverage is achieved over both substrates.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply manufacturer's recommended transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
 1. Transition Strip: Roll firmly to enhance adhesion.
 2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
 3. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and membrane.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal top of through-wall flashings [, specified in Section 04 00 00,] to air barrier with an additional 6-inch- wide, strip.
- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.05 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
 - 1. Membrane Air Barrier: Dry film thickness as required by manufacturers written instructions or greater thickness as required to meet specified performance properties.
- E. Apply strip and transition strip a minimum of 1 inch onto cured air membrane according to air barrier manufacturer's written instructions.
- F. Do not cover air barrier until it has been tested and inspected by testing agency
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.06 FIELD QUALITY CONTROL

- A. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air barrier system has been provided.
 - 3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been

exceeded.

6. Surfaces have been primed, if applicable.
 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 8. Termination mastic has been applied on cut edges.
 9. Strips and transition strips have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- B. Remove and replace deficient air barrier components and retest as specified above.

3.07 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 60 days or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions..
 2. Protect air barrier from contact with incompatible materials and sealants not approved by air barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

SECTION 07 31 35

METAL SHINGLES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work of this Section includes metal shingles, miscellaneous fasteners, trims and flashings.

1.02 RELATED SECTIONS

- A. Flashing and Sheet Metal: Section 07 62 00.
- B. Nailable Insulation: 07 22 19.

1.03 REFERENCES

- A. ASTM D 3161 Class F - Standard Test Method for Wind-Resistance of Shingles.
- B. ASTM A 240/A 240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- C. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- D. ASTM E 8 – Standard Test Methods for Tension Testing of Metallic Materials.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's printed product information indicating material characteristics, performance criteria, and product limitations.
- B. Samples: Provide actual sample with sample of color.
- C. Manufacturer's Installation Instructions: Provide published instructions that indicate preparation required and installation procedures.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations, and installation details, as required by project conditions indicated.

1.05 QUALITY CONTROL

- A. Mock-Up: Prior to proceeding with the shingle system work, construct a mock-up of the panel system at the job site, for the Architect's review and approval, to establish the general construction and appearance of the installed system. Include horizontal and vertical joint conditions, window and trim condition and flashings. Provide required back-up structure representative of actual project substrate conditions. Demonstrate color variations, percentages and quantities.

1. Size of mock-up as required accommodating elements specified above. However, mock-up must be a minimum of 8' x 8'.

1.06 STORAGE AND HANDLING

- A. Store all materials off ground on wooden pallets.
- B. Stand felt rolls on end for storage.
- C. Use care not to damage products in handling.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: ZAPONNE ALUMINUM Diamond shingles
- B. Other Acceptable Manufacturers: Metal shingles manufactured by other manufacturers will be considered if types, sizes, colors and materials meet the requirements of the Basis of Design and are an acceptable match as approved by the Architect.

2.02 TILES

- A. Description: Individual roof/wall tiles with 4-sided interlocking design, self-aligning tab.

1. Finish: Mill Finish (Bare Aluminum)
2. Size: Exposed To Weather – 9-3/4" Tall by 6" Wide
3. Thickness: 0.020" (+/- commercial tolerance).
4. Weight: 0.58 lbs./sq.ft. - 58 lbs./100 sq. ft.
5. Density: 0.099 lb./cu.in.
6. Temper: H 234 (1/4 Hard)
7. Embossing: Smooth Finish
8. Tensile Strength: 19000 psi.
9. Yield Strength: 18000 psi.
10. Elongation (% in 2 in.): 10
11. Thermal Conductivity @ 77 Degrees F.: CGS Units 0.39

- 12. Specifications: ASTM B209
- 13. Fire Rating: A,B,C
- 14. ICBO Penetration: Yes

2.03 ACCESSORIES

- A. Trim and Flashing: Same material and gauge as tiles, unless otherwise recommended by the manufacturer Millennium Tiles.
 - 1. Starter strip.
 - 2. Outside corner flashing.
 - 3. False starter.
 - 4. J-channel.
 - 5. And as indicated on Drawings.
- B. Underlayment: Provide under entire metal roof surface.
 - 1. Material: Self adhering polyethylene sheet backed rubberized asphalt membrane, 40 mils thick. Provide primer as recommended by membrane manufacturer. Product to withstand high temperature applications, up to 260°F (127°C).
 - 2. Manufacturers: Bituthene HT Ice and Water Shield by W.R. GRACE; or equal by POLYKEN TECHNOLOGIES; POLYGUARD PRODUCTS; GAF; or CERTAINTEED.
- C. Fasteners: Stainless steel, ring-shank nails, unless otherwise recommended by, the manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Inspect surfaces to insure proper conditions to receive the work. Follow shingle manufacturer's recommendations for acceptable substrate materials.
- B. Coordinate support with cold form framing, sheathing and furring for complete structural support.

3.02 INSTALLATION - UNDERLAYMENT

- A. Place metal flashing tight with boards. Weather lap joints 2 inches. Secure flange with nails spaced 8 inches on center.
- B. Apply protection shingle underlayment in accordance with manufacturer's instructions.
- C. Apply at entire perimeter surfaces to receive metal shingles, including corners, copings, fascias and flashings.

3.03 SHINGLE - INSTALLATION

- A. Manufacturers Recommendations: except otherwise shown or specified, Comply with recommendations and instructions of manufacturer of metal shingles being installed.
- B. Prevent Electrolysis:
 - 1. Prevent dissimilar metals and corrosive nonmetallic materials from coming into direct contact with stainless steel materials.
 - 2. Do not allow water to flow from dissimilar metals to stainless steel materials.
- C. Install work to be straight and square or conform to curvilinear geometry indicated on drawings.
- D. Conceal all fasteners and expansion provisions.
- E. All exposed faces to free of buckles, excessive waves and tool marks.
- F. Clean shingles and building of soiling caused by this installation.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Prefinished, vertical steel wall panel systems consisting of siding, subgirts, trim, flashing, fasteners and sealant work for a complete installation. Types include:

- 1. Boxed ribbed profile – match existing adjacent.

1.02 RELATED SECTIONS

- A. Flashing: Section 07 62 00.

1.03 REFERENCES

- A. ASTM: American Society for Testing and Materials.
- B. ANSI A58.1: American National Standard Institute, "Building Code Requirements for Minimum Design Loads in Buildings and Other Structures".
- C. National Association of Architectural Metals Manufacturers.
- D. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.04 SUBMITTALS

- A. Shop Drawings: Submit for all items. Include the following:
 - 1. Panel profile and gage.
 - 2. Erection layout.
 - 3. Wall openings.
 - 4. Special framing details.
- B. Manufacturer's product specifications, standard details, certified product test results, installation instructions and general recommendations as applicable to materials and finishes for each component and for total system of preformed panels.
- B. Samples: Submit minimum 9" long by full width sample of panel showing finish, pattern, color, gage and profile.

1.05 QUALITY ASSURANCE

- A. For the purpose of establishing minimum aesthetic, functional and quality standards for the work of this section, proprietary standards are specified.
- B. The manufacturer, referred to as "Fabricator" shall assume undivided responsibility for all components of metal panel work, and shall demonstrate not less than 5 years successful experience in fabrication and installation of metal panel systems similar to work of this project.
- C. Performance Test Standards: Provide metal panel systems which have been pretested and certified by manufacturer under installed conditions as indicated for resistance as indicated to air and water infiltration and structural deflection and failure.
- D. Qualifications of Installer: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section. The firm shall have not less than 5 years of successful experience in erection of metal panel systems similar to system required for this project.
- E. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.
- F. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Deflection Limits: For wind loads, no greater than 1/180
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.06 HANDLING AND STORAGE

- A. Exercise care so as not to damage or deform material.
- B. Stack on platforms or pallets and cover to protect from weather.
- C. If an anti-stick compound or ply is used it shall be readily removable and not adversely affect the finish surfaces.

1.07 WARRANTY

- A. Prior to initial payment, metal wall panel manufacturer shall furnish the Owner with a written manufacturer's warranty certifying that all wall panel work was furnished and installed in complete accordance with the Contract Documents.
- B. Manufacturer's warranty shall certify that the installation will be free of defects in design and failures of materials, and construction.
 - 1. Failure of materials or workmanship includes excessive deflections, deterioration of finish or construction in excess of normal weathering, and defects in joint sealants, and other components of the work.
- C. Finish: Warranted for 20 years from date of substantial completion against:
 - 1. Color change more than 5 NBS units as determined in accordance with procedures set forth in ASTM D2244.
 - 2. Crack, peel or otherwise lose adhesion, the term "crack" not to include minute facing defects which may occur during fabrication of the coating building products.
 - 3. Chalk in excess of ASTM rating #8; the chalk rating to be determined in accordance with procedures outlined in ASTM D4214.
- D. Should defects develop during the warranty period, such defects will be repaired by the metal panel manufacturer at no expense to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

MATERIALS

- A. Double Box Ribbed Profile – Match existing profile
 - 1. Material: Smooth galvanized steel conforming to ASTM A653, SS Grade 50, minimum yield stress of 50,000 psi, structural quality galvanized coating, designation G90.
 - 2. Description
 - a. Gage: 22 minimum.
 - b. Depth: Approx 1 5/8". with lock configuration.
 - c. Width 12"
 - 1) Panel Flute Width: Approximately 1-1/2".
 - 2) Flute Shape: 90 degree return edges, perpendicular to wall surface.
 - 3) Flute Bend Radii: 1/16" maximum (sharp bends); brake formed.
 - d. Fastening: Concealed
 - 3. Basis of Design: MS METAL SALES EM15-622
 - a. Other Acceptable Manufacturers: Metal panel manufactured by the following companies are acceptable providing they meet the

requirements specified herein and the types and colors are an acceptable match as determined by the Architect.

- 1) DIMENSIONAL METALS
- 2) ATAS
- 3) MORIN
- 4) METL-SPAN.
- 5) CENTRIA

B. Accessories

1. Sub-framing Shapes: Minimum 16 ga., galvanized steel; provide with slotted holes for plumb adjustment.
2. Flashings and Trim: Same material, gage and finish as adjacent panel material.
3. Closure Strip: Flexible closed cell neoprene conforming to ASTM D1056 Grade SCE41.

C. Fasteners: Manufacturer's standard items, conforming to the following minimums:

1. Material: Type 305 stainless steel.
2. Exposed Fasteners: Color heads to match siding.
3. Size: As required for structural attachment.

2.02 FINISHES

A. Panels and Trim

1. Exposed Surfaces
 - a. Material/Manufacturer: Mica or Metallic Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duramar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 - b. Reference: Meet the requirements of Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.
 - c. Color: Match existing color - As selected by Architect.
2. Unexposed Surfaces: Manufacturer's standard primer.

2.03 FABRICATION

- A. General: All components of metal wall panel system shall be of the materials, design, sizes and thickness shown on approved shop drawings and/or specified herein.
- B. Joints in Metal Work: Carefully match all exposed work to produce continuity of line and design, with all joints, unless otherwise shown or specified, being accurately fitted and rigidly secured.

- C. Protection of Metals: Provide protection against galvanic action wherever non-compatible metals are in contact.

PART 3 EXECUTION

3.01 INSPECTION

- A. After lines and grades have been established, and before beginning installation, examine all parts of the structure affecting the installation of the metal siding panels. Should conditions be found which, in installer's opinion, will prevent the proper execution of the metal siding panel work, installer shall report such conditions, in writing, to the General Contractor.
- B. Installation work shall not proceed in that area until such conditions are corrected or adjusted to the satisfaction of the Installing Contractor.

3.02 INSTALLATION

- A. Siding
 - 1. Erect in accordance with the drawings and manufacturer's instructions and recommendations.
 - 2. Erect sheets true and plumb, in alignment with horizontal and vertical edges of the building. Final appearance of the wall shall be visually flat, straight and free from defect.
 - 3. Seal all panel/panel, panel/trim, and accessory/panel joints to provide resistance to specified water penetration.
- B. Flashing
 - 1. Install watertight, without waves, warps, buckles, fastening stresses, or distortion allowing for expansion and contraction.
 - 2. Hem exposed edges.
 - 3. Angle bottom edges of exposed vertical surfaces to form drips.
 - 4. Hold down clips: Install as indicated or required.
- C. Trim: Provide trim at corners, openings, panel terminations, and other areas indicated.

3.03 ERECTION TOLERANCES

- A. Provided the clearances shown on approved shop drawings are maintained and supporting substructure is installed to proper tolerances, all parts of the metal siding system, when completed, shall be within the following tolerances:
 - 1. Maximum variation from plane or location shown on approved shop drawings: 1/4" per 12' of length, or 1/2" in any total length.
 - 2. Maximum offset from true alignment between two identical members abutting end-to-end in line: 1/8".

3.04 DAMAGED PANELS

- A. Do not install panels that are bent, chipped, or otherwise damaged.
- B. Refinish all abraded surfaces to match original finish, using materials and methods recommended by siding manufacturer. Materials shall be fully compatible with the original finish system.
- C. Repaired surfaces shall be uniform and free from variations in color and surface texture from that of adjacent, like surfaces.
- D. If repaired sheet is not acceptable to the Associate, remove sheet and replace with a new sheet, at no additional cost to the Owner.

3.05 REMOVAL OF DEBRIS

- A. All debris caused by or incidental to the installation work shall be removed from the jobsite as the work progresses. Waste debris will not be permitted to accumulate.

3.06 CLEANING AND PROTECTION

- A. Cleaning: Clean finished surfaces as recommended by panel manufacturer, and in accordance with Section 01 74 00 requirements.
 - 1. Clean siding surfaces of dirt, grime and other surface blemishes.
- B. Protection: Installer shall advise Contractor of protection and surveillance procedures, as required to ensure that work of this section will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 07 42 13.23

METAL COMPOSITE MATERIALS WALL PANELS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment, and services necessary for the installation of a preformed metal wall panel system, complete and weather tight. Work shall include but not be limited to panels, stiffeners, fasteners, and weather seals required for a complete installation of panels to the support system provided for this scope of work.
 - 1. Furnish and install a preformed, prefinished composite wall panel system
 - 2. Accessory items such as panel subgirt system, clips, flashings, sealants, and gaskets.
- B. Shop Fabricated MCM Rout and Return Dryjoint System: Incorporating a pressure equalized system on a complete air and vapor seal, allowing air and vapor which enters the panel chamber to drain to the exterior of the wall, and allowing air into the pressuring chamber to provide instantaneous pressure equalization. Vents and drain holes shall be inconspicuously located and in such positions as not to contribute to staining, streaking or marking of the panel face.

1.02 RELATED SECTIONS

- A. Miscellaneous Steel Framing: Section 05 50 00.
- B. Cold-Formed Metal Framing: Section 05 40 00.
- C. Sealant: Section 07 90 00.

1.03 DESIGN AND PERFORMANCE CRITERIA

- A. General Performance: Wall panel assemblies shall comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other defects in construction.
 - 1. Design, fabricate, and erect a pressure equalized wall panel system to meet the requirements of AAMA 508-7
- B. Metal panel system: Designed by manufacturer so that attachment allows panels to successfully accommodate seismic and thermal movement without causing "oil-canning", undue stress on fasteners, or failure of weather seals.

- C. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330.
 - 1. Wind Loads: Indicated on the drawings.
 - 2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss
 - 1. Provide for free and noiseless thermal movement and structure deflection of components as may be caused by a temperature variation.
- G. Individual panels shall be removable without disturbing adjacent panels.
- H. Panels shall not warp or buckle when under full design loads.
- I. All fastenings and connectors shall be concealed.
- J. Fire Performance
 - 1. ASTM E 84 Flame Spread Index must be less than 25, Smoke Developed Index must be less than 450.
 - 2. ASTM D 1929 A self ignition temperature of 650° F or greater
- K. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of (5) years experience in the design and manufacturing of preformed metal wall panel systems with a minimum of (3) projects of similar size and scope of this project, utilizing this type of dry-joint composite panel system.
- B. Single Source Quality Control - Metal panel system manufacturer: Provide all design, engineering, panel fabrication, and assembly of panel system in manufacturing facility.

- C. Installer Qualifications: Minimum of (5) years experience in the installation of the specified panel system type, and be an authorized installer of the preformed metal panel system manufacturer.
- D. Metal Panel System Tolerances
 - 1. Maximum panel bow shall not exceed 2% of panel dimensions in width or length, with an overall maximum tolerance of .1875" within panel face.
 - 2. Face of panel shall not vary in plane to any adjacent panel greater than 1/16".
 - 3. Maximum 1/32" between mitered panel extrusions.
- E. Painted Finishes: Performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.
- F. Mock-Up Panels: Prior to proceeding with the composite wall panel system work, construct a mock-up of the panel system at the job site, for the Architect's review and approval, to establish the general construction and appearance of the installed system. Include horizontal and vertical joint conditions, extrusions and flashings. Provide required back-up structure representative of actual project substrate conditions.
 - 1. Size of mock-up as required accommodating elements specified above. However, mock-up must be a minimum of 6' x 6'.

1.06 SUBMITTALS

- A. Manufacturer's Certification: Submit written certification that metal panel system manufacturer has a minimum of (5) years experience in the design, engineering, and manufacturing of the type of panel system specified. Submit (3) reference projects of similar size and scope utilizing the specified type of panel system.
 - 1. Qualification Data: For Installer.
- B. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- C. Samples: Submit physical samples as follows
 - 1. (4) 12" square panels mounted with specified system attachments, paint finish for composite panel and for perimeter extrusion
 - 2. (2) 12" samples of each perimeter extrusion to be used
 - 3. (6) paint samples from composite panel manufacturers and paint applicator for perimeter extrusion
 - 4. (2) 12" samples of extruded internal system gaskets
 - 5. (6) standard color charts for specified silicone sealant manufacturer
- D. Shop Drawings: Submit complete metal panel system shop drawings with keyed plans, elevations, and sections. Specific details shall be included for all panel

conditions and all interfaces with all other exterior wall systems. Included coordinated details from shop drawings for other exterior wall systems. Drawings shall also indicate method of attachment, location of internal stiffeners and weather seals, and drainage method for perimeter extrusion system.

- D. Structural Calculations: Submit structural calculations for the design and performance of the metal panel system, including specified and building code windloads, deflections, in-place stresses, and capacity of fasteners. Calculations and submittal drawings shall be stamped by a Professional Engineer licensed in the **State Of Ohio**.
- E. Sealant Adhesion Testing: Submit sealant manufacturer's adhesion test results and recommendations for surface preparation to fluoropolymer paint finish.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - 2. Structural failures including rupturing, cracking, or puncturing.
 - 3. Deterioration of metals and other materials beyond normal weathering.
 - 4. Warranty Period: Two years from date of Substantial Completion.
- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading 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.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. Panel Manufacturers: Alucobond by 3A COMPOSITES USA, Reynobond by REYNOLDS METALS COMPANY, Larson by ALUCOIL, Alpolic by MITSUBISHI, CITADEL ARCHITECTURAL PRODUCTS, ALCOTEX or ALFLEX LLC.
- B. Panel System Fabricators/Installers: Provide rout and return dry-joint metal composite system designed and fabricated by the metal panel systems specified in paragraph 2.01A or by fabricators certified by the panel manufacturers. All

panel fabricators' systems must meet the specified design and performance requirements and conform to the design intent indicated on the drawings.

1. Basis of Design Fabricator - Panel System: SOBATEC SL-2000

2.02 MATERIALS

- A. Panels: General Description: Two sheets of alloy AA3000 Series aluminum (0.019" thick) sandwiching a non-combustible core formed in a continuous process.
 1. Thickness: .157" nominal.
 2. Weight: 1.16 lbs/sf
 3. Core: Fire retardant
 3. Tolerances
 - a. Panel Bow: Maximum 0.8% of any 72" panel direction.
 - b. Deviation from Flatness: Maximum 1/8" in 60" in any direction for assemblies unit; non-accumulative.
- B. Metal Panel Subgirt System: Type, size quantity and spacing of all connectors, supporting track, girts, fasteners and other hardware and anchorage devices for panels as required to suit specified standards.
 1. Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system
- C. Fasteners: Subgirt and panel fasteners shall be non-corrosive type as recommended by panel system manufacturer. Size and spacing shall be as required by structural calculations.
- D. Provide matching custom factory-fabricated integral companion flashing, trims, end caps and finishing components from same material as the aluminum building panels.

2.03 FABRICATION

- A. Machine fabricated all material in accordance with reviewed shop drawings with straight lines, square corners or smooth bends, free from twists, kinks, warps, dents, and other imperfections which may affect appearance or serviceability.
 1. Fabricate panels to sizes and configurations as indicated on drawings. All panel joints shall occur exactly where indicated on drawings
- B. Provide reinforced panels as required to meet the tolerances specified above.
- C. Panels shall be aligned with no lap or reveal other than joint width to permit expansion and contraction.

- D. Thickness of the metal and details of assembly and support shall provide sufficient strength and stiffness to resist distortion of finish surface. Exposed edges and ends of metal shall be dressed smooth, free from sharp edges and with no uniform minimum radius corners. Connections and joints exposed to weather shall be constructed to exclude water.
- E. All necessary holes shall be drilled and clip attachments applied before application of finish.
- F. Design and fabricate appropriate type, size, quantity and spacing of all sub-connectors, girts, fasteners and other anchorage devices as required to suit the specified standards.
- G. Subgirts shall be perforated at regular intervals to permit drainage of cavity.
- H. Panel stiffeners required for flatness and deflection shall be applied to the panel with structural silicone and compatible glazing tape.
- I. Field fabrication of panels is not permitted.
- I. Panel flatness tolerance: Fabricate panels not exceeding the following tolerances:
 - 1. Rises and falls across panel, (local bumps and depressions) will not be accepted.
 - 2. .080" (2mm) in a concave/convex direction, measured perpendicular to normal plane.

2.03 PAINT FINISHES

- A. Finishes
 - 1. Exterior Face Sheet: Mica or Metallic Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duranar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 - a. Color: Match existing As selected by Architect.
 - 2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations.
 - 3. Strippable coating shall be clear color, 2-1/2 mils thick, applied to all exterior face sheet materials after finish painting and prior to embossing and roll forming.
 - 4. Interior Face Sheet: White polyester paint suitable for field finish painting.
 - 5. Trim: Extruded aluminum; finish to match panels.
- B. To optimize panel finish uniformity, complete exterior panel elevations shall be finished from the same paint batch, in the same production run, utilizing directional arrows for consistency of application.

PART 3 EXECUTION

3.01 PRE-INSTALLATION CONFERENCE

- A. Not less than two weeks before starting installation of materials in the section, the contractor will convene a meeting at project site with Architect, Construction Manager, Owner's representative, Contractor installer foreman/superintendent, material manufacturer's representative, and mechanical and electrical trades. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates, areas, penetrations and conditions, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

3.02 INSTALLATION

- A. Panel system installer shall be authorized by the metal panel system manufacturer and familiar with the specific details required for this project
- B. Provide at least (1) person to be present at all times who is capable of providing layout for the metal panel system. Notify Architect of any dimensional discrepancies that may affect panel system installation.
- C. Install metal panel system in accordance with fabricator's instructions and recommendations and the approved shop drawings for the project.
- D. Install panel system to subgirt system with specified fasteners and within specified tolerances for joinery, level, and plumb.
 - 1. Maximum offset from true alignment of adjacent panels installed butting or in line shall be 1/16".
 - 2. Panel to panel joints shall not vary greater than 1/16" of the joint size indicated on drawings.
- E. Where required, install sealant with proper joint backing.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC POLYOLEFIN ROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide a thermoplastic membrane roofing system as shown and specified. Work includes:
1. Gypsum roof board substrate and preparation – if required.
 2. Adhered, single ply polyester reinforced thermoplastic polyolefin (TPO) membrane.
 3. Cover board.
 4. Insulation.
 5. Flashing, pipe seals, and roofing accessories.
 6. Installing roof flashings and sheet metal furnished under Section 07 62 00.
 7. Membrane flashing under metal copings.
 8. Plaza deck pavers and pedestal system.
 - a. Concrete units
 9. Drainage/water retention and root barrier components as required.
 10. Filter fabric
 11. Module vegetation
 12. Flood testing

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50.
- B. Flashing and Sheet Metal: Sections 07 62 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: To participate as a qualified company in production of Elasto/Plastic materials, the company must have a minimum of five (5) years as the sole manufacturer of the brand name. Manufacturer shall also furnish notarized certification that he has been in business and had roofs installed for a minimum of five (5) years.
- B. Installer Qualifications: An experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (5) years of successful experience installing thermoplastic membrane roofing systems similar to those required for this project.
- C. Manufacturer's representative shall conduct timely inspection of the roof installation to satisfy all warranty requirements.

- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
- E. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
 - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.
- F. Roofing Conference: Before starting green roofing construction, conduct conference at Project site. Meet with the Construction manager, Architect and Manufacturer to review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.
- G. Temporary Irrigation: The Green Roof System Installer is responsible for the design, implementation, and dosing requirements of the surface spray Temporary Irrigation System, which is required during the first full growing season. The Owner shall assure a suitable source of water supply, consistent with this Section, and provide an adequate number of hose bibs within the Green Roof System perimeter.
- H. Mockups: For approval by Architect: Accepted mockup may remain in place as part of the finished work. Include all curbing, unit paving assemblies and perimeter edges

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience
- C. FM Approvals Listing: Design and provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.

1. Fire/Windstorm Classification: Class 1A-90.
- D. Wind Uplift: Conform to requirements of IBC 1609 – 2017 and ASCE 7-10.
- E. Fire Classification: U.L. Class A.
- F. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289-13.
- H. Vegetated Modules Performance Requirements:
 1. Bulk density of growing media must be less than 32 lb. /ft². Calculations must be based on maximum media density at saturation of growing media per ASTM E2399-05.
 2. Minimum dry weight of the growing media must be more than 18 lb. /ft². Calculations must be based on dry weight of growing media per ASTM E2399-05.
 3. Entire vegetative roof system must retain at least 1.1 US gallons/ft² of water. Calculations must include volume of water represented by difference in weight between dry and saturated weight of the growing media per ASTM E2399-05.
 4. Growing media must have a Saturated Hydraulic Conductivity of greater than 15 inch/hour per ASTM E2399-05.
 5. All vegetation must be verified for compatibility by the Growing Media Manufacturer prior to acceptance

1.05 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include as a minimum the following:
 1. Layout of roof showing sheet sizes and field joint locations.
 2. Location and type of penetrations.
 3. Perimeter, penetration and special details.
 4. Description of all materials.
 5. Conformance to fire classifications requirements of IBC 1505.
 6. Layout of tapered insulation, including slopes.

7. Plaza paver plans and details
 8. Railing penetration details
 9. Plaza paver plans and details
 10. Railing penetration details
 11. Planting module plans and details.
- C. Manufacturer's Approval: Obtain manufacturer's written approval of final shop drawings prior to beginning roofing operations.
- D. Samples: Submit samples of all roofing and flashing materials.
1. 12-by-12-inch square of membrane sheet and flashing sheet.
 2. 12-by-12-inch square of board insulation.
 3. 12-by-12-inch square of substrate board.
 4. 12-by-12-inch square of protection mat.
 5. 12-by-12-inch square of drainage medium.
 6. Engineered soil.
 7. Sedums, plants.
 8. Border aggregate.
 9. Roof pavers, full sized, in each color and texture required.
- E. Submit certification from roofing manufacturer that the roofing membrane and the selected roofing insulation are compatible.
- F. Certifications: Roof manufacturer's certification of compatibility with all adjacent materials that come in contact with roofing membrane.
- G. Warranties: Sample of special warranties detailing terms as required herein.
- 1.06 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in manufacturer's original, unopened, undamaged, labeled bundles or containers.
- B. Store roofing materials, insulation and accessories at the site in storage trailers or the building in a dry, well-ventilated, weather tight place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
1. Handle rolled goods to prevent damage to edge or ends.
 2. Do not apply roofing materials to damp, frozen, dirty or dusty substrate surfaces.
- C. Protection
1. Protect adjacent materials and surfaces from damage and soiling during roofing system installation.
 2. Provide special protection or avoid heavy traffic on completed roofing work.
 3. Protect paving and structure walls adjacent to hoists before starting work.

4. Do not overload the building structure with storage of materials or installation equipment on the substrate decking.
5. Handle and store materials and equipment to avoid damage to substrate decking.

1.07 PROJECT CONDITIONS

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

1.07 WARRANTY

- A. Contractor and roofing subcontractor shall warrant the total roofing system (membrane, insulation and flashing) with respect to workmanship and proper application for two (2) years from the date of acceptance by the Owner. Should any leaks covered under the warranty occur during this period, corrective action will be taken by the Contractor to repair the roof to the satisfaction of the owner and membrane manufacturer. ALL CORRECTIVE WORK WILL BE DONE AT NO COST TO THE OWNER. Work includes all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, substrate boards, vapor retarders, roof pavers, and walkway products.
- B. The manufacturer(s) of the materials used shall provide a written, No Dollar Limit, **twenty (20)** year guarantee on the complete roof installation. Upon warranty inspection and acceptance of the roof, the guaranty will be turned over to the Owner on behalf of the Contractor, by an authorized representative of the manufacturer. The guaranty shall begin when the project is completed and accepted by the Owner. Submit final guaranty in triplicate.
 1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories and other components of membrane roofing system.
 2. System shall be warranted for all requirements specified herein, including for wind uplift as required.
 3. Total System Warranties; covers components of the green roof assembly, including membrane, flashing, insulation, and vegetated roof components.
 4. Includes removal and replacement of the vegetated roof components, pavers and soil when supplied by and installed per manufacturers requirements.
 5. Duration of Pavers: 10-year (will not crack, split or disintegrate due to freeze-thaw)
- C. Corrective measures on leaks shall be undertaken within seventy-two (72) hours after notification has been received by the Contractor or membrane manufacturer from the Owner.

PART 2 PRODUCTS

2.01 MEMBRANE ROOFING

A. Thermoplastic Polyolefin (TPO) Type

1. Thermoplastic Sheet Membrane: Reinforced single ply membrane factory fabricated into flexible sheets.
2. Material Standard: Conform to ASTM D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet.
3. Thickness: Minimum 60 mils (0.60").
4. Physical Properties
 - a. Breaking Strength - ASTM D751: 330 lbf/in.
 - b. Elongation at Break - ASTM D751: 30%.
 - c. Seam Strength - ASTM D751: 75 lbf.
 - d. Retention of Properties After Heat Aging - ASTM D3045
 - 1) Breaking Strength - ASTM D751: 330 lbf.
 - 2) Elongation - ASTM D751: 25% of original.
 - e. Tearing Strength - D1004: 156 lbg.
 - f. Low Temperature Bend - D2136: Pass.
 - g. Accelerated Weathering Test (Xenon Arc) - D2565: 10,000 hrs.
 - 1) Cracking (7x magnification): None.
 - 2) Discoloration (By Observation): Negligible.
 - 3) Cracking (7x magnification): None.
 - h. Linear Dimensional Change - ASTM D1204: 0.1%.
5. Color: White.

B. Flashing: 60 mils (0.60") nominal thick reinforced sheet factory fabricated to the required shapes and sizes to suit project conditions; furnished by sheet roofing membrane manufacturer.

1. Inside and Outside Corners and Vent Flashing: Preformed.
2. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.

C. Adhesive: Provide types as recommended by manufacturer for materials and conditions encountered.

1. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.

D. Flashing Bars and Screws: Manufacturer's standard bars and fasteners. Spacings as required to meet design loads.

E. Mechanical Fasteners: As recommended by roofing manufacturer.

F. Splice Wash, Lap Sealant, Fastener Sealer, Etc.: Sheet material manufacturer's recommended materials for waterproof sealing of seams in membrane and waterproof sealing of joints between flashings and roofing membrane, adjoining surfaces, projections and penetrations through the roofing membrane. Compatible with materials with which used.

- G. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. GEN FLEX ROOFING SYSTEMS
2. JOHNS MANVILLE
3. GAF
4. CARLISLE
5. FIRESTONE - ELEVATE.
6. VERSICO.
7. MULE HIDE
8. IKO COMMERCIAL

2.02 INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type II, glass-fiber mat facer on both major surfaces.

1. Tapered Insulation: 1/4" per foot. No slope under 1/4" per foot will be permitted.
2. R-Value: Provide thickness for average R of 30 over entire roof area.
3. Minimum Thickness at Drain: 2".
4. Compressive Strength: Minimum 20 (Grade 2).

- B. Provide adhesives and mechanical fasteners as recommended by insulation manufacturer for substrates encountered.

- C. Crickets (Tapered Insulation): Provide tapered insulation crickets sloped approximately 1/4" per foot. Locate and arrange as indicated on drawings or as required to divert water at rooftop equipment or vertical obstructions.

1. Material: Polyisocyanurate; conform to requirements and manufacturers specified herein.

- D. Coverboard: Provide one of the following:

1. 1/2" High Density Wood Fiberboard: ASTM C208 cellulosic-fiber insulating board, Type II, Grade 1.
2. 1/2" glass-mat, water-resistant gypsum substrate, primed surface; ASTM C1177,. Dens-Deck by GEORGIA-PACIFIC, Secure Rock Roof Deck by USG, GlasRoc Roof Board by CERTAINTEED.
3. 1/2" ASTM C 1289 Type II, Class 4, Grade 2, polyisocyanurate with coated glass facer. Minimum compressive strength of 120 psi. FIRESTONE Isogard or equal.

2.03 MISCELLANEOUS ITEMS

- A. Wood Members: Comply with requirements of wood blocking, Section 06 10 50 for wood members indicated as roofing system work. Provide wood pressure treated

as specified.

- B. Mastic: Type as recommended by roofing manufacturer.
- C. PVC Walkway Membrane: Roof manufacturer's recommended reinforced PVC heat weldable walkway membrane; minimum 30" wide x lengths indicated. Minimum 2.4mm thick (0.096").
- D. Sheet Metal and Flashings: Furnished under Section 07 62 00.
- E. Plaza Deck Pavers - Concrete: Solid, hydraulically pressed, standard-weight concrete units, square edged, manufactured for use as plaza-deck pavers; 7500-psi minimum compressive strength, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - 1. Basis of Design Manufacturers: HANOVER ARCHITECTURAL PRODUCTS Prest Paver Tudor Finish or equal by READING ROCK.
 - 2. Thickness: 2 inches
 - 3. Face Size: 24 inches square.
 - 4. Color: As selected by Architect from manufacturer's full range.
- F. Paver Pedestals: Self Leveling, adjustable high-density copolymer polypropylene assembly in height required. Provide shims and accessories as required.
 - 1. Basis of Design Manufacturer: BISON INNOVATIVE PRODUCTS B Series
 - a. Other Manufacturers: MRP SUPPORTS.
 - 2. Loading: 1,000 lbs. minimum per pedestal.
- G. Drainage/Water Retention Component: Three-dimensional, molded polyethylene panels with drainage channels top and bottom sides and water retention reservoirs top side.
 - 1. Acceptable Products: CARLISLE Coating & Waterproofing; CCW MiraDRAIN 9900.
 - 2. Root Barrier: A 60 mil thick, low-density polyethylene sheet for use over the roof membrane and below the insulation and edge retention outlining the planted area. Provide root barrier in all areas below landscaping for four (4) feet in all directions. All lap joints of root barrier shall be heat welded. Tapping of joints are not allowed.
- H. Soil: Custom growing media mix capable of supporting vigorous growth of the specified vegetation.
- J. Planting Module: pre-manufactured off site, deliver fully grown.
 - 1. Size: 1' x 2' x 31/4" (soil height approximately 4 - 41/4") Soil fills soil elevator, plants and soil obscure module edges. 14 oz/sq ft.

2. Material: 100% post-consumer recycled polypropylene 100 mil. thick walls. No VOC content.
3. Water dispersal: Approx. 10.0 gal. per min. per lineal foot.
4. Weight Vegetated: Approx. 27-29 lbs./sq. ft. Fully saturated
5. 100 mil. thick (sidewall) recycled polypropylene and colored black or gray. 1 foot x 2 feet outside diameter, 3 inches tall. Provide insert collar that allows for growing soil above the container edge, approximately 3½" tall, 16 mil. thick, and composed of recycled polyethylene or suitable biodegradable material. Each module is to be filled to the top of the insert collar. Soil height from container bottom is approximately 4¼ inches.
6. Module must include a built-in positive locking mechanism to attach the modules together along all four sides, without creating overlapping at the top of adjacent modules (passive lap joints to connect modules are unacceptable).

K. Miscellaneous Items and Accessories: Provide all edging, flashing, fasteners and miscellaneous components required for a complete installation conforming to the layout indicated.

1. Edge Flashing:
 - a. Material: Extruded aluminum edging.
 - b. Perforations: Must be perforated at the drainage course level to allow for free drainage and solid at the growing layer to prevent rooting and plant growth through the edging.
 - c. Shape: L-Shaped

L. Substrate Board: Provide one of the following:

1. ½" glass-mat, water-resistant gypsum substrate, primed surface; ASTM C1177, Dens-Deck by GEORGIA-PACIFIC, Secure Rock Roof Deck by USG, GlasRoc Roof Board by CERTAINTED.
2. ½" ASTM C 1289 Type II, Class 4, Grade 2, polyisocyanurate with coated glass facer. Minimum compressive strength of 120 psi. FIRESTONE Isogard or equal.
3. Adhered Roofing and Parapet Walls: ½" ASTM C1177 with face mat enhancement to allow adhesives to bond uniformly.
 - a. Manufacturers GEORGIA-PACIFIC Dens-Deck Prime with EONIC Technology or equal by above coverboard manufacturers.
 - b. Water Absorption (ASTM C473): Less than 5 percent of weight.
 - c. Surface Water Absorption (ASTM C473): Nominal 1.0 grams.

2.05 FASTENERS

- A. Provide roofing membrane manufacturer's recommended type mechanical fastener for deck. Type, size and spacing shall be as required to maintain manufacturer's system required warranty and wind uplift criteria.

PART 3 EXECUTION

3.01 INSPECTION

- A. Pre-Installation Conference: Not less than two weeks before start of roofing installation, meet at project site with Architect, Owner's representative, Contractor, roofing installer, and roofing material manufacturer's representative.
 - 1. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates and installation conditions. Do not proceed with insulation and roofing work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Verify that work which penetrates roof deck, or requires men or equipment to traverse roof deck, has been completed.
- B. Examine substrate surfaces for adequate anchorage, foreign materials, moisture and unevenness that would prevent the execution of roofing system specified.
- C. Correct unsatisfactory conditions before starting roofing. Roof deck surface conditions shall comply with manufacturer's requirements and be acceptable to the roofing system installer.
- D. Protect other work from spillage of roofing materials. Repair or replace other work damaged by installation of the thermoplastic membrane roofing system work.

3.03 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 12 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened and Adhered Insulation for Metal Roof Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

3.04 ADHERED MEMBRANE INSTALLATION

- A. Comply with roofing manufacturer's instructions and recommendations for handling and installing roofing system.
- B. Flash and make watertight equipment curbs for mechanical equipment located on the roof.
- C. General flashing details for roof penetrations, curbs, parapets and roof perimeters shall comply with roofing material manufacturer's standard details and recommendations for flashings.
 - 1. Provide base flashing at perimeters and edges of membrane abutting walls, curbs or other construction. Provide prefabricated pipe seals for pipe and conduit penetrations, properly cemented to membrane and sealed to pipe or conduit with stainless steel clamp and top bead of sealant.
 - 2. Mechanical fasteners below counterflashing, where required at perimeter flashings, to be fully enclosed with suitable membrane to form water tight seal.
 - 3. Minimum height of membrane flashing terminations to be 8" above top of membrane, unless otherwise indicated.

- D. Install roof flashing and sheet metal work provided herein and furnished under Section 07 62 00.
- E. PVC Walkway Pads: Locate pads as indicated. Maintain approximately 4" between pads. Secure pads to membrane as recommended by membrane manufacturer.
- F. Blocking Shim blocking solidly as required to make top surface of blocking level with top of insulation.
- G. Perform test cuts at lap edges (seams) to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 1. Perform test cuts after stoppages in the work and when recommended by roofing manufacturer after environmental changes.
 - 2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.05 WATER TEST – PLAZA PAVER AND PLANTING MODULE AREAS

- A. Test roof area by means of ponding water at a minimum depth of 2" for a period of 48 hours to check the integrity of the membrane installation.
- B. VERIFY that the structure can support the deadload weight of a watertest before testing.
- C. If leaks should occur the water must be drained completely and the membrane installation repaired.

3.06 PLAZA-DECK PAVER INSTALLATION

- A. Install concrete pavers in locations indicated according to manufacturer's written instructions.
- B. Install paver pedestals and accessories in locations and to elevations required. Adjust for final level and slope.
- C. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - 1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
- D. Install pavers to not vary more than 1/16 inch in elevation between adjacent pavers or more than 1/16 inch from surface plane elevation of individual paver.
- E. Maintain tolerances of paving installation within 1/4 inch in 10 feet of surface plane in any direction.

3.07 VEGETATION INSTALLATION

- A. Supply and install specified vegetation strictly in accordance with the roof system manufacturer's instructions and recommendations.

3.08 CLEANING AND PROTECTION

- A. Patch installations by other trades and make all necessary repairs as required.
- B. Upon completion of roofing work, clean gutters and drains of foreign materials and aggregate and remove all debris and surplus materials.
- C. Protect finished roof areas from foot traffic and construction damage until Contract Completion.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide fabricated flashing and sheet metal work as shown and specified.
 - 1. Shop fabricated formed gravel stops and trim at metal shingle roof areas.
 - 2. Shop fabricated formed flashing and counterflashing.
 - 3. Miscellaneous rooftop and equipment concealed flashing.
- B. Provide manufactured roof specialty work as shown and specified.
 - 1. Manufactured copings, gravel stops and fascia at membrane roofing.
- C. Fasteners, sealants, solder and accessories to complete the work.

1.02 RELATED SECTIONS

- A. Masonry Flashing: Section 04 00 00.
- B. Aluminum Composite Materials: Section 07 42 44.
- C. Metal Shingles: Section 07 31 35.

1.02 QUALITY ASSURANCE

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. General: Comply with Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" recommendations for materials, fabrication and installation of the work unless more stringent requirements are specified or shown on Drawings.
- C. Reference Standards
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American Architectural Manufacturers Association (AAMA)
 - a. AAMA 2605; Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance

Organic Coatings on Architectural Extrusions and Panels.

3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
 - a. SMACNA "Architectural Sheet Metal Manual".
 4. Single Ply Roofing Industry: SPRI ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- D. Subcontractor: Subcontract sheet metal associated with roofing as a part of the roofing contract for undivided responsibility.
- E. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance
- F. Attachments to or penetrations in roofing systems to be made only with full approval of roofing manufacturer. Obtain approvals as required for installation of work under this section. Notify Architect if deviations from documents is required to obtain approval from roofing manufacturer prior to fabrication.
- G. SPRI Wind Design Standard: Manufacture and install roof edge copings and fascia tested according to ANSI/SPRI ES-1 RE1, 2, 3, and ASCE 7-10 capable of meeting the design pressures indicated on the Structural Drawings.
- H. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit on all sheet metal work specified herein. Drawings to show all expansion joint details, joint details, waterproof connections to adjoining work and at obstructions and penetrations, methods of attaching to building and all formed sections. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.

5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

- B. Submit 8" square material samples for each type of sheet metal required.
- C. Submit full width by 8" long samples of all manufactured and fabricated items. Provide with specified finish and color.

1.04 PROJECT CONDITIONS

- A. Do not proceed with the installation of flashing and sheet metal work until substrate construction, blocking and other construction to receive the work are completed.
 1. Metal roofing work is to follow progress of substrate as close as practical to limit exposure of insulation and wood materials.

1.05 WARRANTY

- A. Warranty required for project membrane and metal shingle roofing system work shall include all related roof flashing and sheet metal work. Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section.
- B. Provide Contractor's guarantee for all sheet metal work under this Section to be free from defects of material and workmanship for a period of two years. Work that is not water tight or is damaged by winds that do not exceed 90 mph will be considered defective.
- C. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
 1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 FABRICATED MATERIALS

- A. Prefinished Aluminum Sheet - All Flashings Exposed to View
 1. Description: 3004 alloy aluminum sheet with factory applied finish.
 2. Finish
 - a. Exposed Surfaces
 - 1) Material/Manufacturer: Fluoropolymer baked enamel finish

- with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duranar" by PPG; "Fluoropon" by VALSPAR or equal. Total dry film thickness not less than 1.0 mils
- 2) Reference: Meet the requirements of AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 3) Color:
 - a) Metal Shingle Roof Edges and Trim: Mill finish aluminum to match metal shingles
 - b) All Other Areas: Match existing color - As selected by Architect.
 - 4) Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
- b. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.
3. Thicknesses: Provide the following minimum thicknesses:
 - a. Flashing and Counterflashing: .032".
 - b. Gravel Stop/Fascia: .040"
 - c. Miscellaneous Flashing (not otherwise identified): .032".
- B. Miscellaneous Flashing - Not Exposed to View: Galvanized steel, ASTM A653 G60. Mill phosphatized for paint adhesion. 0.0276". minimum unless otherwise indicated.
 - C. Fasteners: Provide same metal as sheet metal or other non-corrosive compatible metal recommended by sheet metal manufacturer.
 - D. Bituminous coating: Acid and alkali resistant solvent type black bituminous mastic.
 - E. Joint Sealants: See Section 07 92 00. Color matched to factory finished materials at roofing, cornice, fascia, coping and similar type systems.
 - F. Metal accessories: Provide fasteners, solder, welding rods, separators, sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work; matching or compatible with material installed, non-corrosive, size and gage as required for performance.
 - G. Underlayment:
 1. Material: Self adhering polyethylene sheet backed rubberized asphalt membrane, 40 mils thick. Provide primer as recommended by membrane manufacturer. Product to withstand high temperature applications, up to 260°F (127°C).
 2. Manufacturers: Bituthene HT Ice and Water Shield by W.R. GRACE; or equal by POLYKEN TECHNOLOGIES; POLYGUARD PRODUCTS; GAF; or CERTAINTEED.

- H. Wood members: Comply with requirements of Wood Blocking, Section 06 10 50.
- J. Roof Expansion Joint: Chlorinated polyethylene bellows with stainless steel flanges. AFCO Flexi-span LBH; WASCO/YORK Superflash Roof Expansion Joint; JOHNS MANVILLE Expando Flash.

2.02 MANUFACTURED MATERIALS

- A. Coping: Provide with concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
 - 1. Cap: Fabricated in 10'-0" lengths to sizes indicated of smooth aluminum. Thickness to be determined and required to meet performance requirements. 0.040" minimum.
 - 2. Special Shapes: Provide units fabricated to radius indicated on drawings and fabricated to curve indicated on drawings. Provide metal locking corners.
 - 3. Coping-Cap Attachment Method: Snap-on to continuous cleat with back.
 - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, with integral cleats. Thickness to be determined and required to meet performance requirements but not less than cap.
 - b. Coping cover snapped-on to cleat spaced minimum 5'-0" on center.
 - 4. Manufacturers
 - a. OMG ROOFING PRODUCTS; "Permasnap Coping".
 - b. PETERSEN ALUMINUM CORP.; "Tite-Loc Coping".
 - c. ARCHITECTURAL PRODUCTS COMPANY; "Snap-Tight Coping".
 - d. CARLISLE SYN TEC, INC.; "SecurEdge 200 Coping".
 - e. FIRESTONE BUILDING PRODUCTS; "Firestone Coping System".
 - f. JOHNS MANVILLE, INC.; "Presto Lock Coping System".
 - g. METAL-ERA, INC., "Perma-Tite".
- B. Gravel Stop: Provide with concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching caps.
 - 1. Cap: Fabricated in 10'-0" lengths to sizes indicated of smooth aluminum. Thickness to be determined and required to meet performance requirements. 0.040" minimum.
 - 2. Special Shapes: Provide units fabricated to radius indicated on drawings and fabricated to curve indicated on drawings. Provide metal locking corners.
 - 3. Coping-Cap Attachment Method: Snap-on to continuous cleat with back
 - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, with integral cleats. Thickness to be determined and required to meet performance requirements but not less than cap.
 - b. Cover snapped-on to cleat spaced minimum 5'-0" on center.
 - 4. Manufacturers
 - a. OMG ROOFING PRODUCTS, Model No. TE 8.25.
 - b. METAL-ERA, INC.; Anchor-Tite Fascia.

- c. CARLISLE SYN TEC, INC.; Secur Edge 300 Fascia System.
- d. FIRESTONE BUILDING PRODUCTS; Edge Guard and Fascia.
- e. JOHNS MANVILLE, INC.; Presto-Lock Fascia System.

C. Reglet and Counterflashing

- 1. Description: Surface mounted type, roll formed, prefinished aluminum.
- 2. Manufacturer
 - a. METAL ERA, INC. two-piece Reglet #CFR2-500
 - b. CHENEY FLASHING COMPANY; "Type B Reglet".
 - c. FRY REGLET CORPORATION; "MA Masonry Reglet".
 - d. OMG ROOFING PRODUCTS; "Drive-Lock-In-Wall Counter Flashing".

D. Finish

- 1. Exposed Surfaces
 - a. Material/Manufacturer: Mica or Metallic Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duramar" by PPG, "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils
 - b. Reference: Meet the requirements of AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 - c. Color: Match existing color - As selected by Architect
 - d. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
- 2. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.

2.03 SHOP FABRICATION

- A. Shop fabricate sheet metal work to comply with standard industry standards as shown by SMACNA in the "Architectural Sheet Metal Manual."
 - 1. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Form sections square, true and accurate to size and profile, free from distortion and other defects detrimental to appearance or performance.
 - 1. Make all lines, edges, angles and moldings straight, sharp and true; reinforce for rigidity and strength.

- C. Fabricate for watertight and weatherproof performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form exposed sheet metal work with exposed edges folded back to form hems.
 - 1. Fabricate with seams overlapping in the direction of water flow.
- D. Fabricate non-moving seams in sheet metal with flat lock or butt hairline joints except as otherwise indicated. Fabricate corners mitered, soldered and sealed as one piece. Locate corner joints 2'-0" from corners and intersections.
- E. Seal movable non-expansion type joints with joint sealant. Form joints as indicated, when not indicated, in compliance with industry standards to receive joint sealants.
- F. Provide for separation of metal from non-compatible or corrosive substrates by coating concealed surfaces with bituminous coating or other permanent separation as recommended by the sheet metal manufacturer.
- G. Trim for Roof Hatches: Provide galvanized sheet metal trim to cover all construction from bottom of roof deck to hatch or vent.
 - 1. Trim to form 90° bend at bottom of roof deck with minimum 3-inch return and lap hatch or vent curb not less than 2".
 - 2. Provide hemmed edge at curb.
 - 3. Provide lapped covers for joints or corners if trim package fabricated from more than one piece. Joint covers to lap joints by minimum 2" and have hemmed edges.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not install flashing and sheet metal work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- C. Coordinate flashing and sheet metal work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing and rain drainage.

3.02 INSTALLATION

- A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations, and drawing details for installation of the work.
- B. Install prefabricated items in accordance with manufacturer's instructions and

recommendations.

- C. Anchor units securely in place by methods indicated, providing for thermal expansion. Conceal fasteners and expansion provisions whenever possible. Install joint sealants where indicated.
- D. Set units true to lines and levels indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- E. Separate sheet metal work from dissimilar metals, treated wood, and cementitious materials. Provide roofing felt underlayment and rosin-sized paper slip sheet over treated wood surfaces.
- F. Fabricate, support and anchor downspouts in a manner which will withstand thermal expansion, stresses and full loading by ice or water without damage, deterioration or leakage.
- G. Continuously seal exposed joints where flashing or counter flashing terminates into reglets after sheet metal is adequately wedged and secured.
- H. Metal flashings which may be built into masonry mortar joints shall be preformed with corrugations, ribs or crimps which will maintain integrity of mortar bond for masonry.
- J. Coping and Roof Edge Components
 - 1. Install membrane roofing flashing over top of parapet substrate prior to installing coping/roof edge. See Section 07 54 23. Coordinate installation.
 - 2. Apply continuous bead of sealant on both sides of joints immediately prior to setting coverplates.

END OF SECTION

SECTION 07 72 33

ROOF HATCH

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide roof hatch as indicated on drawings.
- B. Provide ladder extension device.
- C. Provide factory fabricated roof hatch rail system.

1.02 RELATED SECTIONS

- A. Roof Insulation: Section 07 54 23.
- B. Roof Membrane and Flashing: Section 07 54 23.
- C. Painting: Section 09 91 00.

1.03 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.04 SUBMITTALS

- A. Submit shop drawings and manufacturer's product data indicating sizes, dimensions, rough opening required, finish, material and gages.

1.05 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

PART 2 PRODUCTS

2.01 ROOF HATCH

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. MILCOR INC.

2. J. L. INDUSTRIES, INC.
3. O'KEEFFE'S INC.
4. BABCOCK-DAVIS.
5. BILCO COMPANY.

B. Size: As indicated on drawings.

C. Description

1. Material: Galvanized steel, 14 gage cover and curb, and 22 gage cover liner with 1" insulation and beaded flange, neatly welded.
2. 12" high curb with flange for securing to roof deck and full welded cap flashing for weather tightness.
 - a. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.
 - b. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
3. Provide cover with heavy pintle hinges, compression spring operator enclosed in telescopic tubes, snap latch with turn handles, and padlock hasps inside and out, neoprene seal, automatic hold open arm and grip for release.
4. Finishes: Provide all galvanized surfaces factory prime painted. Provide cadmium plated hardware.

D. Metal in contact with concrete, masonry and other dissimilar materials: Provide contact surfaces with coating of zinc-chromate primer at 1.0 mil dry film thickness, in addition to other coatings previously specified.

E. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

2.02 LADDER EXTENSION SAFETY DEVICE

A. Extending type climb assist post mounted on ladder or fixed type ladder extension mounted on outside of hatch curb.

1. Material: Galvanized steel; provide all mounting accessories, fittings and hardware.
2. Manufacturers: BILCO LadderUp; PS DOORS Hatch Grip; ACUDOR PRODUCTS Telescoping Safety Post or similar products by other listed access door manufacturers.

2.03 HATCH RAIL SYSTEM

A. Provide hatch rail system models sized to fit roof hatches.

1. Color: Gray
 2. Attach to the capflashing of the roof hatch; do not penetrate any roofing material.
 3. Hatch Rail System Design: Meet requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
 4. UV and corrosion resistant construction with a twenty-five year warranty.
 5. Provide self-closing gate with hatch rail system.
- B. Posts and Rails: Round pultruded reinforced fire retardant yellow fiberglass treated with a UV inhibitor.
- C. Hardware: Mounting brackets shall be ¼" thick hot dip galvanized steel. Hinges and post guides shall be 6063T5 aluminum. Fasteners shall be Type 316 stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
 2. Verify dimensions of roof openings for roof accessories.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install roof hatch and accessories according to manufacturer's written instructions. Anchor securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.
- C. Check roof hatch and accessories for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire resistance rated construction.
 - a. Gaps between the top of walls and ceilings, floor or roof assemblies. Includes filling metal deck flutes where applicable.
 - b. Openings around structural members which penetrate floors or walls.
 - c. Control joints.
 - d. Floor joints not requiring expansion joints.
 - 5. Walls enclosing plenum spaces, rated and unrated.
 - a. Gaps between the top of walls and ceilings or roof assemblies.
 - b. Openings around items which penetrate walls.
 - 6. Joints at exterior curtain-wall/floor intersections.

1.02 RELATED SECTIONS

- A. Coordinate Work of this Section with work of other similar or equivalent Specification Sections as required to properly execute the work, including:
 - 1. Masonry: Section 04 00 00.
 - 2. Gypsum Wallboard Partitions: Section 09 21 16.
 - 3. Deflection tracks for metal stud fire walls: Section 09 21 16.

4. Plumbing: Division 22.
5. HVAC: Division 23.
6. Electrical: Division 26

1.03 DEFINITIONS

- A. Firestopping: Material or combination of materials (assembly) to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.
- B. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- C. Through-Penetration Firestop Systems: Material or combination of materials which are field constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.
- D. Through-Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation.
- E. System: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s).
- F. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- G. Membrane-penetration: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- H. Fire Resistive Joint: Any gap, joint, or opening, whether static or dynamic, between two fire rated barriers including where the top of a wall meets a floor; wall edge to wall edge applications; floor edge to floor edge configurations; floor edge to wall.
- I. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire rated floor assembly and a non-rated exterior wall assembly.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 1. E84: Test Method for Surface Burning Characteristics of Building Materials.
 2. E119: Fire Tests of Building Construction Materials.
 3. E814: Fire Tests of Through Penetration Fire Stops.
 4. E2174: Standard Practice for On-Site Inspection of Installed Fire Stops
- B. National Fire Protection Association (NFPA)

1. 70: National Electrical Code (NEC)
2. 101: Code for Safety to Life from Fire in Buildings and Structures (Life Safety Code).

C. Underwriters' Laboratories (UL)

1. UL1479: Fire Tests of Through Penetration Fire Stops.
2. UL2079: Tests for Fire Resistance of Building Joint Systems

D. Firestop Design Classification References

1. Warnock Hersey Listing Manual
2. UL Fire Resistance Directory - Vol. 1

E. Factory Mutual (FM) Research

1. FM Approval Standard of Firestop Contractors – Class 4991

1.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. System Design and Product Selection: Contractor responsible for selection of products and tested designs that fulfill the firestopping requirements of this section.
- B. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gasses.
- C. F-Rated Through Penetration Firestop Systems: Provide through penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.
- D. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T -rated assemblies are required where specified by codes or where the following conditions exist:
 1. Where firestop systems protect penetrations located outside of wall cavities.
 2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
 3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.
 4. Where firestop systems protect penetrating items larger than a 4 inch diameter nominal pipe or 16 square inch in overall cross sectional area.

- E. L – Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings, as determined per UL 1479, where indicated by Code.
- F. Fire Resistive Joint Sealants: Provide joint sealants with fire resistance ratings indicated, as determined per ASTM E119, UL 1479 and UL 2079 but not less than that equaling or exceeding the fire resistance rating of the construction in which the joint occurs.
- G. For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions and will meet load requirements.
 - 1. For piping penetrations for plumbing and wet pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not required removal of insulation.
- H. For through-penetration firestop systems exposed to view, provide products with flame spread of less than 25 and smoke developed ratings of less than 450, as determined per ASTM E 84.
- I. Where there is no specific third party tested and classified firestop system available for an installed condition, obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Approving Authority and Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.
- J. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21.
- H. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- I. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.
 - 1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- J. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of

0.30-inch wg (74.7 Pa).

1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.

1.06 SUBMITTALS

- A. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used, and manufacturer's installation instructions.
 1. Manufacturer's engineering judgement identification number and drawing details when no tested system is available.
- B. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each 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.
 2. Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer with modifications marked.
- C. Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements. Certification shall be signed by the Installer.
- D. Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.
- E. Firestopping installer shall provide a letter of certification stating that all firestopping systems have been installed in accordance with the Contract Documents.

1.07 QUALITY ASSURANCE

- A. Meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.
 1. ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."

2. ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."
- B. Requirements of Regulatory Agencies: Comply with the applicable requirements for fire separations and penetrations of the following:
 1. OBC: See Chapter 6, Table 601 and 602 for the time rated construction requirements.
 2. NFPA 70.
 3. NFPA 101.
- C. Installer: Specialist in the installation of type(s) of firestopping required; trained and approved by the firestop manufacturer.
 1. Shown to have successfully completed not less than 5 firestop projects similar in type and size to that of this Project.
- D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".
- E. Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.
- F. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- G. Single Source Responsibility: Obtain firestop systems for each kind of penetration and construction condition indicated from a single primary firestop systems manufacturer.
 1. Materials of different manufacture than allowed by the tested and listed system shall not be intermixed in the same firestop system or opening.
 2. Tested and listed firestop systems are to be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRA) is installed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping undamaged 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 multi-component materials.
 1. Comply with recommended procedures, precautions, or remedies described in material safety data sheets as applicable.

- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate this Work as required with work of other trades. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- B. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products from one or more of the following manufacturers according to the suitability of the product for the intended purpose.
 - 1. W.R. GRACE (Flamesafe System)
 - 2. FYRESLEEVE INDUSTRIES
 - 3. TREMCO
 - 4. HILTI, INC.
 - 5. SPECIFIED TECHNOLOGIES (STI).
 - 6. 3M FIRE PROTECTION PRODUCTS.
 - 7. THE RECTORSEAL CORPORATION (Metacaulk and Bio Fireshield).
 - 8. NELSON FIRESTOP PRODUCTS.

2.02 MATERIALS - GENERAL

- A. As selected by Contractor. See SYSTEM PERFORMANCE REQUIREMENTS in Part 1 hereinbefore.
- B. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as

demonstrated by firestopping manufacturer based on testing and field experience.

1. All materials shall comply with ASTM E814 or E 119 (UL 1429), and shall be manufactured of nontoxic, non-hazardous, asbestos free materials, and unaffected by water or moisture when cured.
 2. Primers: Conform to manufacturer's recommendations for primers required for various substrates and conditions.
 3. Backup Materials: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.
 4. Provide all firestopping sealant materials within the VOC limits specified in Section 01 81 13.
- C. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems. Accessories include but are not limited to the following items:
1. Permanent forming/damming/backing materials must be noncombustible and may include the following:
 - a. Semi-refractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.03 RATED STUD DEFLECTION ASSEMBLY

- A. Deflection Track Ceiling Runner: See Section 09 21 16.
- B. Gypsum Wallboard: See Section 09 21 16.
- C. Insulation: Mineral wool, 3.5 PCF minimum density.
- D. Firestopping Compound: Types as manufactured by listed manufacturers in 2.01A herein.
- E. Accessories: Provide all fasteners, clips and other related installation accessories as required for a complete UL approved assembly.

2.04 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate

proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. 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 systems seal with substances.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 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.

3.04 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" in Part 1 with ASTM C1193, and with the sealant manufacturer's installation instructions and drawings -pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint.
Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 INSTALLING PERIMETER FIRE BARRIER SYSTEMS

- A. General: Comply with "System Performance Requirements" article in Part 1 and with the firestop manufacture's installation and drawings pertaining to products and applications indicated.

- B. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.

3.06 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Special Inspections Penetration Firestops. When required per IBC 1705, inspections of penetration firestop systems shall be conducted by an approved inspection agency in accordance with ASTM E 2174.
 - 1. Fire-resistant joint systems. Inspection of fire-resistant joint systems shall be conducted by an approved inspection agency in accordance with ASTM E 2393.
- E. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- F. Manufacturer's Field Services: During installation, contractor shall have manufacturer's representative provide periodic training and visual observations with written documentation of the results.
- G. Do not proceed to enclose firestopping with other construction until inspection agency has verified that the firestop installation complies with the requirements.
- H. Where deficiencies are found, repair or replace the firestopping so that it complies with requirements of tested and listed system design.

3.07 IDENTIFICATION

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

.08 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.
 - 1. The Documentation form for through penetrations is to include:
 - a. Sequential location number
 - b. Date of installation
 - c. Detailed description of the penetration's location
 - d. Tested system or engineered judgment number
 - e. Type of assembly penetrated
 - f. A detailed description of the size and type of penetrating item
 - g. Size of opening
 - h. Number of sides of assemblies addressed
 - i. Hourly rating to be achieved
 - j. Installer's name
- B. Compiled copies of these documents are to be provided to the Owner at the completion of the project.

3.09 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints 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 Contract Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

END OF SECTION

SECTION 07 91 13

COMPRESSION SEALS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work in this section includes exterior vertical and horizontal expansion joint seals.

1.02 RELATED SECTIONS

- A. Expansion Joint Cover Assemblies: Section 07 95 13.
- B. Sealants: Section 07 92 00.

1.03 SUBMITTALS

- A. Manufacturer's Literature and Data
 - 1. Submit copies of manufacturer's current literature and data for each item specified.
 - 2. Clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for ultraviolet exposure.
- B. Certificates: Material test reports from approved independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements specified.
- C. Shop Drawings
 - 1. Showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joiners with other type assemblies, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes.
 - 2. Include description of materials and finishes and installation instructions.
- D. Samples
 - 1. Samples of each type and color of flexible seal used in work.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in the original, intact manufacturer labeled containers.

1.05 PROJECT CONDITIONS

- A. Coordinate the installation of the joint system with related work. Protect installed units until completion of entire project.
- B. Ambient temperature shall not be lower than 40°F during installation. Note that gap size will change with cold and hot temperature extremes. Gap measurement should optimally be carried out at the mid-point of the average temperature range for the area of installation.
- C. Substrate Surfaces: Free of dust, oil, grease, wax, moisture, and frost. The gap wall surfaces must be thoroughly cleaned.
- D. No installation may be performed in rainy weather, or when rain is expected within one hour before installation. All surfaces must be completely dry prior to installing system.
- E. Upon completion of this work, remove trash and debris on the site caused by work under this section.

1.06 QUALITY ASSURANCE

- A. Installer: Approved by manufacturer.

PART 2 PRODUCTS

2.01 VERTICAL SEALS

- A. Provide exterior seal consisting of a silicone pre-coated, preformed, precompressed, self-expanding, sealant system. Seal shall combine factory-applied, 15 Shore-A hardness, low-modulus silicone and impregnated expanding foam sealant.
 - 1. Joint Thicknesses: As indicated on drawings.
- B. Materials
 - 1. Expanding Polyurethane Foam: Open-cell polyurethane foam impregnated with a waterproof polymer sealing compound. Impregnation density of uncompressed foam to be minimum 9 lbs./cu.ft. as tested by ASTM D3575
 - 2. Silicone External Color Facing: Factory-applied to the foam. Coating width to be a minimum of 1.75 -1.85 times the designed, or field measured, joint gap width.
 - a. Colors: As selected by Architect.
 - 3. Physical Properties: Manufacturer to certify that the material has been tested and meets the values in the table below and has been performance tested according to the listed performance tests and exhibits results that meet those listed below:

- a. Durometer Hardness – Silicone Coating; ASTM D2240, Shore A: 15.
- b. Ultimate Elongation; ASTM D3574: 105-145%.
- c. Tensile Strength; ASTM D3574: Minimum 21 psi.
- d. Thermal Conductivity; ASTM C518: 0.34 BTU. IN/HR. FT² °F.
- e. Water Penetration of Curtain Walls by Uniform Static Air Pressure Difference; ASTM E331: UP TO 20.88 PSF—PASSED
- f. Structural Performance of Curtain Walls by Uniform Air Pressure Diff. (Gust Loads); ASTM E330: +62.66 PSF, -56.39 PSF—Passed

C. Fabrication/Design

- 1. Seal must be supplied precompressed to less than the joint size, packaged in shrink-wrapped lengths (sticks) with a self-adhesive on one face.
- 2. Depth of seal as recommended by manufacturer.
- 3. End to end joins of consecutive lengths of material to be joined by mitering and adhering as recommended by manufacturer. To obtain identical color sealant, use liquid silicone sealant supplied by manufacturer from same color batch as was used to form the bellows.

- D. Drawings and specifications are based on Colorseal Seismic manufactured by EMSEAL or equal. Similar system manufactured by TREMCO, WATSON BOWMAN ACME, WILLIAMS PRODUCTS INC., SCHUL INTERNATIONAL or WILLSEAL is acceptable providing the system meets the performance requirements specified herein.

PART 3 EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Joint configuration and the joint surfaces shall be as detailed in the drawings. All known detrimental conditions shall be reported immediately in writing.
- B. Do not proceed with the installation of joint sealer if the joint is other than designed, until written notification of these conditions is submitted to the manufacturer and Architect, and a written acknowledgement with an order to proceed is provided.

3.02 INSTALLATION

- A. Install in accordance with the manufacturer's recommendations and instructions.
- B. Cut profile to the correct length of the appropriate gap for installation, without pulling or exerting excess tension.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SCOPE

- A. General: Prepare joints and apply sealant or caulking at all locations which normally require sealing to prevent infiltration of air, water, and insects and to reduce transmission of sound.
- B. Apply sealants to exterior and interior non-static joints. Do not seal normal drainage points or weep holes. Include the following:
 - 1. masonry control and expansion joints
 - 2. stone joints
 - 3. around louvers, exterior trim, windows, door frames, aluminum entrances and other penetrations or openings in exterior walls
 - 4. threshold bedding
 - 5. joints between different wall materials
 - 6. termination in joints between wall materials and adjacent materials
 - 7. perimeter seal of metal door and borrowed light frames where they abut masonry and where they abut drywall in toilet rooms
 - 8. other applications indicated
- C. Sealing of joints in concrete construction, including sidewalk joints, concrete paving joints and floor joints, tile floor expansion joints and other floor joints as indicated.
- D. Sealing of all exterior and interior locations where materials or equipment do not fit together or against the adjoining surface with a hairline joint.
- F. Sealing between wall and wall mounted plumbing fixtures and floor and floor mounted plumbing fixtures.
- G. Sealing at intersection of countertops and side/backsplashes to each other and to wall.
- H. Sealing at reglets and wall and roof flashings set in sealant.
- I. Seal penetrations through ceramic tile work.
- J. Trim exposed masonry flashing.
- J. Latex type caulking of interior static joints. Include the following:
 - 1. intersection of exposed structure or ceiling construction with masonry walls

2. perimeter seal of metal door and borrowed light frames where they abut drywall, except in toilet rooms
 3. intersection of grilles and louvers with adjacent surfaces
 4. intersection of cabinets, casework and similar items applied to or recessed in walls
 5. other applications indicated
 - K. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestopping specified in Section 07 84 00.
 - L. Joints, perimeter, and penetrations in sound-rated assemblies. See Section 09 21 16.
- 1.02 RELATED SECTIONS
- A. Firestopping Sealants: Section 07 84 00.
- 1.03 GENERAL PERFORMANCE
- A. Except as otherwise indicated, joint sealant is required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application.
 - B. Failures of installed sealant to comply with this requirement will be recognized as failures of both materials and workmanship.
- 1.04 SUBMITTALS
- A. Submit manufacturer's product data and installation instructions.
 1. Certification, in the form of manufacturer's standard data sheet or by letter, stating that each type of compound and sealant to be furnished complies with these specifications.
 2. Statement that each product to be furnished is recommended for the application shown and is compatible with all materials to which applied.
 3. Instructions for handling, storage, mixing, priming, installation, curing and protection for each type of sealant.
 - B. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.
 - B. Submit manufacturer's color chart for color selections.
 - C. Submit cured sealant samples in colors required for the work. Architect's approval will be for color only. Compliance with other requirements is the Contractor's

responsibility.

1.05 STORAGE AND HANDLING

- A. Prevent inclusion of foreign matter or the damage of materials by water or breakage.
- B. Procure and store in original containers until ready for use.
- C. Materials showing evidence of damage shall be rejected.

1.06 WARRANTY

- A. **Installer's Warranty:** Contractor and joint sealant applicator shall jointly warranty joint sealant work for two (2) years from date of final acceptance. Warranty shall include replacing joints which fail to perform as airtight; or fail in adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration and stain resistance, general durability or any other form of apparent deterioration (excluding inherent qualities and limitations clearly specified in the manufacturer's submitted product data).
- B. **Manufacturer's Warranty:** Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section for ten (10) years from date of final acceptance
- C. Warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
- C. Comply with these specifications for repair or replacement of work.

PART 2 PRODUCTS

2.01 GENERAL

- A. **Definitions:**
 - 1. The term "sealant" will be understood to be a urethane or silicone elastomeric type.
 - 2. The term "caulk" will be understood to be a synthetic resin base of highest quality acrylic latex compound.

B. General:

1. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
2. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
3. Colors: As selected by Architect from manufacturer's full range; selected colors to match adjacent materials.
4. Where exposed to foot traffic, select materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealant system.

C. Manufacturers: BOSTIK; DOW CORNING CORPORATION; EUCLID CHEMICAL; TREMCO MANUFACTURING COMPANY; GENERAL ELECTRIC COMPANY/MOMENTIVE; SIKA CHEMICAL CO.; MAMECO INTERNATIONAL; MASTER BUILDERS SOLUTIONS; VULCHEM; SOPREMA CHEMLINK.

1. Manufacturer's listed under the following applications are for basis of design. Equal products by above listed manufacturers are acceptable.

2.02 ELASTOMERIC MATERIALS

A. Exterior Vertical and Overhead Joints: Single-component neutral curing silicone sealant meeting ASTM C920, Type S, Grade NS, Class 50.

1. DOW 791
2. GE SCS9000 Silpruf NB
3. TREMCO Spectrum 3
4. PECORA 895 NST

B. Horizontal Wearing Expansion Joints; Interior and Exterior

1. Type: Two-part polyurethane based elastomeric sealant, complying with ASTM C920, Class 25, Type M, Grade P, Use T. Self-leveling or gun grade type as recommended by manufacturer for application shown.
2. Location: For joints in exterior concrete pavements, sidewalks and interior floors.
 - a. BOSTIK Chem-Calk 555-SL
 - b. EUCLID Eucolastic II
 - c. SONNEBORN Sonolastic SL 2
 - d. TREMCO THC 900/901

C. Interior Vertical and Overhead Joints: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Do not use where painted.

1. DOW 799
2. GE SCS2000 SilPruf
3. TREMCO Spectrum 2
4. PECORA 895 NST

D. Interior Vertical and Overhead Joints: Use at joints requiring movement and to be painted. Single or multi-component polyurethane hybrid gun-grade, non-sag sealant complying with ASTM C920, Type S or M, Class 25, Use NT, M, A, Grade NS.

1. EUCLID Eucolastic I or II
2. BASF Sonolastic NP 1 or NP 2
3. BOSTIK Chem-Calk 900
4. TREMCO Dymonic

E. Sealants at Countertops, Backsplashes and Plumbing Fixtures: ASTM C920, Type S, Grade NS, Class 25. Provide with mildew resistive additive.

1. Sealant Colors
 - a. Countertops and Backsplashes: Clear.
 - b. Plumbing Fixtures: white, unless colored fixtures are selected, then sealant color shall match fixture color.
2. Manufacturers/Products
 - a. DOW 786
 - b. GE SCS1700 Sanitary.
 - c. SONNEBORN Sonolastic Omniplus
 - d. TREMCO Tremsil 200
 - e. PECORA 898 Sanitary Sealant

F. Exterior and Interior Joints Subject to Water Immersion: Two-part elastomeric polysulfide sealant, meeting ASTM C920, Type M, Grade NS, Class 25.

1. SONNEBORN Sonolastic Two-Part
2. EPOXY SYSTEMS 913
3. CMI Sealtight Deck-O-Seal

2.03 LATEX CAULK

A. Caulk Joints – Interior, Static - Paintable: High quality acrylic latex compound, non-staining non-bleeding complying with ASTM C834 Type OP, Grade NF with a maximum volume shrinkage of 30%.

1. BASF BUILDING SYSTEMS; Sonolac.
2. PECORA CORPORATION; AC-20+.
3. TREMCO INCORPORATED; Tremflex 83

2.04 ACCESSORIES

- A. Joint Primer/Sealer: Non-staining type, recommended by sealant manufacturer; compatible with joint forming material.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming material.
- C. Bond Breaker Tape: Pressure sensitive polyethylene or plastic tape, recommended by sealant manufacturer, to suit applications where bond to substrate should be avoided for proper joint sealant performance.
- D. Joint Backing: Compressible rod stock conforming to ASTM C1330, Type B; material as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance
- E. Solvents: Cleaning agent recommended by the manufacturer of the sealant in writing to Architect.

PART 3 EXECUTION

3.01 INSPECTION

- A. Pre-Installation Meeting
 - 1. Prior to sealant installation, and at the Contractor's direction, meet at project site to review material selections, joint preparations, installation procedures, weather conditions and coordination with other trades.
 - 2. Include sealant installer, Contractor, Architect, manufacturer's representative and representatives of other trades or subcontractors affected by the sealant installation.
- B. Examine substrates and installation conditions. Do not proceed with joint sealant work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Clean, seal and prime surfaces in accordance with manufacturer's recommendations. Confine primer/sealant to areas of sealant bond.
- B. Remove dust, dirt, loose coatings, moisture and other substances which could interfere with sealant bond.
- C. Remove lacquers and protective films from metal surfaces.
- D. Architectural Concrete and Stone: Apply masking around joints to protect adjacent surfaces from defacement and staining during sealing operations. Repair

damaged masking until sealant is installed.

3.03 INSTALLATION

- A. Apply joint sealant as late as possible in construction, preceding painting and following cleaning operations. Do not apply sealant during inclement weather conditions or when temperature is above or below manufacturer's limitations for installation.
- B. Install joint sealant materials and accessories in strict accordance with manufacturer's installation instructions.
- C. Set joint filler units at depth or position in joint as indicated to coordinate with other work. Do not leave voids or gaps between ends of joint filler units.
- D. Install sealant backer rod, except where recommended to be omitted by sealant manufacturer for application indicated. Use rod diameter that will cause compression when installed.
- E. Install bond breaker tape and where required by manufacturer's recommendations to ensure that sealants will perform as intended.
- F. Apply joint sealants in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces on both sides. Fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. At horizontal joints between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt. Hand tool and finish all joints.
- G. Install joint sealants within recommended temperature ranges and to depths indicated or when not indicated, as recommended by sealant manufacturer. For normal moving vertical and horizontal joints, fill joints to a depth equal to 50% of joint width, but not more than 1/2" deep nor less than 1/4" deep, measured at the center section of bead.
- H. Confine materials to joint areas with masking tapes or other acceptable methods. Remove excess sealant materials promptly as work progresses and clean adjoining surfaces.
- I. Masonry Flashing: Where sealant joint is in direct contact with flexible masonry flashing, trim flashing flush with face of masonry after sealant is installed and cured. Verify during this procedure that weep holes have not been compromised during sealing operations.

3.04 CLEANING

- A. Upon completion, remove and dispose of masking materials; remove all excess sealing materials; clean adjacent materials of all soil and stain resulting from sealing operations.

1. Replace damaged material and material which cannot be properly cleaned.

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide expansion joint covers, including all accessories and closures required for a complete installation. Assemblies include, but are not necessarily limited to, the following:
 - 1. Wall to wall.
 - 2. Floor to floor.
- B. Joint covers included in this Section are generally those exposed to view.
- C. Coordinate with all trades associated with materials that expansion joint covers are attached to or in contact with; obtain approvals as required; obtain special details required for proper installation of expansion joint covers.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's catalog cuts and other information showing sizes, materials and finishes.
- B. Shop Drawings: Submit typical joint cross-section(s) indicating pertinent dimensioning, general construction, component connections, and anchorage methods.
- C. Samples: Submit samples for approval, minimum 6" long, for each type of device proposed. Samples to show all components required for expansion joint cover assembly.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Shall have a minimum ten (10) years experience specializing in the design and manufacture of Architectural Expansion Control Systems.
- B. Application: The specified expansion control systems shall be installed by a Certified Applicator, factory trained and certified in the proper installation of the specified expansion control system.
- C. Floor devices to be watertight.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver products in each manufacturer's original, intact, labeled containers and store under cover in a dry location until installed. Store off the ground, protect from weather and construction activities.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Catalog numbers specified below are based on expansion joint covers manufactured by WATSON BOWMAN ACME (WBA). These model numbers are to establish a level of quality. Equal products manufactured by NYSTROM; CONSTRUCTION SPECIALTIES, INC. (CSI); BALCO; INPRO or MM SYSTEMS CORPORATION are acceptable providing they meet the requirements specified herein and the design intent of the drawings.
 - 1. Wall-to-Wall: WBA Model CWS 200.
 - 2. Floor-to-Floor: WBA FJS 200.
 - 3. Other types required but not identified herein by catalog number will be of the same type or series as listed above for similar type application.

2.02 MATERIALS

- A. General: Provide extruded 6063-T5 alloy aluminum devices; clear anodized finish for wall and ceiling covers; mill finish for floor covers.
- B. Provide models as indicated on drawings.
- C. Fasteners
 - 1. Masonry Anchors: Expansion type; length as required to provide minimum 2" embedment into sound masonry.
 - 2. Bolts: Stainless steel, flat or oval head, of sizes required for various conditions.
- D. Fire rated: Where required provide ceramic fiber fire barrier backing system designed to provide the required fire rating and cycle tested.
 - 1. Fire rating: As indicated
 - 2. Density: 8 pcf
 - 3. Compliance: UI 2079, ASTM E1966, NFPA 5000

2.03 FABRICATION

- A. General: Fabricate joint cover assemblies as detailed. Provide sealing washers, gaskets, splice covers, and closures as required for complete and secure installations.
 - 1. Fabricate special transitions and corner fittings as required.

2. Miter and weld joints as applicable.
3. Provide necessary and related parts, devices, water barrier, anchors, form clips, and other items required for water-resistant and fire-resistant installations.
4. Provide corners, tees, transitions, curb risers, assembled with connection mitered or interlocking and secured to ensure proper fit and alignment.
5. Special conditions shall be shop fabricated.
6. Floor cover plates shall have surfaces to comply with ADA requirements.
7. Provide components in single lengths where possible; minimize site splicing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General
 1. Verify that existing conditions including block-outs are ready to receive expansion joint systems.
 2. Beginning the work of this section means acceptance of existing conditions.
- B. Install in strict compliance with manufacturer's instructions and recommendations.
- C. At existing floor conditions, remove concrete as required and repour to accommodate specified device.
- D. Adjust finished height of floor devices for smooth transition with finish flooring materials; verify heights of approved floor finishes before installation of expansion joint covers.
 1. Locate wall and ceiling devices in continuous contact with adjacent surfaces.
 2. Make splices as recommended by manufacturer.
 3. Exposed Butt Joints: Make tight, flush and hairline.

3.02 CLEANING AND PROTECTION

- A. Do not remove strippable protective material from joint devices until Architect approves the removal.
- B. When Architect permits removal of protective material, remove protective material and clean surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Standard steel doors and frames.
 - 2. Fire rated steel doors and frames.

1.02 RELATED SECTIONS

- A. Wood Doors: Section 08 14 00.
- B. Door Hardware: Section 08 71 10.

1.03 QUALITY ASSURANCE

- A. Provide metal doors and frames fabricated by one manufacturer to ensure uniformity in appearance and construction.
- B. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.
 - 1. ANSI: American National Standards Institute.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. SDI: Steel Door Institute.
 - 4. DHI: Door and Hardware Institute.
- C. Fire rated doors and frames: Provide units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E152, and are labeled and tested by Factory Mutual (FM), Underwriters Laboratories (UL), or other National Recognized testing agency. Units shall bear testing agency labels.
 - 1. Provide UL labels permanently fastened on each door and frame which is within the size limitations established by NFPA and UL for labeling.
 - 2. Provide anchors for UL labeled frames required by the authority having jurisdiction.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of standard metal door and frame required.

- B. Submit shop drawings. Identify doors and frames in accordance with drawing door schedule. Indicate:

1. Elevations of each door design.
2. Hardware locations, installation methods and hardware reinforcements.
3. Dimensions and shapes of materials, anchorage and fastening methods.
4. Door frame types, profile of molding and details.
5. Wall opening construction and connection to other work.

- C. Certificates documenting:

1. Fire testing: Fire-rated units have been successfully tested in accordance with Paragraph 1.03C.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver metal doors and frames cartoned or crated for protection during transit and job delivery. Provide sealed wrapping for factory.
- B. Store doors and frames inside the building in a dry, well-ventilated area. Protect from damage, wetting and deterioration in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: STEELCRAFT MFG. CO; CECO CORP.; PIONEER INDUSTRIES; REPUBLIC BUILDERS PRODUCTS CORP.; CURRIES; BLACK MOUNTAIN DOOR.

2.02 MATERIALS AND COMPONENTS

- A. Materials

1. Metallic-Coated Steel: Commercial quality, hot dipped, A-60 galvanized steel in accordance with ASTM A653, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process".
2. Cold-Rolled Steel: Commercial Steel in accordance with ASTM A1008, "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength with Improved Formability"; Type B; suitable for exposed applications.
3. Hot-Rolled Steel Sheet: Commercial Steel in accordance with ASTM A1011, "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength"; Type B; free of scale, pitting, or surface defects; pickled and oiled.

4. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B Comply with SDI 100 material and fabrication recommendations and as specified.
- C. Standard Metal Doors
1. Provide flush seamless type doors with seamless faces and edges, 1-3/4" thick, internally reinforced. Top and bottom closed flush.
 - a. Provide glass lites where indicated.
 2. Exterior Doors: Provide doors complying with requirements of ANSI 250.8 for Level 3 (extra heavy duty) and Model 2 (seamless design) and ANSI A250.4 for physical endurance Level A.
 - a. Fabricated from metallic-coated (galvanized) steel face sheets, mill phosphatized
 - b. Core: Minimum 1-1/2 lb. density polyurethane or polyisocyanurate; thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - c. Tops and bottoms closed with flush galvanized steel caps.
 3. Interior Doors: Provide doors complying with requirements of ANSI 250.8 for Level 2 (heavy duty) and Model 2 (seamless design) and ANSI A250.4 for physical endurance Level A
 - a. Fabricated from cold rolled steel; stretcher-leveled standard flatness.
 - b. Kraft resin impregnated honeycomb or polystyrene slab core bonded to door face sheets with thermal adhesive.
 4. Hardware Reinforcements: Meet or exceed ANSI/SDI A250.6 requirements.
 5. Edge Profile: 1/8" bevel in 2" core on hinge and lock edges.
 6. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings. Factory prepare for hardware as scheduled in Section 08 71 10. Mount astragal to overlap on key side of doors.
 7. Louvers: Inserted fixed type, minimum free area of 38%.
- D. Standard Metal Frames
1. Interior Frames: Fabricated from either commercial grade cold-rolled steel conforming to ASTM A1008 or commercial grade hot-rolled and pickled steel conforming to ASTM A1011, minimum 0.053" thick. Set-up and welded type, all miters clean cut, reinforced, fully seam welded with exposed welds ground smooth.
 2. Exterior Frames: Fabricated from commercial grade metallic -coated (galvanized) steel conforming to ASTM A653, minimum 0.053" thick, and shall have an A-60 zinc coating (0.30 ounces per square foot per side). Set-up and welded type, all miters clean cut, reinforced, fully seam welded with exposed welds ground smooth.
 - a. Back prime frames with asphaltic emulsion.
 3. Profile: Double rabbet, jamb face and depth as indicated.
 4. Hardware Reinforcements: Meet SDI 107 requirements.

5. Transoms and Sidelites: Provide for loose glazing stops to be secured with countersunk screws.
 - a. Provide $\frac{3}{4}$ " stops for sidelites and transoms where the individual glass areas for fire rated openings exceeds the allowable area for $\frac{5}{8}$ " stops.

D. Fire Doors and Frames

1. Comply with Fire-Rated Door Requirements specified herein before (Paragraph 1.03C.
2. Agency: Underwriter's Laboratories.
3. Classification: As indicated.
4. Conform to requirements of Standard Metal Door and Frames specified herein.

2.03 FABRICATION

- A. Reinforce and prepare doors and frames to receive hardware. Fit for hardware at the factory to template. Do all necessary cutting, drilling and tapping. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- B. Provide surfaces smooth and free from defects, warp or buckle with arrises straight and sharp.
- C. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied finish hardware may be done at project site.
- D. Locate finish hardware as shown on drawings or, if not shown, in accordance with DHI "Recommended Locations for Builder's Hardware."
- E. Door and Frame Fabrication
 1. Provide cutouts for mortised hardware, accurately located and made to fit hardware.
 2. Punch frames for door silencers, three on strike side for single doors. Factory install plastic caps. Stick-on silencers are not acceptable.
 3. Exterior and Interior Frames: Provide minimum three anchors of suitable design for each jamb. Provide galvanized anchors for units built into exterior walls.
 4. Floor Anchors: Provide floor clip on bottom of each jamb. Provide angle spreaders at bottom of each set-up frame.
 5. Conduit for Door Frames
 - a. Shop install $\frac{3}{4}$ " electrical conduit within hollow metal door frame where indicated or where required for electric strikes or similar type electrical frame mounted hardware.
 - b. Route conduit in frame in the most direct and simple manner so that pulling wire can be performed with a minimum of bends and obstructions. Route conduit to avoid damage to conduit during field

installation of frame and operations to grout frame solid.

- c. Connect conduit to electrical junction box or conduit embedded in building structure by means of a threaded coupling. The termination point of the conduit within the frame shall be free and have enough slack to make final connection to embedded device.

F. Shop Painting

- 1. Clean, bonderize or chemically treat and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
- 2. Clean steel surfaces of mill scale, rust oil, grease, dirt and other foreign materials before application of paint. Sand free of imperfections.
- 3. Apply one baked-on shop coat of rust-inhibitive prime paint in accordance with ASNI A224.1. Provide a smooth, uniformly finished surface ready to receive finish paint.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, rough openings and installation conditions. Do not proceed with metal door and frame work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install metal doors and frames in accordance with manufacturer's instructions and recommendations.
- B. Placing Frames
 - 1. General
 - a. Comply with ANSI/SDI A250.11 (SDI 105) "Recommended Erection Instructions for Steel Frames."
 - b. Erect frames in proper position to receive partition work before construction of enclosing walls. Set frames accurately in position, plumbed, aligned with heads level and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders.
 - c. Grout frames as indicated on the drawings. Coordinate grout placement with adjoining materials and door hardware.
 - 2. At Masonry Construction: Locate wall anchors at 16" on center. Building-in of anchors and grouting of frames is specified in Section 04 00 00.
 - 3. Fire-Rated Frames: In accordance with NFPA standard No. 80 and SDI 118.

4. Metal Stud Partitions: Install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with tapping screws.

C. Door Installation

1. Install doors plumb and in true alignment in prepared openings. Fit metal doors accurately in frames, within clearances specified in ANSI/SDI A250.8 (SDI100).
2. Install fire-rated doors with clearances as specified in NFPA Standard No. 80 and SDI 118.

- D. Immediately after erection, sand smooth rusted or damaged areas of door and frame coat and apply touch-up prime coat of compatible air-drying primer.

3.03 FIELD QUALITY CONTROL

A. Final Adjustment: Provide final adjustment as follows:

1. Door Contact with Silencers: Doors shall strike a minimum of two (2) silencers without binding lock or latch bolts in strike plate.
2. Head, Strike and Hinge Jamb Clearance: 1/8".
3. Meeting Edge Clearance, Pairs of Doors: +1/16"
4. Bolts and Screws: Leave tight and firmly seated.

END OF SECTION

SECTION 08 12 16

INTERIOR ALUMINUM DOOR FRAMES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Aluminum door concealed frames for interior use.

1.02 RELATED SECTIONS

- A. Door Hardware: Section 08 71 10.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and finishes for each type of frame specified.
 - 1. Include information for factory finish, glazing gaskets, accessories and other required components.
 - 2. Include color charts for finish indicating manufacturer's standard colors available for selection.
- B. Door Schedule: Submit schedule of door frames using same reference numbers for details and openings as those on Drawings.
- C. Shop Drawings: Submit schedule indicating opening identification number, frame types, dimensions, swing, label, and hardware requirements. Use same reference numbers for openings as Contract Drawings.
- D. Include elevations and details indicating frame types, profiles, conditions at openings, methods and locations of anchoring, glazing requirements, hardware locations, and reinforcements for hardware, details of connections to special construction and other custom features.
- E. Samples: Submit following:
 - 1. Samples indicating quality of finish on alloys used for Work.
 - 2. Where normal color and texture variations are expected, include additional samples to show range of such variation.
- F. Informational Submittals: Submit manufacturer's instructions.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer shall demonstrate previous experience in manufacturing of interior aluminum door frames for a period of not

less than 10 years on comparable sized project.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames in cartons to provide protection during transit and storage at project site.
- B. Inspect frames upon delivery for damage.
 - 1. Repair minor damage to pre-finished products by means as recommended by manufacturer
 - 2. Replace frames that cannot be satisfactorily repaired.
- C. Store frames at project site under cover and as near as possible to final installation location. Do not use covering material that will cause discoloration of aluminum finish.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not begin installation of frames until area of work has been completely enclosed and interior is protected from the elements.
- B. Maintain temperature and humidity in areas of installation within reasonable limits, as close as possible to final occupancy. If necessary, provide temperature control and ventilation to maintain required environmental conditions.

1.07 WARRANTY

- A. Warrant against defects in manufacturing of materials for a period of 2 years from date of substantial completion.
- B. Warrant framing finish against defects, including cracking, flaking, blistering, peeling, and excessive fading, chalking and non-uniformity in color for a period of 5 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Manufacturers
 - 1. Basis of Design: Specifications are based on FRY REGLET SD Out-Swing Door Frame.
 - 2. Other Manufacturers: Aluminum door frames manufactured by RACO INTERIORS VERSATRAC, FRAMEWORKS, or KAWNEER are acceptable provided they meet the specified requirements and size requirements indicated on the drawings.
- B. Interior Door Frames: Throat frames to accommodate wall thicknesses indicated on Drawings.

- C. Gasket: Manufacturers standard

2.02 MATERIALS

- A. Aluminum: ASTM B221, 6063T5 alloy, and as otherwise required to assure compliance with dimensional tolerances and maintain color uniformity.
- B. Anchorage Devices, Clips and Fasteners: Manufacturer's standard type, compatible with materials being secured.
- C. Accessories: As necessary for complete system.

2.03 EXTRUDED ALUMINUM FRAME FABRICATION

- A. Assemble all frames with screws utilizing internal screw spline system, insert into the drywall rough opening, and then attach perimeter flanges.
- B. Factory pre-machine door frame jambs and prepare for hardware, with concealed reinforcement plates, drilled and tapped as required, and fastened within frame with concealed screws.

2.04 FINISHES

- A. Factory finish extruded frame components so that all parts exposed to view upon completion of installation are uniform in finish and color. Exposed surfaces shall be free of scratches and other serious blemishes.
- B. Clear Anodized: AA-M12C22A21, etched, medium matte, clear anodic coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine project conditions and verify that project is ready for work of this section to proceed. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify wall thickness does not exceed manufacturer's recommended tolerances of specified throat size.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations. Do not attempt installation in areas where wall thickness exceeds tolerances of specified throat size.
- B. Install frames plumb and square, free from warp or twist, securely anchored to substrates with fasteners recommended by frame manufacturer.
- C. Maintain dimensional tolerances and alignment with adjacent work. Ensure joints are hairline tight and surfaces flush with adjacent components.

- D. Set all door frames in correct locations as shown on the drawings, level, square, plumb and in alignment with other work.

3.03 ADJUSTING AND CLEANING

- A. Protect exposed portions of aluminum surfaces from damage by plaster, lime, acid, cement, and other contaminants.
- B. Touch up marred areas so that touch-up is not visible from a distance of 4 feet. Remove and replace frames that cannot be satisfactorily adjusted.

3.04 PROTECTION

- A. Protect as required to assure that frames will be without damage until Substantial Completion.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide the following types of flush wood doors:

1. Solid core
2. Fire rated

B. Faces

1. Hardwood veneer
2. Medium Density Overlay (MDO)

1.02 RELATED SECTIONS

A. Hollow Metal Door Frames: Section 08 11 13.

B. Door Hardware Section 08 71 10.

1.03 QUALITY ASSURANCE

A. Provide wood doors fabricated by one manufacturer to ensure uniformity in appearance and construction.

B. Reference Standards

1. Underwriters' Laboratories - UL 10C (positive pressure) - Fire Tests of Door Assemblies
2. Window and Door Manufacturers Association (WDMA): WDMA IS 1A-04.
3. Architectural Wood Work Institute: AWI "Quality Standards, Guide Specification" requirements.
4. NFPA 80 - Fire Doors and Windows
5. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies

C. Engineered Wood Products

1. Determine formaldehyde concentrations in air from wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or E1333.
2. Determine Volatile Organic Compounds (VOC), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of wood door required.
 - 1. Include details of core and edge construction.
 - 2. Include certification indicating compliance with specification requirements.
- B. Submit Shop Drawings
 - 1. Indicate location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking and other pertinent data.
 - 2. Identify doors in accordance with drawing door schedule.
- C. Submit sample corner section, 12" square, showing required veneer and edge construction.
- D. Finish Samples
 - 1. Factory Finished Doors: Submit three (3) flitch samples of each species of face veneer with factory applied stain and finish as specified and indicated illustrating expected range of color and grain variation.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store and protect doors in accordance with manufacturer's recommendations and WDMA.
- B. Following are general guidelines. For more specific information refer to WDMA's Appendix Section "Care and Installation at Job Site."
 - 1. Deliver doors in manufacturer's original unopened protective packaging or wrapper.
 - a. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse.
 - b. Do not subject interior doors to extremes in either heat or humidity. HVAC systems should be operational and balanced, providing a temperature range of 50 to 90 degrees Fahrenheit and 30% to 50% relative humidity.
 - c. When handling doors, always lift and carry. Do not drag across other doors or surfaces. Handle with clean hands or gloves.
 - d. Each door will be marked on top rail with opening number.

1.06 LABEL DOOR REQUIREMENTS

- A. Fire Ratings Compliance: Comply with the label requirements of NFPA and

applicable local codes. Fabricate doors and frames in accordance with requirements of NFPA Standard No. 80 and U.L. Standards as follows:

1. Positive Pressure Testing UL 10C

B. Ratings Certifications

1. Provide U.L. labels permanently fastened on each door that is within the size limitations established by NFPA and U.L. for labeling.
2. Provide anchors for U.L. labeled frames required by the authority having jurisdiction.

1.07 WARRANTY

- A.** Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty Period for Solid-Core Exterior Doors: Two years from date of Substantial Completion.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A.** Interior Flush Doors Solid Core: Meet or exceed WDMA I.S.1A Industry Standard for Wood Flush Doors requirements and as specified. WDMA I.S.1A. Performance Grade – Heavy Duty.

1. Interior Flush Doors Solid Core – Non-Rated and 20 Minute Rated Fire Doors: Provide one of the following cores with hardwood veneers:
 - a. Stave Lumber Core (SLC-5) may be a combination of solid, low-density hardwood lumber blocks or strips not more than 2-1/2" wide of one species of wood between 6% to 9% moisture content. Joints to be tight and staggered in adjacent rows. Lumber density is 25 to 27 lbs. per cubic foot. Formaldehyde free.
 - b. Structural Composite Lumber Core (SCLC-5) is an engineered hardwood composite sometimes referred to as LSL (Laminated Strand Lumber). The material complies with WDMA minimum performance levels for interior applications with screw holding power of 540 lbs., modulus of rupture of 6,500 psi, modulus of elasticity of 1,300,000 psi and density of 38 lbs per cubic foot. Formaldehyde free.
2. Interior Flush Fire Doors – Above 20 Minute Rated: FD solid core with

hardwood face veneer.

- a. Rating as indicated on drawings.
- b. Provide one of the above cores or the following as required to maintain fire rating:
 - 1) Non-combustible mineral composite material that is necessary for higher hourly ratings per manufacturer's approval

B. Moldings: Trim louver and glass openings with recessed bead type wood moldings, species matching door face veneer species. Profiles as selected by the Architect from manufacturer's standard profiles.

1. Glass Lites in Fire Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.02 FABRICATION

A. Flush Doors: Fabricate doors in accordance with WDMA I.S. 1A, Custom with Grade A faces Grade requirements for transparent stained finish. Formaldehyde free.

1. Core Construction: Bond stiles and rails to core and sand entire unit prior to assembly of face veneers.
2. Number of Plies: 5.
3. Face Veneers: Minimum 1/50" thick before sanding, plain sliced select white maple hardwood.
 - a. Figure: Biological defects of grain, color and effects including but not limited to - blisters, flake, quilts, rope, burl, crotch, mottle patterns, shall not exceed approved veneer samples.
4. Merium Density Overlay (MDO) Faced Doors: Factory primed.
 - a. Location: Plumbing chase door
5. Door Thickness: 1-3/4" thick.
6. Adhesive: Type I, waterproof.
7. Edge Strips: Stile edges hardwood species matching face veneer; bonded to core; 1-1/8" minimum width after trimming. Top and bottom edges hardwood of mill option.
8. Match Between Veneer Leaves:
 - a. Plain Sliced Veneer: Book matched for color and grain.
 - b. Rift or Quarter Sawn Veneer: Slip match for color and grain.
9. Assembly of Veneer Leaves on Door Faces: Running match.
10. Hardware: Factory machine for mortise hardware using template provided by hardware manufacturer.
11. Reinforcement: Reinforce doors to receive hardware specified.
 - a. Hinge Attachment: Stiles and rails to be continuously glue bonded to the core so that screw stress is transmitted directly to the core.
 - b. Closure, Exit Device and Other Surface Mounted Hardware:

Provide top rail 2-1/2" or more in width to hold closer fasteners and solid wood blocking for all other surface applied hardware.

- B. Fire Rated Doors: Conform to "Flush Door" requirements specified above. Provide doors of U.L. classification indicated.
 - 1. Reinforcement: Reinforce doors to receive hardware specified.
 - a. Surface applied hardware that is located where screws cannot penetrate the above mentioned stiles or wood rails shall be through bolted.
- C. Factory Finish
 - 1. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - a. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
 - 2. Finish: WDMA TR-4 conversion varnish.
 - 3. Staining: Color as selected by Architect.
 - 4. Effect: Filled finish.
 - 5. Sheen: Satin.
- D. Individually package doors at factory with manufacturer's standard packaging or wrapping for delivery to job site.
- E. Manufacturers: MARSHFIELD; ALGOMA; EGGERS; MOHAWK; OSHKOSH; VT INDUSTRIES, LAMBTON DOORS.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substances, rough openings and installation conditions. Do not proceed with wood door installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Verify metal frame dimensions and hardware mortises in metal frames with metal frame manufacturer.

3.03 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area before hanging.

- B. Install doors in accordance with manufacturer's installation instructions. Job fit and prepare doors to receive hardware. Bevel 1/8" in 2" at strike edges for clearance in arc of swing. Seal cut surfaces, tops, bottoms and edges with sanding sealer after fitting and machining.
- C. Hang doors straight, plumb and square securely anchored into position. Adjust doors to provide uniform clearance and to contact stops uniformly. Remove and replace doors that are warped, bowed or otherwise damaged and cannot be properly fit to the opening.
- D. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

3.04 PROTECTION

- A. Protect installed doors from soiling, staining and damage until final acceptance.
- B. Repair or replace doors damaged beyond acceptable repair as directed by the Architect.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide wall, partition and ceiling access doors for access to mechanical and electrical equipment as indicated.

1.02 RELATED SECTIONS

- A. Finish Painting: Section 09 91 00.

1.03 QUALITY ASSURANCE

- A. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access panels. Coordinate delivery with other work to avoid delay.

1.04 SUBMITTALS

- A. Submit product data and shop drawings for each item. Include installation instructions for conditions involved.

PART 2 PRODUCTS

2.01 MATERIALS AND FABRICATION - WALL AND CEILING TYPES

- A. General: Provide access panel assembly manufactured as an integral unit, complete with all parts and ready for installation. Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
- B. Standard Access Door
 - 1. Description: Minimum 14 gage steel panels with minimum 16 gage steel frames. Units to have concealed hinges.
 - 2. Provide with exposed 1" frame flange.
 - 3. Manufacturer: Provide panels by one of the following, subject to the above requirements.
 - a. J. L. INDUSTRIES INC. Model TM
 - b. LARSEN'S MANUFACTURING Model L-MPG
 - c. BABCOCK-DAVIS Model B-NT
 - d. NYSTRON Model NT/NW/NP

C. Insulated Door (Carpet Cleaning Doors)

1. Description: Minimum 16 gage 304 satin stainless steel panels with minimum 16 gage steel frames. Units to have concealed hinges and spring closer.
2. Provide with exposed 1" frame flange.
3. Door: 2" thick insulated 20 gage 304 satin stainless steel
4. Size: 10" x 10" door.
5. Manufacturer: Provide panels by one of the following, subject to the above requirements.
 - a. J. L. INDUSTRIES INC. Model FDSS
 - b. Other Manufacturers: LARSEN'S MANUFACTURING, BABCOCK-DAVIS.
6. Provide at exterior side. Provide fabricated 16 ga. stainless steel 4 sided liner from exterior door to interior door. Flash liner bottom to drain to exterior. Seal frame perimeter to masonry. Interior door to be standard as specified herein.

D. Locks

1. Exposed to Public: Provide cylinder locks on all access doors; 7-pin removable core cylinders. Key in accordance with Section 08 71 10.
2. All Others: Screw drive type latching device.

- E. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which access panels are to be installed.
- B. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access panels.
Coordinate installation with work of other trades.
- B. Set frames accurately in position and securely anchor to supports with face panels level in relation to adjacent finish surfaces.

3.03 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 08 36 13

SECTIONAL DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Section includes:
 - 1. Glazed aluminum sectional overhead doors.
 - 2. Operating hardware, tracks and supports.
 - 3. Electric operations and controls

1.02 RELATED SECTIONS

- A. Electrical: Division 26.

1.03 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI/DASMA 102 Specifications for Sectional Overhead Type Doors (ANSI A216.1 published in National Garage Door Manufacturers Association Bulletin 102).
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM A653: Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM B221: Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire

1.04 SYSTEM DESCRIPTION

- A. Design Requirements
 - 1. Furnish sectional overhead doors that comply with ANSI/DASMA 102.
 - 2. Wind Loading: Design and reinforce sectional overhead doors to comply with ANSI/DASMA 102 criteria for wind loading.
 - 3. Insulated units.
 - 4. Full vision panels where indicated.

1.05 SUBMITTALS

- A. Shop Drawings: Fully dimensioned and detailed drawings showing complete installation with components, materials and finishes, and accessories indicated.

- B. Samples for Color Selection: Submit samples of door manufacturer's full range of metal finish colors on 4" x 6" piece of standard base metal.
- C. 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.
- D. Quality Control Submittals
 - 1. Certificates: For review and approval, submit manufacturer's written certificates indicating that doors comply with specified design criteria of ANSI/DASMA 102.
 - 2. Installer Qualifications: For review and approval, submit installer's written statement of compliance with installation experience requirement.

1.06 QUALITY ASSURANCE

- A. Provide each sectional overhead door as a complete unit produced by one manufacturer, including frames, sections, brackets, guides, tracks, counterbalance mechanisms, motor operator, controls, hardware and installation accessories to suit openings and allowable headroom.
- B. Provide sectional overhead door units by one manufacturer for entire project.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- D. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.07 WARRANTY

- A. Provide manufacturer's standard 2-year product warranty covering door sections.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Warranty Period: 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: CHI OVERHEAD DOOR Model 3295
- B. Other Manufacturers: Subject to compliance with requirements and an acceptable match to basis of design, provide doors by OVERHEAD DOOR COMPANY, HAAS, CLOPAY; COOKSON, WAYNE DALTON or ARM-R-LITE.

2.02 GLAZED ALUMINUM DOOR SECTIONS

- A. Sectional Door Assembly: Aluminum stile and rail assembly secured with 1/4" diameter through rods. Design units to the following:
 - 1. Thickness: 1-3/4".
 - 2. Glazing: 1/4" tempered glass; see Section 08 81 00.
 - 3. Aluminum: Minimum 0.065" thick, alloy 6063-T6.
 - 4. Door Finish: Manufacturer's standard baked-on epoxy primer with polyester finish coating. Architectural Class 1, clear anodized coating; AA-M12C22A41, minimum 0.7 mil thickness.
 - 5. Counterbalancing Mechanism: Torsion spring type.
 - 6. Rollers: Case hardened steel rollers with inner and outer race.
 - 7. Installation: Standard lift roof pitch.
 - 8. Accessories
 - a. Head and jamb weatherstripping.
 - b. Full vision lites.
 - 9. Door Layout: As indicated on the drawings.

2.04 COMPONENTS

- A. Tracks
 - 1. Provide manufacturer's standard galvanized steel track system, sized for door size and weight, and designed for clearances shown.
 - 2. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of ball-bearing roller guides.
 - 3. Slot vertical sections of track at 2" on center for door drop safety device.
 - 4. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed.
 - 5. Provide tracks and make provisions for extending above lay-in ceiling where indicated.
- B. Track Reinforcement and Supports
 - 1. Provide galvanized steel track reinforcement and support members.
 - 2. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity, and to ensure against sag, sway and detrimental vibration during opening and closing of doors.
 - 3. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall.

C. Counterbalancing Mechanism

1. Hang door assembly for operation by torsion spring counterbalance mechanism, consisting of adjustable-tension tempered steel torsion springs mounted on a case hardened steel shaft, and connected to door with galvanized air-craft type lift cables.
2. Provide cast aluminum or gray iron casting cable drums, grooved to receive cable.
3. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft with one additional midpoint bracket for shafts up to 16' long and 2 additional brackets at one-third points to support shafts over 16' long, unless closer spacing is recommended by door manufacturer.
4. Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side, designed to stop door automatically if either cable breaks.
5. Provide either a compression spring or leaf spring bumper installed at end of each vertical track to cushion door at end of opening operation.

- D. Weather Seals: Provide continuous rubber or flexible vinyl weatherstrip gasket at door bottom.

2.05 ACCESSORIES

- A. Hardware: Provide heavy duty, rust-resistant hardware, with galvanized, cadmium plated, or stainless steel fasteners, to suit type of door.

1. Hinges
 - a. Provide heavy steel hinges at each end stile and at each intermediate stile, per manufacturer's recommendations for size of door.
 - b. Attach hinges to door sections through stiles and rails with bolts and lock nuts or with lock washers and nuts.
 - c. Use rivets or self-tapping fasteners where access to nuts is not possible.
2. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track.

2.06 ELECTRIC DOOR OPERATOR

- A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, clutch and accessories required for proper operation.
- B. Door Operator Type: Provide wall mounted door operator units consisting of electric motor, worm gear drive from motor to reduction gear box, chain or worm

gear drive from reduction box to gear wheel mounted on counterbalance shaft, and a disconnect-release for manual operation. Provide motor and drive assembly of horsepower and design as determined by door manufacturer for size of door required.

- C. Electric Motors: Provide high-starting torque, reversible, constant duty, Class A insulated electric motors with overload protection, sized to move door in either direction, from any position at not less than 2/3' nor more than 1' per second.
 - 1. Power: 115v, 1 phase, 60Hz; motor horsepower sized for application, minimum 1/3 hp.
 - 2. Controls: Provide key operated switches where indicated.
 - 3. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
 - 4. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening.
 - a. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - b. Provide sensor in tamperproof enclosure as indicated.

PART 3 EXECUTION

3.01 INSPECTION

- A. Installer must examine the supporting structure and the conditions under which the work is to be performed and notify the General Contractor in writing of conditions which are detrimental to proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 INSTALLATION

- A. Install door and operating equipment complete with necessary hardware, tracks, anchors, inserts, hangers and equipment supports in accordance with drawings and manufacturer's instructions and recommendations.

3.03 FIELD ADJUSTMENT

- A. Upon completion of installation including the work by other trades, test and adjust doors to operate easily, free from warp, twist or distortion.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work under this section includes the design of the aluminum entrance and window systems and all materials, labor and equipment for the complete installation of the work as shown on the drawings and specified herein. Work includes:
1. Aluminum entrance doors.
 2. Aluminum entrance framing system for entrances and vestibule, including sidelight and transom frames as indicated.
 3. Aluminum storefront system.
 4. Aluminum windows.
 - a. Fixed
 5. Glass and glazing of the systems.
 6. Hardware.
 7. Anchors, fasteners, flashings, trim and accessories to complete the work.
 8. Sealants required within entrance and window construction.
 9. All gaskets, sealants and tapes required in final assembly of the work.
 10. Installation of lock cylinders furnished under Section 08 71 10.

1.02 RELATED SECTIONS

- A. Joint Sealants: Section 07 92 00.
- B. Glazing: Section 08 81 00.
- C. Hardware: Section 08 71 10.
- D. Glazed Aluminum Curtainwalls: Section 08 44 13.
- E. Vapor/Air Barrier Transition Membranes: Section 07 27 26.

1.03 QUALITY ASSURANCE

- A. Provide aluminum doors and framing system manufactured by a single firm specializing in the production of this type of work.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.04 REFERENCES

- A. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.05 SUBMITTALS

- A. Submit the following:
 - 1. Framing system details.
 - 2. Door details.
 - 3. Window details.
 - 4. Installation instructions.
 - 5. Itemized schedule of door hardware.
 - 6. Finish samples.
- B. Tests: Submit two copies of test reports made or witnessed by an independent testing laboratory showing the results of tests conducted on previously manufactured windows of the type used on this project. The reports shall verify conformance to thermal movement, air and water infiltration and structural properties as described herein.
- C. Building Shop Drawings: Include complete evaluations of all systems including doors; details and methods of anchorage; details of construction finishes; methods of assembly; location and installation of hardware and reinforcement for same; size, shape and thickness of materials; joints and connections; details of joining with other work.
 - 1. Scale: Include typical unit elevation of each system at 1/2" scale and details at full scale where practical.
- D. Product Data: Submit manufacturer's specifications for materials and fabrication of work, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated.
- E. Samples: Submit samples of each type and color and finish required by this Section, on 12" sections of extrusions or formed shapes and on 6" squares of sheet/plate. Include two or more samples in each set.
 - 1. Architect reserves right to require fabrication samples showing prime members, joinery, anchorage, expansion provisions, glazing and similar details, profiles and intersections.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.

1. Remove paper type wrappings when unloading.
2. Store materials inside the buildings whenever possible in clean, dry ventilated areas free of dust or corrosive fumes.
3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
4. During installation, protect materials from lime mortar, run-off from concrete and copper, weld splatter, acids, roofing materials, solvents and abrasive cleaner.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.07 WARRANTIES

- A. Submit written warranty signed by manufacturer, Contractor, and installer agreeing to repair or replace work which fails in materials or workmanship within three (3) years of the date of project acceptance.
 1. Failure of materials or workmanship shall include excessive leakage or air infiltration, excessive deflections and defects in accessories, weather seals and other components of work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and specifications are based on products by KAWNEER CO.
- B. Other Acceptable Manufacturers: Equal products by the following manufacturers are acceptable providing they meet or exceed the requirements specified herein and conform to the design intent indicated on the drawings:
 1. CRL – U.S. ALUMINUM
 2. EFCO
 3. OLDCASTLE BUILDING ENVELOPE
 4. TUBELITE DIVISION, INDAL, INC.
 5. YKK AMERICA

2.02 MATERIALS

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

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308.

- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36.
2. Cold-Rolled Sheet and Strip: ASTM A 1008.
3. Hot-Rolled Sheet and Strip: ASTM A 1011.

2.03 STOREFRONT, WINDOW FRAMING AND ENTRANCE DOOR SYSTEMS

- A. Type: An integrated system of extruded aluminum sections, glazing devices, sealing devices, doors and hardware and operable windows.

- B. Materials: Provide aluminum alloy and temper for each shape as recommended by manufacturer and processor to comply with requirements of performance, fabrication, and application of finish.

1. Thickness: As required to meet design requirements with a minimum of 1/8" for major sections.

- C. Framing: KAWNEER 451T, framing for 1" insulating glass.

1. Type: Thermally broken, outside glazed, fixed type framing as indicated on drawings.
2. Frame
 - a. Members: Main frame members designated specifically for manufacture of aluminum windows extruded from 6063-T5 aluminum alloy.
 - b. Glazing: Extruded snap-in type bead. Units to accept 1" insulating glass.
 - c. Trim: Provide all trim, sills, flashings and closures to complete installation.
 - d. Size
 - 1) Sightline: Nominal 2".
 - 2) Depth: 4-1/2".
 - e. Provide subframing as required for power operated entrance door application. See Section 08 42 29.
3. Glazing Plane: Front
4. Special Framing Shapes: Provide as detailed or as required to maintain design intent as indicated on building elevations drawings and section drawings. Aluminum extruded shapes and bent aluminum sheet, minimum 0.063", finished after fabrication.

5. Vestibule Framing: Non-thermally broken; dimensions to match exterior framing. KAWNEER Trifab II 451. Units to accept 1/4" glass.
 6. Interior Framing: Non-thermally broken. KAWNEER Trifab II 451. Units to accept glass thickness indicated.
 - a. Designed to resist a 200 lb/SF concentrated load in any direction where indicated on the drawings.
 - b. Size
 - 1) Sightline: Nominal 2".
 - 2) Sill Sightline: Nominal 4-1/2"
 - 3) Depth: 4-1/2".
 7. Provide extruded solid backed framing shapes where framing abuts solid wall conditions.
- D. Performance Requirements: Exterior window wall system (excluding doors) shall meet or exceed the following performance requirements.
1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures indicated on the drawings.
 2. Thermal Movement: Window framing system shall be designed to provide for expansion and contraction of component materials caused by a surface temperature range of 180° F., without causing buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects.
 - a. Doors: Function properly over the above specified temperature range.
 3. Air Infiltration: Air leakage shall not exceed 0.06 cfm per square foot of fixed wall area when tested in accordance; with ASTM E283 at test pressure not less than 6.24 psf.
 4. Water Infiltration
 - a. Provide drainage to exterior face of framing any water entering at joints.
 - b. No uncontrolled water penetration shall occur when tested in accordance with ASTM E331, at test pressure not less than 8.0 psf.
 5. Structural Properties - Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
 6. Thermal Properties
 - a. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than (Glass to Center) 0.44 (low-e) BTU/hr/ft sq./degree F
 - b. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than (Glass to Center) 62 frame and 68 glass (low-e)
- E. Glazed Aluminum Entrance Doors: Standard duty, wide stile, manufacturer's standard, single acting aluminum entrances. Provide thermally broken units without

vestibules

1. Stiles: Nominal 4 1/4" to 5" wide.
2. Rails
 - a. Top: 4 1/4" to 5" wide.
 - b. Bottom: 10" high.
3. Intermediate Rail: Provide if indicated.
4. Section Wall Thickness: .125" for major components; 0.05" for glazing moldings.
5. Door Thickness: 1-3/4" in vestibules. Provide thermally broken 2 1/4" units without vestibules.
6. Corners: Stiles through design, joined by concealed bolts and weld.
7. Provide complete with snap-in glazing stops and gaskets.
8. Sizes: As indicated. Provide single or pairs of doors as scheduled.
9. Exterior Entrance Weatherstripping: Stile with dual pile weathering with polymeric fin and bulb polymeric weatherstripping and pile weathering with polymeric fin in door frame system or equal by other approved manufacturer. Locate weatherstripping at jambs, head and meeting stiles (as applicable). Provide bottom rail with EPDM blade gasket sweep. Size sweep to close against door threshold. Sweep housing finish to match door finish.
10. Glazing: 1/4" thick in vestibules, insulated units without vestibules, unless otherwise indicated.
11. Finish: Interior and exterior to match as indicated below.

2.04 FINISHES

- A. All exposed aluminum surfaces shall receive an Architectural Class 1, clear anodized coating; AA-M12C22A42 on exterior surfaces and clear anodized coating; AA-M12C22A41 on interior surfaces, minimum 0.018 mm thickness.

2.05 ENTRANCE DOOR HARDWARE

- A. Prepare and reinforce doors and frames for hardware. Factory fit and install hardware in accordance with Section 08 71 10 and manufacturer's requirements.

2.06 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components. Finish exposed fasteners to match aluminum work.
- B. Flashing, Trim and Accessories: Provide as required to complete the work. Finish shall match aluminum entrances and storefront finishes. Work includes:
 1. Aluminum closure panels, flashing and trim.
 2. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, type selected by manufacturer for compatibility.
 3. All trim materials shall be finished after fabrication, unfinished exposed

edges at holes and trim terminations are not acceptable.

- C. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
- D. Bituminous Coatings: Cold applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil thickness per coat.

2.07 FABRICATION

- A. Provide manufacturer's standard fabrication and accessories that comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- B. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members. Conceal fasteners wherever possible.
- C. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate dissimilar metals with bituminous paint or preformed separators that will prevent corrosion. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- D. Coordinate work of this section with other work for proper sequence of construction without delays. Verify dimensions of supporting structure and other elements that precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates supporting structure, and installation conditions. Do not proceed with aluminum entrances erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. General
 - 1. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraded and broken members.

2. Remove and replace members that have been damaged during installation or thereafter before time of acceptance.
 3. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection or a failure in performance of the work.
- B. Install components in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Assembly and Anchorage: Anchor component parts securely in place, by bolting or other permanent mechanical attachment system, which will comply with performance requirements and permits movements as required.
1. Anchor storefront sill to a continuous interior aluminum anchor.
- E. Apply a bituminous coating or other suitable separator on concealed contact surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.
- F. Set sill members and entrance thresholds in a bed of sealant compound, or with joint fillers or gaskets to provide weathertight requirements.
- G. Install glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- H. Install joint sealants specified in Section 07 92 00, in accordance with the manufacturer's requirements.
- I. Coordinate installation of storefront framing with installation of air/vapor barrier transition membrane.
- J. Adjust operating hardware to function properly, without binding, and to provide tight proper fit at contact points and weatherstripping.

3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum entrance systems thoroughly, inside and out. Demonstrate proper cleaning methods to Owner's

maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 08 42 29

SLIDING AUTOMATIC ENTRANCES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide automatic sliding door as a complete unit, including operator, header, track, jamb, sliding door panel(s), fixed sidelight panel(s), threshold, activating device and all accessories and miscellaneous components to provide an operating installation.
 - 1. Limited access security equipment: Electric solenoid lock and concealed vertical rod exit device. Clarification: Locking and emergency exit device to be provided on exterior doors only. Vestibule (interior) doors will not be locked and are not to receive this locking option. However, interior doors are to have the same breakout capabilities as the exterior doors.
- B. Coordinate automatic sliding entrance doors with aluminum storefront framing, Section 08 41 13.

1.02 RELATED SECTIONS

- A. Aluminum Storefront Framing: Section 08 41 13.
- B. Glass: Section 08 81 00.
- C. Sealant: Section 07 92 00.
- D. Electrical: Division 26.

1.03 QUALITY ASSURANCE

- A. Reference Standards
 - 1. ANSI A156.10 Standards: Comply with applicable requirements of Power Operated Pedestrian Door Standard.
 - 2. U.L. Standard: Provide power door operators complying with U.L. 325, Electric Door, Drapery, Gate, Louver and Window Operators and Systems.
 - 3. NFPA 101 Life Safety Code.
 - 4. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.
- B. Manufacturer's Qualifications: Provide units produced by a firm with a minimum 3

years successful experience in the fabrication of automatic entrance doors of the type required for this project.

C. Installer Qualifications: Approved and authorized by the door system manufacturer for both installation and maintenance.

1. Minimum Experience: Minimum 3 years experience in the installation and service of automatic entrance doors.
2. Maintenance Proximity: Not more than 3 hours normal travel time from installers place of business to project site.

1.04 SUBMITTALS

A. Submit the following in accordance with the requirements of the General Conditions.

1. Product Data: Manufacturer's product data and standard details for automatic entrance doors, including fabrication, finishing, hardware, operators accessories and other components of the work. Include rough-in diagrams, wiring diagrams, parts lists, and maintenance instructions.
2. Furnish templates, diagrams and other data to fabricators and installers of related work, as needed for coordination of installation.
3. Shop Drawings: Submit for fabrication and installation of automatic entrance doors and associated components of the work. Indicate anchors, joint system, expansion provisions, hardware, glazing details and other components not included in manufacturer's standard data.
4. Samples
 - a. Painted Finish: Samples of each type and color and finish required by this Section, on 12" sections of extrusions or formed shapes and on 6" squares of sheet/plate. Include two or more samples in each set, showing limits of variations (if any) in color and texture of finish.

1.05 WARRANTY

A. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.

1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Drawings and specifications are based on RECORD USA Series 5100.
- B. Acceptable Manufacturers: The following manufacturers are acceptable providing the system proposed meets or exceeds the requirements of the specifications and

drawings. Manufacturers are responsible for modifications and coordination of work required to make their systems properly function within the parameters indicated or specified.

1. BESAM, INC.
2. LCN .
3. HORTON AUTOMATICS.
4. STANLEY

2.02 DOOR UNIT

- A. General: Unit includes operator, header and track, jambs, sliding door panel(s), fixed sidelight panel(s) and threshold.
 1. Bi-Parting Entrances:
 - a. Configuration: Two sliding leaves and two full sidelights.
 - b. Traffic Pattern: Two-way.
 - c. Emergency Breakaway Capability: Sliding leaves only.
- B. Material: Extruded aluminum, 6063T-5 alloy, 0.125 inch thickness.
- C. Header Section: Continuous, extruded aluminum. Conceal support track and ball-bearing wheels. Track must be replaceable without removing operator.
- D. Emergency Breakaway: Provide release hardware that allows panels to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 30 lbf according to ANSI/BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.
 1. Emergency breakaway feature shall include at least one adjustable detent device mounted in the top of each breakaway panel to control panel breakaway force.
 2. Limit Arms: Limit arms shall be provided to control swing of sliding or non-sliding panels on break-out; swing shall not exceed 90 degrees.
- E. Weatherstripping: Manufacturer's standard type. Provide around complete perimeter of door panels.
- F. Provide sliding panels with recessed exit device with cylinder. No bottom latching is required. Provide satin stainless steel finish. Key cylinder with building keying system as specified in Section 08 71 00.
- G. Miscellaneous: Provide additional hardware items as required for a complete operating entrance door assembly.

2.03 OPERATOR

- A. Description: Electro-mechanical type, header mounted and concealed with a securely attached removable cover.
 1. Time Delay: Adjustable from 1 to 28 seconds.

2. Opening speed, closing speed, back check and latch check shall be fully and independently adjustable.
 3. For protection in case of power failure, operator shall include automatic pressure relief to prevent closing on pedestrians; there shall be no springs or mechanisms to prevent free manual operation of the door.
 4. Power "ON" and "OFF" switch shall be located on the inside of the header; serving a second function as a hold open for door.
- B. Electrical: Provide door assembly complete with all internal wiring. Electrical Contractor shall provide all wiring to the operator. Door installation contractor shall make final connections to power.
1. Service: 115 volt, 60 cycle, 1 phase, 15 amp.

2.04 ACTIVATION AND SAFETY DEVICES

- A. Motion Sensors: Motion sensors shall be mounted on each side of door header to detect pedestrians in the activating zone, and to provide a signal to open doors in accordance with ANSI/BHMA A156.10. Units shall be programmable for bi-directional or uni-directional operation and shall incorporate K-band microwave frequency to detect all motion in both directions.
- B. Presence Sensors: Presence sensors shall be provided to sense people or objects in the threshold safety zone in accordance with ANSI/BHMA A156.10. Units shall be self-contained, fully adjustable, and shall function accordingly with motion sensors provided. The door shall close only after all sensors detect a clear surveillance field.
- C. Photoelectric Beams: Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting. Beams shall be monitored by electrical controls for faults and shall be fail safe.
- D. Access Control:
1. Provide manufacturers custom control package to include remote function to secure operation for one way exiting.

2.05 ELECTRICAL CONTROL

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.
1. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be a software driven handheld interface.

2.06 FABRICATION

- A. Sizes: As indicated on drawing.
- B. Sliding door unit is to be installed in coordination with aluminum entrance system framing. Coordinate opening size and installation details with framing system manufacturer.
- C. Preassemble door unit to the greatest extent possible prior to shipment. Disassemble only to the extent necessary for shipment or installation.
- D. Provide all concealed fasteners, unless approved by Architect.

2.07 FINISHES

- A. All exposed aluminum surfaces shall receive an Architectural Class 1, clear anodized coating; AA-M12C22A42 on exterior surfaces and clear anodized coating; AA-M12C22A41 on interior surfaces, minimum 0.018 mm thickness.

PART 3 EXECUTION

3.01 INSPECTION

- A. Installer must examine areas and conditions under which automatic entrances are to be installed and notify Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with installations until unsatisfactory conditions have been corrected in a manner acceptable to the manufacturer.

3.02 INSTALLATION

- A. Install in accordance with the manufacturer's instructions and recommendations.
- B. Set units plumb, level and true to line, without warp or rack of frames or doors. Anchor securely in place.
- C. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with dissimilar materials.
- D. Set tracks, header assemblies, operating brackets, rails and guides level and true to location, with adequate anchorage for permanent support.

3.03 ADJUST AND CLEAN

- A. Adjust door operators and controls for optimum operating condition and safety. Lubricate as recommended by manufacturer.
- B. Clean aluminum surfaces after installation, exercising care to avoid damage to the protective coating.

END OF SECTION

SECTION 08 43 14

INTERIOR ALUMINUM STOREFRONT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide aluminum storefront systems as shown and specified. Work includes:
 - 1. Aluminum framing.
 - 2. Glass and glazing of the systems.
 - 3. Anchors, fasteners, flashings, trim and accessories to complete the work.
 - 4. Sealants required within storefront construction.
 - 5. All gaskets, sealants and tapes required in final assembly of the work.
 - 6. Aluminum doors.

1.02 RELATED SECTIONS

- A. Joint Sealants: Section 07 92 00.
- B. Aluminum-Framed Entrances and Storefronts: Section 08 41 13.
- C. Glass and Glazing: Section 08 81 00.
- D. Door Hardware: Section 08 71 10.

1.03 REFERENCES

- A. Architectural Aluminum Manufacturer's Association (AAMA)
- B. American Society for Testing and Materials (ASTM)
- C. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.04 QUALITY ASSURANCE

- A. Provide interior aluminum storefront systems manufactured by a single firm specializing in the production of this type of work.

1.05 SUBMITTALS

- A. Submit the following in accordance with the General Conditions and Section 01 33 23:

1. Framing system details.
2. Installation instructions.
3. Finish samples.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.

1. Remove paper type wrappings when unloading.
2. Store materials inside the buildings in clean, dry ventilated areas free of dust or corrosive fumes.
3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
4. During installation, protect materials from lime mortar, run-off from concrete and copper, weld splatter, acids, roofing materials, solvents and abrasive cleaner.

PART 2 PRODUCTS

2.01 MATERIALS

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

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.

2.02 STOREFRONT SYSTEM

- A. Type: An integrated system of extruded aluminum sections, glazing devices, sealing devices.

- B. Framing: "Trifab 450 CG." and "Trifab VG 450" by KAWNEER, 1-3/4" x 4-1/2" members. Equal products by VISTAWALL; EFCO, YKK AMERICA or TUBELITE are acceptable provided they comply with requirements stated herein.

1. Provide complete with snap-in glazing stops and gaskets for the thicknesses of glass units indicated or specified. Provide rectangular glazing stops; triangular or beveled not permitted.
2. Provide silicone glazed system framing members where indicated.

- C. Provide door frame extrusions as required to fit in storefront framing system or as individual framed opening as scheduled.

2.03 DOORS

- A. Glazed Aluminum Interior Doors: Wide stile, single acting, glazed aluminum entrances.
 - 1. Sizes: As indicated. Provide single or pairs of doors as scheduled.
 - 2. Stiles: Nominal 5-1/2" wide.
 - 3. Rails
 - a. Top: 5" high.
 - b. Bottom: 10" high.
 - 4. Section Wall Thickness: .125" for major components; 0.05" for glazing moldings.
 - 5. Door Thickness: 1-3/4".
 - 6. Corners: Stiles through design, joined by concealed bolts and weld.
 - 7. Provide complete with snap-in glazing stops and gaskets. Provide rectangular glazing stops; triangular or beveled not permitted.
 - 8. Glazing: 1/4", unless otherwise indicated.

2.03 FINISHES

- A. All exposed aluminum surfaces shall receive an Architectural Class 1, clear anodized coating; AA-M12C22A41, minimum 0.7 mil thickness.

2.04 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components. Finish exposed fasteners to match aluminum work.
- B. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
- C. Bituminous Coatings: Cold applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil thickness per coat.
- D. Clear Protective Coatings: Provide aluminum surfaces covered with strippable surfacing designed specifically for protection of aluminum finish.

2.05 FABRICATION

- A. Aluminum Storefronts: Provide manufacturer's standard fabrication and accessories which comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- B. Shop fabricate aluminum storefront systems. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline

fit of contacting members. Conceal fasteners wherever possible.

- C. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- D. Coordinate aluminum storefront systems work with other work for proper sequence of construction without delays. Verify dimensions of supporting structure and other elements which precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates supporting structure, and installation conditions. Do not proceed with aluminum storefront erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. General
 - 1. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded and broken members. Remove and replace members which have been damaged during installation or thereafter before time of acceptance.
 - 2. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection or a failure in performance of the work.
- B. Install the aluminum storefront systems in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Assembly and Anchorage: Anchor component parts securely in place, by bolting or other permanent mechanical attachment system, which will comply with performance requirements and permits movements as required.
- E. Apply a bituminous coating or other suitable separator on concealed contact

surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.

- F. Install aluminum storefront system glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- G. Install joint sealants within the aluminum storefront systems work with elastomeric joint sealants specified in Section 07 92 00, in accordance with the manufacturer's requirements.

3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum storefront systems thoroughly. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.
- D. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work under this section includes the design and engineering of the curtain wall system and all materials, labor and equipment for the complete installation of the aluminum curtain wall system as shown on the drawings and specified herein. Work includes:
 - 1. Aluminum curtain wall framing.
 - 2. Glass and glazing of the aluminum curtain wall system and entrance doors.
 - 3. Anchors, fasteners, flashings, trim and accessories to complete the work.
- B. Provide reinforcing within curtain wall framing as required to meet design loads and span conditions.
- C. Coordination and scheduling of Owner's field performance tests.

1.02 RELATED SECTIONS

- A. Joint Sealants: Section 07 92 00.
- B. Glass and Glazing: Section 08 81 00.
- C. Aluminum Entrance doors: Section 08 41 13.
- D. Spandrel Insulation: Section 07 21 00.
- E. Vapor/Air Barrier Transition Membranes: Section 07 27 26.

1.03 QUALITY ASSURANCE

- A. Provide standard aluminum curtain wall framing system and aluminum doors manufactured by firms specializing in the production of this type of work that conforms to project requirements.
- B. Coordination: Coordinate entrance doors, frames and subframes that are indicated to operate within curtain wall system. Include:
 - 1. Aluminum finish systems. Colors selected must be an exact color match to aluminum entrance system finish, as determined by the Architect, from the same paint system manufacturer.
 - 2. Door hardware.

- C. Mockups: Build in-place, on-building mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups of typical curtainwall area and punched openings as shown on Drawings.
 - 2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. Field Testing Laboratory: Provide testing lab services in accordance with Section 01 45 29.

1.04 REFERENCES

- A. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.05 SUBMITTALS

- A. Submit the following:
 - 1. Framing system details.
 - 2. Installation instructions.
 - 3. Finish samples.
- B. Tests: Submit two copies of test reports made or witnessed by an independent testing laboratory showing the results of tests conducted on previously manufactured systems, including doors, of the type used on this project. The reports shall verify conformance to thermal movement, air and water infiltration and structural properties as described herein.
- C. Building Shop Drawings: Include complete evaluations of all systems including doors; details and methods of anchorage; details of construction finishes; methods of assembly; location and installation of hardware and reinforcement for same; size, shape and thickness of materials; joints and connections; details of joining with other work.
 - 1. Scale: Include typical unit elevation of each system at 1/2" scale and details at full scale where practical.
 - 2. Calculations: Show full derivation of loads and successful resolution of loads on individual members, their connections, and fasteners to the connection to the building, showing conformance to specified criterion. Such calculations shall be done by a structural engineer licensed to practice in the **State of Ohio**. Calculation submission must coincide with

shop drawing submission.

- D. Product Data: Submit manufacturer's specifications for materials and fabrication of work, and instructions/recommendations for installation and maintenance. Include a summary cover listing conformance to project conditions.
- E. Samples: Submit samples of each type and color and finish required by this Section, on 12" sections of extrusions or formed shapes and on 6" squares of sheet/plate. Include two or more samples in each set.
 - 1. Architect reserves right to require fabrication samples showing prime members, joinery, anchorage, expansion provisions, glazing and similar details, profiles and intersections.
- G. Field Performance Tests: Submit copies of field performance test reports specified in Article 3.03 herein. See Section 01 45 29.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.
 - 1. Remove paper type wrappings when unloading.
 - 2. Store materials inside the buildings whenever possible in clean, dry, ventilated areas, free of dust or corrosive fumes.
 - 3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
 - 4. During installation, protect materials from all construction materials, including mortar, concrete, weld splatter, cleaning acids, roofing materials, solvents, abrasive cleaners and runoff from all the above.

1.07 PERFORMANCE REQUIREMENTS – CURTAINWALL

- A. Performance Requirements: Exterior curtain wall system shall have been tested to meet or exceed the following performance requirements.
 - 1. Wind loads: Provide curtain wall system; including glazing, panels and anchorage, capable of withstanding wind load design pressures derived from criteria indicated.
 - 2. Air Infiltration: Air leakage shall not exceed 0.06 cfm per square foot of fixed wall area and 0.1 cfm for each lineal foot of crack of operable elements when tested in accordance; with ASTM E283 at test pressure not less than 6.24 psi.
 - 3. Water Infiltration
 - a. Provide drainage to exterior face of framing any water entering at joints and any condensation occurring within window construction.
 - b. Static Pressure: No uncontrolled water penetration when subjected

to water spray at the rate of five gallons per hour per square foot at a static pressure of 10 psf for 15 minutes when tested in accordance with ASTM E331.

- c. Dynamic Pressure: No uncontrolled water penetration when subjected to water spray at the rate of five gallons per hour per square foot with wind from an aircraft engine generating a pressure of 10 psf for 15 minutes; tested in accordance with AAMA TM-1 and AAMA 501.1.
4. Structural Properties: No damage or failure shall occur when tested in accordance with ASTM E330. Standard test design loading shall be minimum 40 psf, positive and negative windload. A design deflection criteria of $L/175$ or $3/4"$ maximum for spans up to $13'-4"$, and $L/240+1/4$ inch for spans over $13'-4"$ shall apply to both positive and negative loads. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans or $1/16"$ at members shall occur.
5. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.44 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor for the frame shall not be less than 59 using low e glass (90 % argon fill with warm edge spacer).
7. Thermal Requirements: Framing system designs to accommodate expansion and contraction movement due to surface temperature differential of 180°F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance or other detrimental effects.

1.08 WARRANTIES

- A. Furnish written guarantee certifying that all work furnished and installed will be free of defects in materials and workmanship, and remain watertight for a period of three (3) years from date of Substantial Completion. Should any defect develop during the guaranty period due to faulty materials or improper workmanship, such defects will be repaired or replaced with new work at no expense to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and Specifications are based on 1600 Series manufactured by KAWNEER.
- B. Other Manufacturers: Systems manufactured by the following are acceptable providing they meet the performance and dimensional requirements that are specified herein and conform to the design intent indicated on the drawings.
 1. CRL – U.S. ALUMINUM
 2. EFCO

3. OLDCASTLE BUILDING ENVELOPE
4. TUBELITE DIVISION, INDAL, INC.
5. WAUSAU
6. YKK AMERICA

2.02 MATERIALS

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

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.

2.03 CURTAIN WALL SYSTEM

- A. Aluminum Framing Members: Alloys best suited to meet the performance requirements and structural characteristics as published by the Aluminum Association. Other alloys will be considered only if published literature is available by the primary producer of the material and justified by both the manufacturer and structural engineer for the curtainwall. Provide thicknesses, shapes and profiles as required to comply with performance requirements.

1. Shapes: extruded horizontal and tubular vertical framing sections; anchor mullions at framing structure as indicated. 0.125" inch thick minimum for primary structural members.
2. Special (Custom) Framing Shapes: Provide as detailed or as required to maintain design intent as indicated on building elevations drawings and section drawings. Aluminum extruded shapes and bent aluminum sheet, minimum 0.063", unless indicated otherwise.
 - a. Corners
 - b. Sill extensions
 - c. Perimeter trim.

- B. Size: 2-1/2" wide x depths indicated

- C. Design system for exterior glazing of vision lites.

- D. Anchorage: Provide anchorage to building structure for three directional adjustments for fabrication and construction tolerances. All connections must be bolted; screws are not permitted.

- F. Trim and Closures: Visible aluminum trim and closures that are not extruded, shall be fabricated from .125" thick aluminum plate finished to match other aluminum curtain wall materials, unless noted otherwise on the drawings. Provide concealed fasteners wherever possible.

2.04 ALUMINUM DOORS AND SUBFRAMES

- A. Type: A system of extruded aluminum subframe sections, sealing devices, and doors and hardware integrated into the curtainwall system.
 - 1. Provide subframe and doors compatible with aluminum curtain wall system.
 - 2. See Section 08 41 13.

2.05 ACCESSORIES

- A. Fasteners: 300 Series stainless steel for system joinery, zinc-plated for bolt anchors if occurring interior of system's water barrier. No exposed fasteners without Architect's permission. If exposed, finish exposed fasteners to match aluminum work.
- B. Sill Pan Flashing: Dead-soft stainless steel, 26 gauge minimum, type selected by manufacturer for compatibility.
- C. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A386.
- D. Separate dissimilar materials and metals with full face plastic shims or similar type materials.
- E. Slip Joint Linings: Provide plastic sheets, spacers or bearing pads to ensure free movement between surfaces where expansion and deflection movements are intended. Provide units of sizes and thicknesses as recommended by manufacturer.
- F. Structural Sealant: Designed to carry gravity loads of glazing and capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - 1. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.
 - a. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- G. Back-Pans: Minimum 0.040 inch painted aluminum back-pan where exposed, and 20 gauge galvanized steel where not exposed, with stiffeners as required for smooth level face.
 - 1. Finish: Where exposed, provide finish color to match framing as approved by Architect.

2.05 FABRICATION

- A. Comply with dimensions and profiles indicated on drawings.
- B. Provide manufacturer's standard fabrication and accessories that comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- C. Thermal Break Construction: Fabricate curtain wall framing with a concealed low conductance thermal barrier, located in a manner which eliminates direct metal-to-metal contact. Provide manufacturer's standard construction that has been tested to demonstrate resistance to thermal conductance and condensation as specified, and has been tested to resist specified loads and differential movement.
- D. Shop fabricate aluminum curtain wall assemblies. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit and flush alignment of contacting members. Conceal fasteners.
- E. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- F. Factory-Assembled Frame Units
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact with structural sealant with manufacturer's written instructions to ensure compatibility and adhesion.
 - 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 4. Seal joints watertight unless noted otherwise.
 - 5. Install glazing to comply with requirements of Section 08 80 00.

2.04 FINISHES

- A. All exposed aluminum surfaces shall receive an Architectural Class 1, clear anodized coating; AA-M12C22A42 on exterior surfaces and clear anodized coating; AA-M12C22A41 on interior surfaces, minimum 0.018 mm thickness.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after

surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates supporting structure and installation conditions. Do not proceed with curtain wall system erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- C. Preinstallation Conference
 - 1. Prior to installation of curtain wall and associated work, meet at project site, or other mutually agreed location, with installer, representative of curtain wall manufacturer, installers of related work, and other entities concerned with performance, including test agencies, governing authorities, Construction Manager, Architect, and Owner.
 - 2. Record discussions and agreements and furnish a copy to each participant.
 - 3. Provide at least 72 hours advance notice to participants prior to convening installation conference.
 - 4. Meeting agenda shall include:
 - a. Construction
 - b. Safety
 - c. Installed curtain wall protection
 - d. Damage to installed curtain wall
 - e. Person responsible to inspection of substrate.

3.02 INSTALLATION

- A. General
 - 1. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraded and broken members. Remove and replace members that have been damaged during installation or thereafter before time of acceptance.
 - 2. Do not cut or trim component parts during erection without advanced permission of the Architect, and acceptance from structural engineer.
- B. Install the curtain wall system in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive structural shims,

anchors and bolts; never attach to wood blocking or through wood spacers.

- D. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or greater, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.
- E. Assembly and Anchorage: Anchor component parts securely in place, by bolting, which will comply with performance requirements and permits movements as required.
- F. Install curtain wall system glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. All tests must be performed in the presence of the Architect, Construction Manager and Owner's Representative. Provide a minimum of 72 hours notice prior to each test being performed.
- C. Test Area: Perform tests on areas approximately 25 feet wide by one story high. Actual test areas to be coordinated with Architect.
- D. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to ASTM E1105 and shall not show evidence of water penetration.
 - a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion
 - 2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 - a. Perform tests in each test area as directed by Architect. Perform

- at least three tests, prior to 10, 35, and 70 percent completion
3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- E. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
1. Test a minimum of two areas on each building facade.
 2. Repair installation areas damaged by testing.
- F. Repair or remove work where test results and inspections indicate that the work does not comply with specified requirements. Obtain authorization for remediation from Architect before accomplishing any repairs. Remediate and repeat test of that area, and test another similar area until all tests are successful.
- G. Additional testing and inspecting, Contractor's expense, will be performed to determine compliance of replaced, remediated or additional work with specified requirements.
- H. Prepare test and inspection reports.

3.04 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation. Attach streamers to framing. Do not apply markings or materials of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum curtain wall system thoroughly, inside and out. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning.
- D. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair, deglazing and reglazing and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Stile and Rail Wood Doors"
 - d. "Interior Aluminum Doors and Frames"
 - e. "Aluminum-Framed Entrances and Storefronts"
 - f. "Stainless Steel Doors and Frames"
 - g. "Special Function Doors"
 - h. "Entrances"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies

2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:

- 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.

- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
- 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

- 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) 3 years
 - 2) Exit Devices
 - a) 3 years
 - 3) Closers
 - a) 30 years
 - b. Electrical Warranty
 - 1) Locks
 - a) 1 year
 - 2) Exit Devices
 - a) 1 year
 - 3) Closers
 - a) 2 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. McKinney TB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Select
 - b. Roton

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. Securitron CEPT-10
 - b. Security Door Controls PTM

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

2.07 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 99/33A series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.09 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:

a. No Substitute

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.10 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Medeco
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.11 KEYING

A. Scheduled System:

1. Existing non-factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Master Keys: 6.

2.12 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson
2. Acceptable Manufacturers:
 - a. Rixson
 - b. Sargent

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International
2. Acceptable Manufacturers:
 - a. Reese
 - b. Legacy

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.19 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Schlage

2. Acceptable Manufacturers:

- a. GE-Interlogix
- b. Sargent

B. Requirements:

- 1. Provide recessed or surface mounted type door position switches as specified.
- 2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.20 BARN DOOR HARDWARE

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Schlage

2. Acceptable Manufacturers:

- a. Brio
- b. KN Crowder

B. Requirements:

- 1. Provide complete sets of sliding door hardware as recommended by manufacturer for door type and weight.
 - a. Include track, channels, brackets, hangers, fasteners, guides, pulls, stops, and other hardware as required for complete installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

- L. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.

- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

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Hardware Group No. 01

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 M52A	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 M52A	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 M52A	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. 04

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK W/ INDICATOR	L9040 M52A L283-722	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. 05

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9492LEU M52A RX DM	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	EXTERIOR INDICATOR - OCCUPIED/VACANT	L283-414 626	626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER
MOMENTARILY UNLOCKS OUTSIDE LEVER ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.
THROWING DEADBOLT CHANGES EXTERIOR INDICATOR FROM "VACANT" TO "OCCUPIED" AND
DISABLES EXTERIOR READER.

Hardware Group No. 06

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 07

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	INVISIBLE HINGE	218	626	SOS
1	EA	CYL X TURN DEAD LOCK	L460L 09-544	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	FLUSH PULL	955	626	IVE

Hardware Group No. 08

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 09

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 10

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

REUSE BALANCE OF DOOR, FRAME AND HARDWARE

VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES. PROVIDE FIELD MODIFICATIONS AND/OR FILLERS TO EXISTING DOORS AND FRAMES AS NECESSARY TO ACCEPT NEW SPECIFIED HARDWARE. SUBMIT FOR APPROVAL, A DETAILED LIST OF REQUIRED MODIFICATIONS PRIOR TO PERFORMING.

Hardware Group No. 11

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A	A	ZER

DOORS REQUIRE SPECIAL 3/8 INCH UNDERCUT FOR ADA TYPE THRESHOLD.

Hardware Group No. 12

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG ST-1630	689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	141AA	AA	ZER
		*MOUNT ABOVE AUTO DR. BTM			
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR BOTTOM	365AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER

Hardware Group No. 13

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER

REUSE BALANCE OF DOOR, FRAME AND HARDWARE

VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES. PROVIDE FIELD MODIFICATIONS AND/OR FILLERS TO EXISTING DOORS AND FRAMES AS NECESSARY TO ACCEPT NEW SPECIFIED HARDWARE. SUBMIT FOR APPROVAL, A DETAILED LIST OF REQUIRED MODIFICATIONS PRIOR TO PERFORMING.

Hardware Group No. 14

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

REUSE BALANCE OF DOOR, FRAME AND HARDWARE

VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES. PROVIDE FIELD MODIFICATIONS AND/OR FILLERS TO EXISTING DOORS AND FRAMES AS NECESSARY TO ACCEPT NEW SPECIFIED HARDWARE. SUBMIT FOR APPROVAL, A DETAILED LIST OF REQUIRED MODIFICATIONS PRIOR TO PERFORMING.

Hardware Group No. 15

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	MANUAL FLUSH BOLT	FB358/FB458 (AS REQ'D)	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	INSTITUTION LOCK	L9082L M52A	626	SCH
2	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ *ACTIVE LEAF ONLY	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER
2	EA	DOOR CONTACT	7766	628	SCE

REUSE BALANCE OF DOOR, FRAME AND HARDWARE

DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

Hardware Group No. 16

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB358/FB458 (AS REQ'D)	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080L M52A	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
2	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ *ACTIVE LEAF ONLY	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS	630	IVE
1	EA	OVERLAPPING ASTRAGAL	BY DOOR/FRAME MANUFACTURER		B/O
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 17

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU M52A RX	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY UNLOCKS OUTSIDE LEVER ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.

Hardware Group No. 18

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU M52A RX	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY UNLOCKS OUTSIDE LEVER ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.

Hardware Group No. 19

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU M52A RX	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY UNLOCKS OUTSIDE LEVER ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.

Hardware Group No. 20

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU MORTISE LOCK	L9092LEU M52A RX	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG ST-1630	689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY UNLOCKS OUTSIDE LEVER ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.

Hardware Group No. 21

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	LD-99-L-M52	626	VON
1	EA		RIM CYLINDER AS REQ'D	626	MED
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 22

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	LD-99-L-M52	626	VON
1	EA		RIM CYLINDER AS REQ'D	626	MED
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 23

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	PANIC HARDWARE	LD-99-EO	626	VON
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A	A	ZER
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE

DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

DOORS REQUIRE SPECIAL 3/8 INCH UNDERCUT FOR ADA TYPE THRESHOLD.

Hardware Group No. 24

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	99-EO-996	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER
1	EA	DOOR CONTACT	7766	628	SCE

REUSE BALANCE OF DOOR, FRAME AND HARDWARE

VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES. PROVIDE FIELD MODIFICATIONS AND/OR FILLERS TO EXISTING DOORS AND FRAMES AS NECESSARY TO ACCEPT NEW SPECIFIED HARDWARE. SUBMIT FOR APPROVAL, A DETAILED LIST OF REQUIRED MODIFICATIONS PRIOR TO PERFORMING.

DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

Hardware Group No. 25

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-99-EO-ALK 9-VOLT BATTERY WITH HARDWIRED OPTION	626	VON
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61	689	LCN
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A	A	ZER
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

PERIMETER WEATHER SEALS PROVIDED BY ALUMINUM SECTION.

DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

WHEN TOUCHBAR OF EXIT DEVICE IS DEPRESSED, AN INTERNAL HORN SOUNDS INDICATING UNAUTHORIZED USE OF THE OPENING. ALARM CAN BE ARMED OR DISARMED BY KEYED CYLINDER.

Hardware Group No. 26

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	DOOR CORD	788-18 LESS WIRES	626	SCE
1	EA	ELEC PANIC HARDWARE	RX-99-EO-ALK 9-VOLT BATTERY WITH HARDWIRED OPTION	626	VON
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER
1	EA	DOOR CONTACT	7766	628	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE

VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES. PROVIDE FIELD MODIFICATIONS AND/OR FILLERS TO EXISTING DOORS AND FRAMES AS NECESSARY TO ACCEPT NEW SPECIFIED HARDWARE. SUBMIT FOR APPROVAL, A DETAILED LIST OF REQUIRED MODIFICATIONS PRIOR TO PERFORMING.

DOOR POSITION SWITCHES ARE FOR USE BY ACCESS CONTROL CONTRACTOR.

WHEN TOUCHBAR OF EXIT DEVICE IS DEPRESSED, AN INTERNAL HORN SOUNDS INDICATING UNAUTHORIZED USE OF THE OPENING. ALARM CAN BE ARMED OR DISARMED BY KEYED CYLINDER.

Hardware Group No. 27

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-98-L-M996-M52-FS-WH	630	VON
1	EA		RIM CYLINDER AS REQ'D	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61	689	LCN
1	EA	RAIN DRIP	141AA	AA	ZER
			*MOUNT ABOVE AUTO DR. BTM		
1	EA	DOOR BOTTOM	365AA	AA	ZER
1	EA	THRESHOLD	655A	A	ZER
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS	BLK	SCE
			CONTROL PROVIDER		
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	SCE

PERIMETER WEATHER SEALS PROVIDED BY ALUMINUM SECTION.

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY UNLOCKS OUTSIDE LEVER, ALLOWING ACCESS. OUTSIDE LEVER ALSO CAPABLE OF BEING ELECTRONICALLY UNLOCKED (I.E. PUSH/PULL MODE) AS DESIGNATED BY ACCESS CONTROL SYSTEM SCHEDULE. FREE EGRESS AT ALL TIMES.

Hardware Group No. 28

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-99-L-BE-F-M52-ALK	626	VON
1	EA	CYLINDER	AS REQUIRED	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS	BLK	SCE
			CONTROL PROVIDER		
1	EA	POWER SUPPLY	PS902	LGR	SCE

WHEN TOUCHBAR OF EXIT DEVICE IS DEPRESSED, AN INTERNAL HORN SOUNDS INDICATING UNAUTHORIZED USE OF THE OPENING. ALARM CAN BE ARMED OR DISARMED BY KEYED CYLINDER.

PRESENTING VALID CREDENTIAL TO READER MOMENTARILY DISABLES ALARM.

Hardware Group No. 29

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-99-NL 24 VDC	626	VON
1	EA		RIM CYLINDER AS REQ'D	626	MED
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A	A	ZER
1	EA	MULTITECH READER	MTB11/MTB15 - BY ACCESS CONTROL PROVIDER	BLK	SCE
1	EA	DOOR CONTACT	679 SERIES	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING VALID CREDENTIAL TO READER MOMENTARILY RETRACTS PANIC DEVICE LATCH ALLOWING ENTRY. FREE EGRESS AT ALL TIMES.

DOORS REQUIRE SPECIAL 3/8 INCH UNDERCUT FOR ADA TYPE THRESHOLD.

Hardware Group No. 30

Provide each BD door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SLIDING DOOR	EXAMSLIDE SYSTEM, SECTION 08 34 00		ADS
1	EA	Office Deadbolt	AD5450-L-L03	630	ADS
1	EA	Door Pulls	PULLS ONLY-16" BTB LADDER PULLS	630	ADS
1	EA	CYLINDER	AS REQUIRED	626	MED

BACK TO BACK LADDER PULLS WITH DEADBOLT LOCKING (PULL BY AD SYSTEMS)

Hardware Group No. 31

Provide each SL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR

ALL REQUIRED HARDWARE BY DOOR MANUFACTURER. REFER TO SPECIFICATION SECTION 08....

Hardware Group No. 32

Provide each RU door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR

ALL HARDWARE BY OVERHEAD DOOR MANUFACTURER

Hardware Group No. 33

Provide each SL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR

ALL REQUIRED HARDWARE BY DEMOUNTABLE SLIDING DOOR MANUFACTURER

END OF SECTION

SECTION 08 81 00

GLASS AND GLAZING

PART 1 GENERAL

1.01 SCOPE

- A. Work Included: Provide glass and glazing for all exterior and interior openings as indicated on the drawings and specified herein. Work also includes the following:
 - 1. Etch look decorative film.
 - 2. Interior manufactured extruded aluminum framing system for glass.
 - a. Butt glazed type (glazed channel bottom and top frame).
- B. Work Not Included: Glass and glazing not provided under this Section are as follows:
 - 1. Framed Mirrors: Section 10 28 13.

1.02 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated or specified are minimums and are for detailing purposes only. Confirm glass thickness 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, as a minimum, 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: 30 psf.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 lites set more than 15 degrees off vertical and under wind and snow action.
 - 1) Load Duration: 30 days.
 - d. 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", whichever is less.

- 1) For monolithic glass lites, heat treated to resist wind loads.
- 2) For insulating glass.
- 3) For laminated glass lites.

e. Minimum Glass Thickness for Exterior Lites" ¼".

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° F, ambient; 180° F, material surfaces.

1.04 REFERENCED STANDARDS

A. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.

1. AAMA: American Architectural Manufacturers Association.
2. ANSI: American National Standards Institute.
3. ASTM: American Society for Testing and Materials.
4. GANA: Glass Association of North America.
5. IGMA: Insulated Glass Manufacturers Alliance.
6. NFPA: National Fire Protection Association.
7. IGCC: Insulating Glass Certification Council.

B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations listed below, except where more stringent requirements are indicated herein.

1. Glass Association of North America (GANA) "Glazing Manual."
2. Insulated Glass Manufacturers Alliance (IGMA)
 - a. TM-3000 "Vertical Glazing Guidelines"
 - b. TB-3001 "Sloped Glazing Guidelines".
3. American Architectural Manufacturers Association (AAMA)
 - a. TIR-A7 "Sloped Glazing Guidelines"
 - b. GDSG-1 "Glass Design for Sloped Glazing".

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this project.

B. Fire-Rated Door Assemblies: Provide 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.

- C. Safety Glass Standards: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Each lite shall bear permanent, non-removable label manufacturers designation of safety glazing standard for which it complies.
- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or on at least one component lite of unit with appropriate certification label of Insulating Glass Certification Council (IGCC).
- E. Allowable Tolerances: Thicknesses of glass specified are nominal; provide glass manufactured to tolerances listed in GANA Manual.
 - 1. Interior Glass Partition Thickness: Provide recommended minimum thickness for fully tempered glass used in fixed interior panels mounted or restrained at top and bottom or fully captured systems as required.
- F. Fire- Rated Glass: Each lite shall bear permanent, non-removable label of UL certifying it for use in tested and rated fire protective assemblies.

1.05 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of glass, glazing sealants and accessories required.
 - 1. Indicate structural, physical and environmental characteristics, size limitations, special handling requirements, etc.
- B. Submit insulating glass manufacturer's certification indicating units meet or exceed specified requirements.
- C. Submit laminated glass manufacturer's certification indicating units meet or exceed specified requirements.
- D. Shop Drawings: Required data for shop drawings on glazing may be incorporated with shop drawings for framing members. Show thicknesses of glass; proposed "bites" in frames, sizes and locations of blocks, clips, beads, stops edge treatments; note quality, type and strength of each lite.
- E. Samples: Submit and obtain approval of samples before proceeding with glass fabrication. Minimum two 12" x 12" samples of each glass type required, except clear monolithic glass. Submit color samples of exposed sealants and/or gaskets.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle glazing materials in accordance with manufacturer's recommendations to prevent damage and deterioration.
- B. Various items to receive glazing as specified elsewhere may be factory-glazed or

site-glazed at Contractor's option.

- C. Deliver glazing compounds and sealants in manufacturer's unopened labeled containers.
- D. Deliver glass with manufacturer's labels intact. Do not remove labels until glass has been installed.

1.07 PROJECT CONDITIONS

- A. Field verify measurements and conditions of installations.
- B. Examine all details. Provide proper fitting for details indicated.
- C. Do not perform work under adverse weather or job site conditions. Install liquid sealants when temperatures are within lower or middle third of temperature range recommendations by manufacturer.
- D. Protect work from damage during and after installation until project acceptance.

1.08 WARRANTY

- A. Contractor to guarantee work under this Section against defects of materials, fabrication and installation. Guarantee period is one year, except where specified otherwise. Defects include, but are not necessarily limited to:
 - 1. Weather tightness: Two (2) year warranty.
- B. Insulating Glass: Submit manufacturer's written warranty that for ten (10) years from date of substantial completion, a replacement will be provided (furnished and installed) for any unit which develops edge separation, thermal stress cracks, or other defects which materially obstruct vision through the glass or affect thermal and physical integrity of insulating glass units, except warranty shall not cover glass breakage from other than natural causes. Defective units shall be replaced at no additional cost to the Owner.
- C. Coated Glass: Submit manufacturer's written warranty that for five (5) years from date of substantial completion, a replacement will be provided for defective units. Defects are defined as peeling, cracking or deterioration in coating due to normal conditions and not due to handling or installation contrary to glass manufacturer's published instructions. Defective units shall be replaced at no additional cost to the Owner.
- D. Laminated Glass: Submit manufacturer's written warranty that for five (5) years from date of substantial completion a replacement will be provided for laminated glass having manufacturing defects which result in edge separation or other defects which materially obstruct vision through the glass. Defective units shall be replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturers and Fabricators: Specifications herein are based on glass and materials manufactured or fabricated by the following companies. Not all firms listed manufacture or fabricate all the items specified herein. However, to ensure consistent quality of appearance and performance, provide each type or kind of glass or material from a single source. Manufacturers for specialty products are listed within the specification to establish a particular type, color, pattern, etc. Equal products by the manufacturers listed are acceptable providing they meet the type, color, pattern, etc. as approved by the Architect.

1. Manufacturers
 - a. AGC FLOAT GLASS NORTH AMERICA
 - b. VITRO
 - c. GUARDIAN INDUSTRIES
 - d. SAINT GOBAIN
2. Fabricators
 - a. VIRACON
 - b. OLDCASTLE BUILDINGENVELOPE
 - c. ARCH ALUMINUM & GLASS LLC
 - d. TRULITE GLASS AND ALUMINUM

2.02 PRIMARY FLOAT GLASS

- A. Conformance: Type I, Class 1 for clear glass, Quality q³, conforming to ASTM C1036.
- B. Thickness: 1/4", unless otherwise indicated.
- C. Color: Clear.
1. When used in insulating units, provide color specified under each insulating unit.

2.03 HEAT TREATED FLOAT GLASS

- A. Conformance: Condition A, Kind FT Type I, Class 1 for clear glass, conforming to ASTM C1048.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
 3. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C 1048.

- B. Thickness: 1/4", unless otherwise indicated.
- C. Color: Clear.
 - 1. When used in insulating units, provide color specified under each insulating unit.
- D. Locations: Safety glazing locations as designated and required by applicable code(s) and where indicated.

2.04 COATED FLOAT GLASS

- A. General: Provide coated glass complying with this article and in schedules at the end of Part 3.
- B. Low E, Sputter Coated Float Glass: Float glass with metallic-oxide or metallic nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules at end of Part 3.
- C. Coated Spandrel Float Glass:
 - 1. General: Heat treated with ceramic frit color coating fused to inside surface.
 - 2. Conformance: Condition B, Kind FT, Type I, Class 1, conforming to ASTM C1048.
 - 3. Thickness: 1/4", unless otherwise indicated.
 - 4. Color: As selected by Architect.

2.05 WIRE GLASS

- A. Wire Glass: USE PROHIBITED.

2.06 LAMINATED GLASS

- A. Conformance: Kind LHS conforming to ASTM C1172 "Laminated Architectural Flat Glass" and ANSI Z97.1.
- B. Interlayer: As indicated below; clear or in colors/patterns indicated; with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation. Provide interlayer type as recommended by manufacturer for application intended (safety, decorative, security, structural or acoustical).
 - 1. Manufacturer: KURARAY Trosifol or approved equal.
- D. Laminating Process: Fabricate to produce glass free of foreign substances and air or glass pockets as follows:

1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.07 INSULATING GLASS

- A. Sealed Insulating Glass: General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E2190 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.
 1. For properties of individual glass making up units, refer to requirements specified in schedule at the end of Part 3 as applicable to types, kinds, classes and conditions.
 2. 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 to comply with glass design requirements. Provide Kind FT (fully tempered) where safety glass is indicated or required.
- B. Warm Edge Spacer Construction: Combination of stainless steel and polypropylene. Double sealed with a primary seal of polyisobutylene and a secondary seal of silicone. Delete low-E coating prior to fabrication of insulating units according to coated glass manufacturer's instructions.
 1. Spacer to be black; clear aluminum color not permitted.

2.08 MISCELLANEOUS GLASS TYPES

- A. Fire-Rated Glass
 1. 20 Minute - For use in 20 minute rated doors only. Superlite I manufactured by SAFTI FIRST, PyroEdge-20 by AGC GLASS COMPANY, SGG Pyroswiss US by VETROTECH SAINT GOBAIN or Fireglass 20 by TECHNICAL GLASS PRODUCTS. 1/4" thick tempered glass with a 20 minute fire-rating.
 2. 45 Minute - For use in 45 minute door and window applications. Superlite II-XL manufactured by SAFTI FIRST, Pyrobel by AGC GLASS COMPANY, SGG Swissflam-45 by VETROTECH SAINT GOBAIN or Pyrostop by PILKINGTON. 3/4" thick unit comprised of inboard and outboard tempered lites protecting a fire resistive interlayer.
 3. 60 or 90 minute Doors - For use in 60 or 90 minute door applications, must comply with CPSC Category I and limited to 100 square inches in size. Superlite X-90 manufactured by SAFTI FIRST, Pyran Platinum L by SCHOTT, SGG Keralite FR-L by VETROTECH SAINT GOBAIN or Firelite Plus by TECHNICAL GLASS PRODUCTS. 3/4" thick safety rated glass.
 4. All fire-rated glazing to have Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, name of manufacturer, testing laboratory, fire rating period, and safety glazing standards.

2.09 GLAZING MATERIALS AND ACCESSORIES

A. Glazing Sealants and Compounds:

1. Comply with manufacturer's recommendations for selection of hardness. Select materials and variations or modifications for compatibility with surfaces contacted in the installation.
2. Exterior Glazing: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - a. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920 Class A, Type S, Grade NS, Class 100/50, Use NT; for high movement joints at metal-to metal and glass to metal.
 - 1) Dow Corning Corporation; 790
 - 2) GE Advanced Materials - Silicones; SilPruf LM SCS2700
 - 3) Pecora Corporation; 890
 - 4) Tremco Incorporated; Spectrem 1
 - b. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT; for general applications in glazing installation subject to high movement including perimeter; use non-staining formula at absorbent perimeter applications
 - 1) DOW CORNING CORPORATION; 795 or 756 SMS
 - 2) GE ADVANCED MATERIALS -SILICONES; SilPruf NB SCS9000 or SilPruf SCS2000
 - 3) PECORA CORPORATION; 864
 - 4) TREMCO INCORPORATED; Spectrem 2
 - c. Glazing Sealant: One-part neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT; for general applications in glazing installation including perimeter; use non-staining formula at absorbent perimeter applications.
 - 1) DOW CORNING CORPORATION; 791
 - 2) GE ADVANCED MATERIALS-SILICONES; UltraGlaze SSG4000 or UltraGlaze SSG4000AC
 - 3) TREMCO INCORPORATED; Proglaze SSG or Tremsil 600
 - d. Structural Glazing Sealant: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in glazing assembly indicated.
 - 1) DOW CORNING CORPORATION; 995.
 - 2) GE ADVANCED MATERIALS -SILICONES; UltraGlaze SSG4000.
 - 3) PECORA CORPORATION; 896.
 - 4) TREMCO INCORPORATED; Proglaze SG.

3. Interior Glazing: Compound of polymerized butyl rubber and inert fillers, with or without polyisobutylene modification, solvent based, 95% solids, formed and coiled on release paper, tack-free in 24 hours, paintable, non-staining.

B. Miscellaneous Glazing Materials

1. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
2. Setting Blocks: Neoprene or EPDM, 80-90 durometer hardness, with proven compatibility with sealants used.
3. Spacers: EPDM, 40-50 durometer hardness with proven compatibility with sealants used.
4. Compressible Filler (Rod): Closed cell or waterproof jacketed rod stock of synthetic rubber or plastic form, compatible space with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

C. Glazing Film: Translucent, dimensionally stable, cast PVC film, 2-mil- minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing. Ensure components and materials are compatible with specified accessories and adjacent materials

1. Manufacturer: Fasara Interior Design Film manufactured by 3M ENERGY CONTROL PRODUCTS or equal by VISTA FILMS, CP FILMS, EASTMAN PERFORMANCE FILMS - SOLUTIA or DECORATIVE FILM, LLC.
2. Adhesive: Clear, pressure sensitive, permanent adhesive.
3. Provide die-cut pattern, graphic or letters that complies with requirements indicated.

2.10 FABRICATION

A. General: Fabricate glass and other glazing products in sizes required to glaze openings indicated, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

1. Glass Thickness: Design analyze and comply with published recommendations of glass product manufacturers and organizations listed herein.

B. Glass Cutting: Cut glass to accurate sizes and shapes as indicated on drawings. Allow edge clearances and tolerances in accordance with GANA recommendations.

1. Edges: Provide factory-cutting and factory-formed edges for all butt-glazed, heat tempered and insulating glass. Provide ground edges for all drilled holes, notches and other fabrication or finishing techniques.
2. Butt-Glazed Systems: All work in accordance with manufacturer's recommendations.

- a. Edges Exposed to Air: Polished finish.
- b. Edges Receiving Sealant: "Suede" finish.
- c. Concealed Edges: Factory option.

C. Heat Strengthened and Tempered Glass

- 1. Heat Strengthened: Heat treated to strengthen glass in bending to not less than 2.0 times annealed strength for the strengthened glass.
- 2. Tempered: Heat treated to strengthen glass in bending to not less than 4 to 5 times annealed glass strength for the strengthened glass.
- 3. Cut glass to required size before tempering. Comply with Glass Tempering Association recommendations.
- 4. Provide tongless tempered glass. When size limitations require tong edges, support each piece during tempering process so that tong marks will be concealed in the glazed system.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, substructure and installation conditions. Do not proceed with glazing work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PROTECTION AND PREPARATION

- A. Protect glass from edge damage during handling and installation. Remove and legally dispose damaged glass off of the project site. Damaged glass is defined as glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and/or appearance.
- B. Do not cut, seam, nip or abrade tempered glass.
- C. Inspect each piece of glass immediately before installation and eliminate any which have observable edge damage or face imperfections.
- D. Unify appearance of each series of lights by setting each piece to match other pieces, as nearly as possible. Inspect each piece and set with pattern, draw, and bow oriented in same direction as other pieces.
- E. Clean glazing channels and other framing members to receive glass immediately before glazing. Remove loose coatings. Apply primer to joint surfaces receiving sealants when recommended by sealant manufacturer.

3.03 INSTALLATION - GENERAL

- A. Comply with combined recommendations and technical reports of manufacturer's

of glass and glazing materials used with GANA "Glazing Manual", except when more stringent requirements are indicated.

- B. Install insulating units to comply with recommendations by IGMA, except as otherwise specifically indicated or recommended by glass and sealant manufacturers.
- C. Glazing channel dimensions shown are intended to provide for necessary bite on glass, minimum edge clearance and adequate sealant thickness, with reasonable tolerance. Adjust as required by job conditions at time of installation.
- D. Install setting blocks in sill rabbets, properly sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Install primers, sealants, tapes, and gaskets in accordance with manufacturer's recommendations. Set glass without springing and install securely to prevent rattling or breakage.
- F. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proved adhesives, including embedment of gasket tail in cured heel bead.
 - 1. Miter cut and bond gasket ends together at corners where gaskets will not pull away from corners and result in voids or leaks in the glazing system.
- G. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.
- H. Coordinate aluminum framing systems work with other work for proper sequence of construction. Verify dimensions of supporting structure and other elements which precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.
- I. Glazing Film: Apply in accordance with film manufacturers written instructions for adhesive set application. Apply uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in pattern indicated on Drawings to the back face of clean glass, according to manufacturer's written instructions, including surface preparation and application temperature limitations

3.04 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 edge-to-edge, but not necessarily in one continuous length. Do not stretch tapes to make them fit openings.
- 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. 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.

3.05 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 gaskets 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.

3.06 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 sealant to provide a substantial wash away from glass.

3.07 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation by attachment of streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass. Remove non-permanent labels and clean surfaces.
- B. Maintain glass in a reasonable clean condition during construction so that it will not be damaged by corrosive action, and will not contribute (by wash off) to the deterioration of glazing materials and other work. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- C. Wash and polish on both faces not more than four days before acceptance of the work. Comply with glass manufacturer's recommendations for final cleaning.

3.08 GLAZING SCHEDULE

- A. Basis of Design Products: Glass types and products below are based VIRACON.
 - 1. Other Acceptable Manufacturers: Equal products by other manufacturers listed in Part 2 herein are acceptable providing they meet or exceed the performance requirements specified herein and conform to the design intent as determined by the Architect:
- B. Insulating Glass – IG20 Clear Vision
 - 1. 1" Overall Thickness Insulating Coated Glass
 - a. Exterior Glass Ply: 1/4" Pure Mid Iron HS or FT
 - b. Coating: VE-2M Coating on #2 Surface
 - c. Airspace: 1/2" black warm edge argon gas
 - d. Interior Glass Ply: 1/4" Clear HS of FT
 - 2. Performance Requirements
 - a. Visible Light Transmittance: 72%
 - b. Solar Energy Transmittance: 35%
 - c. U-V Transmittance: 12%
 - d. Visible Light Reflectance Exterior: 11%
 - e. Visible Light Reflectance Interior: 12%
 - f. Solar Energy reflectance: 37%
 - g. Winter Nighttime U-Value: .25
 - h. Summer Daytime U-Value: .21
 - i. Shading Coefficient: .46
 - j. Solar Heat Gain Coefficient: .40
- C. Insulating Glass – IG-21 – Full Patterned Vision (100%)
 - 1. 1" Overall Thickness Insulating Coated Glass
 - a. Exterior Glass Ply: 1/4" Pure Mid Iron HS or FT

- b. Silk-screen white graduated pattern per architects pattern #2 surface
 - c. Coating: VE-2M Coating on #2 Surface
 - d. Airspace: 1/2" black warm edge argon gas
 - e. Interior Glass Ply: 1/4" Clear HS of FT
 - 2. Performance Requirements
 - a. Visible Light Transmittance: TBD%
 - b. Solar Energy Transmittance: TBD%
 - c. U-V Transmittance: TBD%
 - d. Visible Light Reflectance Exterior: TBD%
 - e. Visible Light Reflectance Interior: TBD%
 - f. Solar Energy reflectance: TBD%
 - g. Winter Nighttime U-Value: .25
 - h. Summer Daytime U-Value: .21
 - i. Shading Coefficient: .TBD
 - j. Solar Heat Gain Coefficient: .TBD
- D. Insulating Glass – IG-22 – Custom Gradient Patterned Vision (100% to 0%)
 - 1. 1" Overall Thickness Insulating Coated Glass
 - a. Exterior Glass Ply: 1/4" Pure Mid Iron HS or FT
 - b. Silk-screen white graduated pattern per architects pattern #2 surface
 - c. Coating: VE-2M Coating on #2 Surface
 - d. Airspace: 1/2" black warm edge argon gas
 - e. Interior Glass Ply: 1/4" Clear HS of FT
 - 2. Performance Requirements
 - a. Visible Light Transmittance: TBD%
 - b. Solar Energy Transmittance: TBD%
 - c. U-V Transmittance: TBD%
 - d. Visible Light Reflectance Exterior: TBD%
 - e. Visible Light Reflectance Interior: TBD%
 - f. Solar Energy reflectance: TBD%
 - g. Winter Nighttime U-Value: .25
 - h. Summer Daytime U-Value: .21
 - i. Shading Coefficient: .TBD
 - j. Solar Heat Gain Coefficient: .TBD

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 SCOPE

- A. Provide gypsum board systems consisting of wall board and framing as indicated and specified. Work includes:
1. Gypsum board and light gage framing wall systems.
 2. Suspended gypsum board ceilings and soffits including suspension framing system.
 3. Fire-rated gypsum board construction where indicated.
 4. Shaft wall assemblies
 5. Exterior soffits and ceilings.
 6. Edge trim, corner beads, control joints, accent reveals, fasteners, joint treatment materials and other accessories required for a complete installation.
 7. Includes installation of acoustical insulation specified
 8. Installation of metal access doors, including those provided by Plumbing and HVAC Contractors. See Section 08 31 13 and Divisions 22 and 23.

1.02 RELATED SECTIONS

- A. Tile Backer Board: Section 09 30 00.
- B. Cold-Formed Metal Framing: Section 05 40 00.
- C. Sealant: Section 07 92 00.
- D. Firestopping: Section 07 84 00.
- E. Expansion Joint Cover Assemblies: Section 07 95 13.
- F. Wood Blocking: Section 06 10 50.

1.03 QUALITY ASSURANCE

- A. Gypsum Board Systems: Comply with ASTM C840 "Application and Finishing of Gypsum Board", and as specified.
- B. Metal Framing System: Comply with ASTM C754 "Installation of Steel Framing Members to Receive Screw Attached Gypsum", and as specified.

1. Performance Requirements: Design framing systems in accordance with AISI S220
 2. Horizontal Deflection: For wall assemblies, limited to L/240 with 5 psf lateral loading of the wall.
- C. Reference Standards: Wherever the following abbreviations are used herein they shall refer to the corresponding standard:
1. ASTM: American Society for Testing and Materials.
 2. GA: Gypsum Association.
 3. AISI: American Iron and Steel Institute
- D. Fire-Rated Construction: Comply with fire resistance ratings indicated on drawings and as required by governing authorities and codes. Provide materials, accessories and application procedures that have been listed by Underwriters Laboratories or tested in accordance with ASTM E119 for the type of construction shown.
1. Electrical Boxes: Comply with IBC Section 712.3.2 for outlet box separation.
- E. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- F. Guarantee: Submit written guarantee stating that cracks, delaminations or other imperfections in the drywall work which may develop within a period of 2 years from date of acceptance will be repaired at no cost to the Owner.
- F. Job Mock-Up:
1. Prior to start of gypsum board systems, a project mock-up is to be prepared. A designated room is to receive, light gage framing, fire rated construction, acoustical treatments and related materials including resilient furring, wall board joint and screw taping and spackling, sanding and surface preparation. Job mock-up must demonstrate compliance with fire rating and acoustical assemblies required and be acceptable to Architect before beginning gypsum board finishing operations. Retain and maintain mock-up throughout remainder of project as a minimum workmanship standard. Gypsum board finishing quality must meet or exceed the quality of job mock-up.
- H. Pre-Installation Conference: Conduct a pre-installation conference at Project site to review manufacturer's recommendations and referenced requirements for locating control joints in gypsum board walls and ceilings a minimum of one (1) week prior to beginning this portion of the Work. Have manufacturer's representative, contractor's representative and Architect present at this meeting.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each gypsum board system component.
- B. Submit manufacturer's certification that fire-rated assemblies proposed meet project requirements, including evidence of approved test reports acceptable to governing building code enforcing authorities, that assemblies when installed with proposed materials, will meet or exceed fire ratings required.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association (SFIA) or be a part of a similar organization that provides verifiable code compliance program.
- D. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies
 - a. Equivalent Framing: Comply with applicable ASTM C 645 allowing provision that allows framing members that do not meet the minimum base-steel thickness and sectional or section properties if they are certified according to ICC-ES AC86 by third-party testing and conform to the limiting-height tables in ASTM C 754. Provide manufacturers of embossed framing members make copies of third-party certification report

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened labeled containers.
- B. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling and deterioration. Protect cold-formed metal framing from corrosion, deformation and other damage during delivery, storage and handling per requirements of AISI's "Code of Standard Practice".
- C. Protect adjoining surfaces against damage and soiling.

1.06 JOB CONDITIONS

- A. Coordinate installation sequencing with work of other trades.
 - 1. Verify completion of other work, including that of other trades, which will be concealed by gypsum drywall construction before installation of wallboard.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Board: U.S. GYPSUM CO.; CERTAINTEED CORP.; GEORGIA-PACIFIC CORP.; NATIONAL GYPSUM COMPANY; CONTINENTAL BUILDING PRODUCTS.
- B. Studs, Framing and Furring: CLARK DIETRICH BUILDING SYSTEMS; MARINO/WARE; STATE BUILDING PRODUCTS.
- C. Others as listed for specific products.

2.02 STEEL FRAMING SYSTEMS

- A. Type: Screw type "C" shape, roll formed sheet steel members conforming to requirements of ASTM C645 and AISI S220.
 - 1. Material: ASTM A653 steel with minimum yield strength of 33 ksi.
 - 2. Finish: Hot-dip galvanized coating, complying with AISI S220; ASTM A653 G40 (Z120), or coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120). Galvannealed products are not acceptable.
 - a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authorities having jurisdiction.
 - b. Provide G90 at natatorium areas as applicable.
 - 3. Gage and Width – 3-5/8" to 6" Studs
 - a. 25 gage x 3-5/8": Up to and including 14'-6" high.
 - b. 20 gage x 3-5/8"
 - 1) Over 14'-6" up to and including 16'-5" high
 - 2) At wall mounted cabinet and countertop locations
 - 3) At walls receiving ceramic tile
 - c. 20 gage x 4": Over 16'-5" up to and including 17'-6" high
 - d. 20 gage x 6": Over 17'-6" up to and including 24'-0".
 - e. 16 gage at door jambs, heavy equipment locations, and interior partitions receiving masonry veneer.
 - f. Provide other gages or widths as indicated on drawings.
 - 4. Gage and Width – 1-5/8" to 2-1/2" Studs
 - a. 25 gage x 1-5/8": Maximum height 8'-4"
 - b. 20 gage x 1-5/8": Maximum height 9'-8"
 - c. 25 gage x 2-1/2": Maximum height 11'-3"
 - a. 20 gage x 2-1/2": Maximum height 12'-10"
 - 5. Flange Width: Nominal 1-1/4".
- B. Runners and Tracks: Designed and sized to receive studs. Thickness to match studs except deflection tracks. All thicknesses are minimum bare metal.

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; 0.0296" thickness and in width to accommodate depth of studs. Provide one of the following:
 - a. 0.0296" top track with 2" minimum legs and 0.0329" Spazzer 9200 Stud Spacer Bar by CLARK DIETRICH BUILDING SYSTEMS
 - b. Slip Track (Slp Trk) by BRADY CONSTRUCTION INOVATIONS
 - c. The System by METAL-LITE
 - d. The Three Legged Dog by FLEX-ABILITY CONCEPTS.
 - e. A double slip track, 0.0296", can be used in lieu of the proprietary deflection tracks specified above. Legs of tracks shall be minimum 2".
 2. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; 0.0296" thickness and in width to accommodate depth of studs. Use only firestop top track seal product that has been UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, space requirements and fire-rating required for each application. Provide one of the following:
 - a. Fire Trak System by FIRE TRAK CORPORATION.
 - b. BlazeFrame DSL or MaxTrak by CLARKDIETRICH BUILDING SYSTEMS
 - c. The system by METAL-LITE INC.
 - d. CFS-TTS "Firestop Top Track Seal" by HILTI, INC.
- C. Backing Plates (Blocking): Steel sheet for blocking; width to fit framing spacing; height to be 6" unless otherwise indicated.
1. Base steel Thickness: Minimum 0.0296".
- E. Shaftwall Framing
1. Provide "C-H" or "CT" studs, "E" studs and "J" runners of sizes required for indicated heights and fire ratings.
 - a. Unless otherwise shown, provide 4" deep studs, 0.0219" up to 13'-0" high, 0.0329" up to 14'-6" high.
 - b. J-Runner at elevator entrances to be not less than 0.0329" with long leg 3" wide.
 2. Track/runners to be of same thickness as studs except minimum thickness gage to be 0.0329".
 3. Roll-formed sheet steel members conforming to requirements of ASTM C645, minimum yield strength 33 ksi except C-H or CT studs. Finish coating to be hot-dipped galvanized conforming to minimum, G40 coating.

2.03 CEILING/SOFFIT SUSPENSION SYSTEM

- A. Provide the following materials unless otherwise indicated on the drawings. Metals used in exterior or areas subjected to moisture to be hot-dipped galvanized in accordance with ASTM A653 G40.
 1. Main Runners: Cold-rolled steel channels; not less than 0.0538"; G90 galvanized finish for exterior and moist areas, black asphaltum painted for other areas. Spacing as required, but not to exceed 48" o.c.
 - a. 1-1/2" deep where structural support framing is at 48" o.c. or less.
 - b. 2" deep where structural support framing is over 48" and less than 66" o.c.
 2. Cross Furring
 - a. Cold-rolled steel channels, not less than 0.0538"; 3/4" size; same finish as main runners.
 - b. Hat shape, 7/8" deep, 0.0179". AISI S220 and ASTM A653 G40 hot-dipped galvanized.
 - c. 2-1/2" x 0.0296", G40 galvanized steel studs. Provide for multiple layer applications. Provide 12" long nested studs at suspension points.
 3. Wire: Stainless steel 304 alloy for exterior conditions; galvanized soft annealed steel wire for interior conditions. Galvanized coating to meet or exceed ASTM A 641.
 - a. Tie Wire: Minimum 16-gage.
 - b. Hanger Wire: Minimum 8-gage.
- B. Optional Framing: At contractor's option, proprietary furring system may be used in lieu of black iron system for dry interior conditions.
 1. Description: Direct hung system consisting of interlocking main beams and cross-furring members and hanger wires, designed and manufactured specifically for suspending gypsum board ceiling.
 - a. ASTM C645.
 - b. Electrogalvanized, cold-rolled steel, 0.020" thick.
 - c. Double web members; 1-1/2" high with 1-3/8" capped face.
 2. Manufacturer: 640 System by CHICAGO METALLIC CORP.; Drywall Suspension System by USG, WORTHINGTON STEEL COMPANY, Watercheck CONTINENTAL BUILDING PRODUCTS, Furring Systems/Drywall by ARMSTRONG.
 3. Reference: ASTM C635, heavy duty.

2.04 METAL FURRING

- A. Material
 1. Steel Sheet Components: Comply with AISI S220 requirements for metal, unless otherwise indicated.
 2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653, G40, hot-dip galvanized, unless otherwise indicated.

- B. Rigid Furring Channels: Hat-shaped; minimum 0.022 inch uncoated metal thickness; 7/8" deep, unless otherwise indicated.
- C. Resilient Furring Channels: Minimum 0.0188" uncoated metal thickness; 1/2" deep; asymmetrical or hat-shaped members designed to reduce sound transmission.

2.05 INTERIOR GYPSUM BOARD

- A. General: Comply with ASTM C1396.
- B. Fire Rated Gypsum Wallboard: Type "C" or "X" (special fire retardant) to meet fire ratings for construction shown. Tapered edges. Thickness 5/8" unless otherwise indicated. Use at all locations indicated as meeting a specific fire resistance rating.
 - 1. Provide 5/8", Type X board at all locations not indicated to receive a specific type board.
- C. Moisture and Mold Resistant Gypsum Wallboard
 - 1. ASTM C1396 (Section 5), Type X.
 - 2. Edges: Tapered.
 - 3. Thickness: 5/8 inch, unless otherwise indicated.
 - 4. Acceptable products: Mold Tough and Mold Tough Firecode (Type X) by USG; XP and XP Fire-Shield by NATIONAL; ToughRock and ToughRock Type X by GEORGIA-PACIFIC; Mold Defense and Mold Defense Type X by CONTINENTAL BUILDING PRODUCTS or equal by other gypsum board manufacturers listed in 2.01A.
 - 5. Water Absorption: ASTM C473, the average water absorption for panels is not greater than 5 percent by weight after two-hour immersion.
 - 6. Resistance to Mold Growth: ASTM D3273, "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber," the panel score was 10.
 - 7. Use on non-ceramic tiled walls, ceilings and soffits in toilet rooms, shower rooms and drying rooms; on ceramic tiled non-wet walls in toilet rooms; walls and partitions above ceilings. Maintain ratings where wall is required to be rated.
- D. Mold Resistant Gypsum Shaftliner Board: ASTM C1396, Type X, 1" thick gypsum core with mold resistant core and faces and chamfered edges.
- E. Tile Backer Board: See Section 09 30 00

2.06 EXTERIOR GYPSUM BOARD AND SHEATHING

- A. Exterior Sheathing and Ceiling Board: Use for exterior sheathing and where indicated on drawings. Provide in conformance with ASTM C1177, water repellent treated core and fiberglass face sheets.
 - 1. Thickness: 5/8" thickness unless otherwise indicated.

2. Fire Rating: Type "C" or "X" (special fire retardant) to meet fire ratings for construction shown..
3. Acceptable Products: Dens-Glas by GEORGIA-PACIFIC, GlasRoc by CERTAINTEED, Weather Defense by CONTINENTAL BUILDING PRODUCTS, EXP Sheathing by NATIONAL, or Secure Rock by USG.
4. Roof Parapets and Similar Roof Conditions:
 - a. Where used as roofing substrate, provide high density, water repellent treated core with fiberglass mat and specifically designed for roofing membrane adhesion. Dens-Deck Prime Roof Board by GEORGIA-PACIFIC, USG Gypsum Fiber or equal by other gypsum board manufacturers listed in 2.01A. Coordinate with roofing assembly.

2.07 ACCESSORIES

- A. Fasteners: Drywall screws and metal framing screws per manufacturer's instructions and recommendations for type and size, based on construction and conditions involved.
 1. Steel Drill Screws: ASTM C1002.
 2. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick specified in Section 05 40 00.
- B. Trim: ASTM C1047.
 1. Manufacturers
 - a. Metal: BEADEX MANUFACTURING; CLARK DIETRICH BUILDING SYSTEMS; listed gypsum board manufacturers
 - b. Vinyl: VINYL TECH; VINYL CORP.; TRIM TEX
 2. Corner Beads - Outside, Square Corners: 1-1/4 inch x 1-1/4 inch heavy gauge galvanized steel or vinyl, perforated.
 3. Corner Beads - Outside, Non-square Corners: BEADEX B-1 Splay Flexible Corner or equal. Concealed metal; two galvanized continuous strips laminated with paper trim; for application without mechanical fasteners.
 4. Curved Edge Cornerbead: Notched or flexible edge.
 5. Exposed Edges (Casing Beads): L-bead or LC-bead; exposed long flange receives joint compound. Size to suit wallboard. J-shaped bead that does not receive joint compound is not permitted.
 6. Expansion (Control) Joints: Tape protected 1/4" wide x nominal 7/16" deep control slot.
- C. Interior Joint Treatment Materials: ASTM C475.
 1. Joint Tape. Width to adequately cover joint.
 - a. Interior Gypsum Board: Paper.
 - b. Exterior Gypsum Soffit Board: Paper.
 - c. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

2. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - a. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 1) Use setting-type compound for installing paper-faced metal trim accessories.
 - c. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - d. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - e. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
 3. Joint Compound for Tile Backing Panels:
 - a. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - b. Cementitious Backer Units: Section 09 30 00.
- D. Additional Item: All additional accessories to complete work including nails and anchors to secure frames to walls and floors.
- E. Extruded Corner Trim
1. Material: Extruded aluminum 1 ¼" legs with 7/8" joint receptor.
 2. Basis of Design: FRY REGLET DMCT-1250
 3. Other Manufacturers: Equal products by PITTCO or GORDON]
- G. Acoustic Materials
1. Insulation
 - a. Type: Semi-rigid mineral fiber (glass fiber, slag wool or rock wool) blankets. Conform to ASTM C665, Type I, unfaced .
 - b. Thickness: 3 inch, unless otherwise indicated.
 - c. Manufacturer: Thermafiber by U.S. GYPSUM; JOHNS MANVILLE; OWENS-CORNING FIBERGLAS; CERTAINTED.
 2. Sealant: Nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - a. Manufacturers
 - 1) USG Acoustical Sealant
 - 2) TREMCO Acoustical Sealant
 - 3) PECORA BA-98
 - 4) BASF MasterSeal NP 520
 3. Neoprene impregnated sealant tape.

- 4. Head of Wall Insulation: Pre-manufactured, high-density mineral fiber acoustical insulation shaped to fit the trapezoidal flutes, typical of metal decking and complying with ASTM E119 as safing insulation.
- H. Electrical / Acoustical Box Pads: Moldable Polybutene pads, minimum 1/8 inch thick. 3M Putty Pads, 3M FIRE PROTECTION PRODUCTS or equal.
- J. Adjustable Aluminum Mullion Closures. GORDON Mullion Mate Series 40 or equal by MULL-IT-OVER. Assembly STC to be 56 minimum. Provide end cap and sealant for complete assembly.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide adequate lighting and ventilation during installation and joint finishing treatment.
- 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 fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.02 INSPECTION

- A. Examine substrates and installation conditions. Do not proceed with gypsum wallboard work until unsatisfactory conditions have been corrected.
 - 1. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of wallboard is started.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.03 FRAMING INSTALLATION

- A. Comply with the requirements of ASTM C754 "Installation of Steel Framing Members to Receive Screw Attached Gypsum", and as specified.
- B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except

where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Rated Stud Deflection Assembly: Install in accordance with manufacturer's instructions to provide required fire ratings. Ensure that anchoring devices, back-up material, clip supports and other materials are as used in referenced fire tests.
 3. Securely attach runner to floor with expansion anchors or other approved means.
- C. Install all framing plumb and square with spacing as indicated.
- D. Provide 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 recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Company's "Gypsum Construction Handbook".
- E. Bridging
1. Up to 10 ft. Wall Height: 1 row.
 2. 10 ft. and Over Wall Height: 2 rows of bridging.
- F. Provide a minimum of two (2) screws per connection.
- G. Shaftwall Framing
1. Install "J" runners, "C-H" or "CT" studs, "E" studs and 1" gypsum liner panels in accordance with manufacturer's recommendations and drawings.
 2. Include additional bracing and blocking as required support of recessed or applied items.
 3. Provide all openings in shaftwall in a manner consistent with shaftwall system manufacturer's published details with approval by the Architect and as required to maintain fire rating integrity of assembly.

3.04 GYPSUM BOARD INSTALLATION

- A. Gypsum Board Systems: Comply with ASTM C840.
- B. General
1. Pre-installation Conference: Before start of gypsum board installation, meet at the project site with the Architect and installers of related work, including work requiring openings, chases, frames, access panels, support, similar integrated requirements and mechanical and electrical trades.

Review potential interferences and conflicts and coordinate layout and sequencing requirements for proper installation and integration of the work.

- a. Do not proceed with gypsum board installation until blocking, framing, bracing and other supports for subsequently applied work have been installed, reviewed and accepted by the Architect.
- b. Do not install gypsum board until work concealed by gypsum board has been installed.

C. Application

1. Install gypsum board face side out. Do not install imperfect, damaged or damp boards.
2. Butt boards together for a light contact at edges and ends with not more than 1/16" open space between boards. Do not force into place.
3. Locate either edges or end joints over supports. Position boards so that both tapered edge joints abut. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
4. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts.
5. Floating Construction: Install gypsum board with "floating" internal corner construction, unless isolation of the intersecting board is indicated.
6. In addition to compliance with the standards, comply with specific requirements indicated for each type of arrangement of gypsum wallboard system shown. Space fasteners in accordance with manufacturer's recommendations and complying with referenced standards.
 - a. Walls and Partitions: Apply sheets horizontally or vertically. Provide maximum sheet lengths to minimize end joints with edges or ends over supports. In two layer applications, stagger joints of second layer from joints of first layer.
 - b. Cut and install panels to eliminate vertical joints in corners of door frames to ceiling.
 - c. Make cutouts to fit within wall plate, register and grille flanged. All cutouts made by knife or saw.
 - d. Make angles and corners clean, true, plumb and square; walls plumb, flat and straight and ceilings flat and level.
 - e. Ceilings: Apply gypsum board on ceilings, before application on walls and partitions. Install in direction and manner to minimize end joints. Stagger end joints over supports. In two layer applications, stagger joints of second layer from joints of first layer.

3.05 INSTALLATION OF SOUND RATED PARTITIONS

- A. Provide sound-rated construction where indicated.
- B. Acoustic Insulation: Install single layer of acoustic batt insulation in designated partitions after one side of gypsum board is installed, filling width and height of partition completely. Attach to gypsum board with adhesive spots to prevent subsequent displacement.

- C. Extend partition stud system through acoustical ceilings to substrate. Apply gypsum board base panels full height, both sides of partition.
- D. Seal construction at perimeters, behind control 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 C919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- E. Seal partition perimeters. Provide continuous beads of acoustical sealant at juncture of both faces of runners or plates with floor and ceiling construction and wherever work abuts dissimilar materials. Seal prior to installation of sound attenuation insulation and gypsum board panels.
- F. Provide continuous beads of sealant at juncture of gypsum board and abutting surface. Install gypsum board with 1/8" relief for sealant. Sealants to be contained within depth of gypsum board, not as a fillet.
- G. At openings and cutouts, fill open spaces between edges of gypsum board and fixtures, cabinets, ducts, and other flush or penetrating items, with continuous bead of acoustical sealant.
- H. If sound-rated partitions intersect non-sound-rated partitions, extend sound construction to completely close-off sound flanking paths through non-rated construction. Seal joints between face layers at vertical interior angles of intersecting partitions.
- I. Exercise particular care at walls surrounding toilet areas and walls and ceilings surrounding mechanical spaces to provide properly constructed sound-rated gypsum board partition and ceiling systems.
- J. Verify that electrical boxes are not located back-to-back; back-to back boxes to be offset at least one stud space. Do not close off non-complying conditions before notifying and receiving direction from Architect.

3.06 TRIM AND ACCESSORIES

- A. Install corner beads at external corners of gypsum wallboard and sheathing work. Use longest practical lengths.
- B. Install edge trim wherever edge of gypsum board or sheathing would be exposed or semi-exposed.
 - 1. Provide beaded trim to receive joint compound at all gypsum wallboard work.
 - 2. Provide L-type trim where work is abutted to other work and Kerf-type where work is kerfed to receive kerf leg.

3. Provide U-type trim where edge is exposed, revealed, gasketed or sealant filled, including expansion joints.
- C. Attach to framing with steel drill screws. Clinch attachment to wallboard not acceptable.
- D. Control Joints
1. Install control joints to isolate gypsum board surfaces as recommended by ASTM C840. Verify locations with Architect prior to installation. Generally locate joints as follows when:
 - a. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
 - b. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration.
 - c. Construction changes within the plane of the partition or ceiling.
 - d. Partition or furring run exceeds 30'.
 - e. Ceiling dimensions exceed 50' in either direction with perimeter relief; 30' without relief.
 - f. Exterior ceilings and soffits exceed 20' in either direction; align with window mullions, when applicable.
 - g. Wings of "L", "U", and "T"-shaped ceiling areas are joined.
 - h. Expansion or control joints occur in the base exterior wall.
 - i. Differential Deflection Conditions: All locations where partitions are supported by two or more structural members and subject to differential deflection by live or dead loading:
 - 1) Typical Framing Floor to Structure: Provide "Ceiling Deflection Track".
 - 2) Framing over One Floor (stairs, shafts, etc.): Provide control joints where studs are interrupted by structure.
 - j. Partition terminations at window mullions.
 - 1) Where indicated provide adjustable aluminum mullion closures specified in Part 2.
 - 2) Where not indicated to receive mullion enclosures: Neoprene joint tape and caulking installed under Section 07 92 00. Provide break metal closure at partition end.
 2. Provide framing immediately on both sides of joint and back with 2"+/- gypsum board strips as required to maintain fire resistance rating.

3.07 FINISHING

- A. Comply with manufacturer's instructions for mixing, handling and application of materials. Apply treatment at joints both directions, at flanges of trim accessories, penetrations of gypsum board (electrical boxes, piping and similar work), fastener heads, surface defects and elsewhere indicated. Apply in manner that will result in each of these items being concealed when applied decoration has been completed.
- B. Prefill open joints of more than 1/16" with special chemical-hardening type bedding

compound, before bedding joint tape.

- C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
- D. Do not use topping compound for bedding joint tape.
- E. Apply joint compound for the final coat of joint treatment, unless specifically recommended by the manufacturer for that use.
- F. Walls Above Acoustical Ceiling Systems: Tape and fill joints with two coats of joint compound, sanding not required.
- G. Leave all exposed surfaces smooth and even, ready for painting.
- H. Provide where indicated on the drawings levels of finish as specified in ASTM C840, "Recommended Specification on Levels of Gypsum Board Finish". Levels of finish consist of:
 - 1. Level 1 - **Areas Above Ceilings**: All joints and interior angles shall have tape embedded in joint compound. Provide surface free of excess joint compound. Tool marks and ridges are acceptable.
 - 2. Level 2 – **As a Substrate for Ceramic Tile**: All joints and interior angles to have tape embedded in joint compound and one separate coat of joint compound applied over all joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - 3. Level 4 – **All Areas Not Indicated to Receive Levels 1, 2 or 5**: All joints and interior angles to have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compound shall be smooth and free of tool marks and ridges.
 - 4. Level 5 – **All Areas to Receive Semi-Gloss or Gloss Coatings**: All joints and interior angles to have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. A thin skim coat of joint compound, or a material manufactured especially for this purpose, shall be applied to the entire surface. Excess material is to be removed leaving a film covering over the gypsum board paper surface.

3.08 ADJUST AND CLEAN

- A. Remove any screw which does not engage into a framing member or spins freely.
- B. When paper face is punctured, drive new screw approximately 1-1/2" from defective fastener and remove defective fastener. Fill damaged surface with compound.
- C. Ridging

1. Do not repair ridging until condition has fully developed: approximately 6 months after installation or one heating season.
 2. Sand ridges to reinforcing tape without cutting through tape.
 3. Fill concave areas on both sides of ridge with topping compound.
 4. After fill is dry, blend in topping compound over repaired area.
- D. Fill cracks with compound and finish smooth and flush.
- E. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.09 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

END OF SECTION

SECTION 09 30 00

TILE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Extent of tile work is shown on drawings and schedules, and as specified herein.
- B. Types of tile work required including the following:
 - 1. Porcelain wall tile, floor tile and base.
 - 2. Backer board.
- C. Section also includes:
 - 1. Crack-suppression membrane for thin-set tile installations.
 - 2. Metal edge/transition strips installed as part of tile installations.

1.02 RELATED SECTIONS

- A. Sealant: Section 07 92 00.
- B. Concrete slab preparation: Section 01 73 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Provide tile of each type produced by a single manufacturer. Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- B. Installer: A firm with not less than 5 years experience in installing tile in applications similar to those required for this work.
- C. Ceramic Tile Manufacturing Standard: TCA 137.1. Furnish tile complying with Standard Grade requirements unless indicated otherwise.
- D. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.
- E. Installer to verify locations of all flexible joints required by the provisions of this section, by the recommendations of TCA, and by the recommendations of the related manufacturers. See Article 3.06.
 - 1. Joint locations may or may not be indicated on the drawings.

- F. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

1.04 PERFORMANCE REQUIREMENTS

- A. Dynamic Coefficient of Friction: For tile installed on walkway surfaces subject to traffic while wet, provide products with a dynamic coefficient of friction not less than 0.42 as determined by testing identical products per ANSI A137.1. and A326.3 in each appropriate category.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required. Include certifications and other data to show compliance with these specifications.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples: Submit manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors available, for each type of tile specified. Include samples of grout and accessories requiring color selection. Submit full size sample for each type of trim, accessory and color. Submit samples of metal edge strip.
- D. Certification: Furnish Master Grade Certificate for each type of tile, signed by manufacturer and Installer.

1.06 PRODUCT HANDLING

- A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions.

1.07 JOB CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation in accordance with referenced standards and manufacturer's printed recommendations.

PART 2 PRODUCTS

2.01 CERAMIC TILE

- A. Ceramic Wall Tile, Floor Tile and Base: Standard grade, impervious porcelain ceramic tile conforming to ANSI 137.1. Provide trim pieces as required.

1. Basis of Design: Manufacturer, Styles and Colors: As indicated on the drawings.
2. Other Acceptable Manufacturers: Ceramic tile manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the sizes and colors are an acceptable match as approved by the Architect.

2.02 MORTAR, GROUT AND ACCESSORIES

- A. Source: Setting mortar and grout to be from same manufacturer.
 1. Adhesives, Epoxies, Mortar and Grout Manufacturers: CUSTOM BUILDING PRODUCTS, BOSTIK, MAPEI, LATICRETE, BOSTIC, TEC (H.B. FULLER) and BONSAI AMERICAN.
 - a. Manufacturer's listed under the following applications are for basis of design. Equal products by above listed manufacturers are acceptable.
- B. General - All Adhesives, Epoxies, Mortar and Grout: See Tile Installation Systems in Part 3 of this Section.
- C. Modified Dry Set Cement Mortar - Thin Set: Factory mixed mortar of Portland cement/sand, field gauged with undiluted latex admixture. Conform to ANSI A118.4, Latex-Portland Cement Mortar. Provide type suitable for "medium-set" for tiles with a dimension larger than 15".
 1. Provide one of the following:
 - a. BOSTIK, Durabond D-50 or D-60.
 - b. MAPEI, Keraflex Super.
 - c. CUSTOM BUILDING PRODUCTS, ProLite Tile and Stone Mortar
 - d. LATICRETE, 255 MultiMax.
 2. Thinset Mortar for Glass Tile: Complies with ANSI A118.4 and A118.11.
 - a. BOSTIC Glass-Mate Glass Tile Mortar with Admixture Product 425TM Multi-Purpose Acrylic Latex Admixture.
 - b. CUSTOM BUILDING PRODUCTS, VersaBond Professional Thin Set Mortar
 - c. MAPEI: Adisilex P10 Mosaic & Glass Tile mixed with Keraply Latex additive
 - d. Equal by LATICRETE
- D. Dry-Set Mortar - Thin Set: Mixture of Portland cement with sand and latex, water imparting additive. Conform to ANSI A118.1, Standard Dry-Set Cement Mortar.
 1. May be used in lieu of Modified Dry Set Cement Mortar for ceramic floor and wall tile.
- E. Grout - Ceramic Tile (ANSI A118.7): Integrally colored, sanded (unless otherwise indicated), polymer modified cement type, factory prepared (premixed) grout. Color as selected by Architect.

1. Provide one of the following:
 - a. BOSTIC, Ceramic Tile Grout with BOSTIK 425 Acrylic-Latex Admixture.
 - b. TEC (H.B. FULLER), TEC Power Grout.
 - c. MAPEI, Ultracolor Plus FA.
 - d. LATICRETE, Permacolor Grout.
 - e. CUSTOM BUILDING PRODUCTS, Prism
2. Colors: As selected by Architect.
3. Provide unsanded grout for glass tile and tile joints less than 1/8" wide.

F. Crack Isolation (Anti-Fracture) Membrane: Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, modified-bituminous sheet with fabric reinforcement facing; 0.040-inch nominal thickness. ANSI A118.12.

1. Products: Provide one of the following:
 - a. MAPEI CORPORATION; Mapeguard CI with Primer HM.
 - b. NATIONAL APPLIED CONSTRUCTION PRODUCTS, INC.; Strataflex.
 - c. POLYGUARD; Tileguard.
 - d. CUSTOM BUILDING PRODUCTS, Crack Buster Pro.

G. Metal Edge Trim: L-shape, height to match tile and setting-bed thickness; stainless steel, ASTM A666, 300 Series. SCHLUTER, CERAMIC TOOL COMPANY, BLANKE

H. Grout Sealer: Low VOC, penetrating type as recommended by grout manufacturer that does not change color or appearance of grout.

2.06 TILE BACKER BOARD

- A. Provide one of the following types in maximum lengths available to minimize end-to-end butt joints.
 1. Nominal 1/2" thick acrylic coated glass mat gypsum backer board: ASTM C 1178.
 2. Nominal 1/2" thick Fiber-Cement Backer Board: ASTM C 1288.
 3. Nominal 1/2" thick cementitious board with fiberglass mesh reinforcements conforming to the requirements of ANSI A118.9 or ASTM C 1325.
- B. Manufacturers: U.S. GYPSUM; GEORGIA PACIFIC, CUSTOM BUILDING PRODUCTS, NATIONAL GYPSUM COMPANY; JAMES HARDIE; CERTAINTEED.
 1. Provide coated screws, type as recommended by board manufacturer.
 2. Joint Treatment Tape: Type as recommended by board manufacturer.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine surfaces to receive tile, setting beds and accessories before tile installation for the following:
 - 1. Defects or conditions adversely affecting quality and execution of the installation.
 - 2. Deviations beyond allowable tolerances of surfaces to receive tile.
 - 3. Do not proceed with installation work until unsatisfactory conditions are corrected.
- B. Conditions of surfaces to receive tile.
 - 1. Surfaces to be firm, dry, clean, and free of oily or waxy films or curing compounds.
 - 2. Grounds, anchors, plugs, hangers, bucks, electrical, plumbing and HVAC work in or behind tile to be installed prior to proceeding with tile work.

3.02 PREPARATION

- A. Prepare surfaces to receive tile as required to achieve proper bond and as recommended by the Tile Council of America.
 - 1. See Section 01 73 00 for additional floor preparation requirements.
- B. Fill cracks, low areas and pits in concrete with self-leveling fill of type recommended by tile manufacturer for substrate conditions encountered.
- C. Lightly grind concrete subfloors with a terrazzo grinder to remove trowel marks, slab curl at saw cut joints or other surface irregularities or high spots which will telegraph to the flooring surface.
- D. Sawcut or grind transition areas to install tile flush with adjacent finished floor materials.
- E. Clean surfaces in a manner suitable for proper installation. Verify that slabs are free of curing membranes, oil, grease, wax, dust and other materials deleterious to tile installation.
- F. Primers or other preparations required or recommended in accordance with manufacturer's instructions.

3.03 TILE BACKERBOARD

- A. Location: Provide tile backerboard on metal stud walls as a substrate for ceramic tile products specified herein which are located on toilet room wet walls.
- B. Install in strict accordance with manufacturer's recommendations and ANSI A108.11, Interior Installation of Cementitious Backer Units.

1. Butt ends and edges of adjacent panels.
2. Attach with screws spaced at 6 inch centers on perimeter and field.
 - a. Maintain minimum 1/2 inch from screws to panel edge.
 - b. At wainscot or similar location where tile terminates in same plane of wall, shim tile backerboard flush with adjacent wall board. Provide shims continuous along face of studs.
3. Locate control and expansion joints in same locations as substrate and where required by wall tile.
4. Apply glass mesh tape, or type recommended by board manufacturer, over joints. Embed tape in setting material indicated for specified tile finish.

3.04 INTERIOR WALL TILE INSTALLATION - SYSTEMS

- A. Prepare surfaces, fit, set or bond, grout, and clean in accordance with Tile Council of America, "Handbook for Ceramic Tile Installation", 2019 Edition; and as follows:
- C. Thin Set - Stud Walls - Over Tile Backerboard: TCA W244, dry-set mortar bond coat or latex Portland cement bond coat and grout.
 1. Tile: ANSI A108.5.
 2. Grout: ANSI A108.10.
 3. Backerboard
 - a. Joint Preparation: Fill joints completely with setting mortar and embed 2 inch wide coated fiberglass tape into skim coat of same mortar.
 - b. Apply setting mortar in one layer, troweling skim coat with trowel's flat edge and then texturing with appropriate notched trowel. Troweling equipment must be appropriate for type of tile work and in good condition.
- D. Thin Set - Stud Walls - Over Gypsum Board: TCA W243, dry-set mortar bond coat or latex Portland cement bond coat and grout.
 1. Tile: ANSI A108.5.
 2. Grout: ANSI A108.10.
- D. Thin Set - Solid Back-Up Walls (concrete, CMU, etc.): TCA W202, dry-set mortar bond coat or latex Portland cement bond coat and grout.
 1. Tile: ANSI A108.5.
 2. Grout: ANSI A108.10.

3.05 INTERIOR FLOOR TILE INSTALLATION - SYSTEMS

- A. Prepare surfaces, fit, set or bond, grout, and clean in accordance with Tile Council of America, "Handbook for Ceramic Tile Installation", 2019 Edition; and as follows:
- B. Thin Set: TCA design F113, latex Portland cement mortar and grout or dry-set mortar and grout.

1. Tile: ANSI A108.5.
2. Grout: ANSI A108.10.

C. Thin Set, Adhesive: TCA F116; organic adhesive and grout.

1. Tile: ANSI A108.4.
2. Grout: ANSI A108.10.

3.06 TILE INSTALLATION - PROCEDURES

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage.

B. All tiles are to be subjected to thermal cycling prior too installation.

C. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. 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 that plates, collars or covers overlap tile.

E. Placement Methods: Install tile using the hereinbefore specified setting beds and grouts.

F. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting.

1. Avoid tile layout with less than half width tiles at room/area perimeters, unless otherwise indicated on the floor layout drawings. Notify Construction Manager if layout not achievable per layout indicated on the drawings. Do not continue in room/area in question until approved by the Associate.
2. Provide uniform joint widths, unless otherwise shown.
 - a. Ceramic Mosaic Tile: 1/16 inch.
 - b. Quarry Tile: 1/4 inch
 - c. Large format Floor Tile: 1/8 inch.

- d. Glazed Wall Tile: 1/16 inch.
- 3. Multiple Tile Face Size: Where indicated tile pattern contains multiple tile face sizes, coordinate with Architect to provide uniform joint with size.

- G. Anti-Fracture Membrane: Install over floor cracks, cold-joints and sawed joints. Discontinue at expansion joints. Install in compliance with ANSI 108.17 and manufacturer's instructions and recommendations. Seam joints as recommended by manufacturer. Conform to TCA F125. Coordinate with flexible joints specified in Article 3.07, Flexible Joints.

3.07 FLEXIBLE JOINTS

- A. Locate flexible joints (expansion, control and isolation joints) prior to tile installation. See Quality Assurance in Part 1 herein.
- B. Provide flexible joints as specified herein, unless more stringent requirements are indicated on drawings. Provide as specified, regardless if not indicated on drawings.
- C. Joint to be continuous from face of tile to bottom of setting bed or leveling bed. Reinforcing to be discontinued at joint. Install continuous joint filler material in joint from setting or leveling bed to a point below face of tile adequate for proper placement of backing rod and sealant.
- D. Joint Design: TCA design EJ171 as applicable. See Section 07 92 00 for sealant. Provide at the following locations:
 - 1. Horizontal Surfaces
 - a. Directly over expansion joints.
 - b. Over anti-fracture membrane which is applied over structural slab cold joints, construction joints and control joints.
 - b. Where tile work abuts restraining surfaces such as perimeter walls, curbs, columns, pipes, etc.
 - c. Floor areas exceeding 12 feet in any direction for exterior work and 24 feet in any direction for interior work.
 - d. Other locations where indicated.
 - 2. Vertical Surfaces
 - a. Directly over joints in wall substrate including cold joints, construction joints, control joints and expansion joints.
 - b. At changes in substrate material.
 - c. Where tile work abuts restraining surfaces such as perimeter walls, curbs, columns, pipes, etc.
 - d. Where indicated.
- E. Curing: Cure tile floor, base, and wall installations in accordance with manufacturer's recommendations, TCA recommendations, and in accordance with ANSI requirements.
- F. Metal Edge Strips: Provide metal edge strips at openings without thresholds, and

where exposed edges of tile floors meet other materials.

1. Except as otherwise indicated, where trim is located across door openings, locate trim on the door side in line with the edge of the door stop, terminating at the rabbet.

3.07 REPAIR, CLEAN AND PROTECT

- A. Repair, or remove and replace chipped, damaged or otherwise defective work to the satisfaction of the Architect.
- B. Cleaning: Upon completion of placement and grouting, clean all tile surfaces so that they are free of foreign matter.
 1. Use methods and materials as recommended by tile manufacturer.
 2. Replace tiles that cannot be satisfactorily cleaned.
- C. Grout Sealer: Apply silicone grout sealer to grout joints according to grout sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer from joints and from tile faces by wiping with soft cloth.
- D. Protection: 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 damage and wear.
 1. Prohibit foot and wheel traffic from using tiled floors for at least 3 days after grouting is completed.
 2. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

1.01 WORK INCLUDED

- A. Provide acoustical lay-in panel ceiling system as shown and specified.

1.02 RELATED SECTIONS

- A. Gypsum Board Ceiling: Section 09 21 16.

1.03 QUALITY ASSURANCE

- A. Workmanship: Comply with Ceilings & Interior Systems Contractors Association (CISCA) "Ceiling Systems Handbook".
- B. Installation: Performed by an experienced authorized installer approved by acoustical material manufacturer.
- C. Fire Hazard Classification: Provide acoustical materials which have been UL tested, listed and labeled Class 0-25, when tested in accordance with ASTM E84, Class A flame spread rating in accordance with ASTM E1264 requirements.
- D. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standards.
 - 1. AIMA: Acoustical and Insulating Materials Association.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. CISCA: Ceilings and Interior Systems Contractors Association.
- E. Coordination Between Trades: Quality assurance includes the cooperation with HVAC, Plumbing and Electrical Contractors in regards to ceiling grid layout.
 - 1. Procedures for submitting coordination drawings for ceiling work is included in Section 01 33 23 - Shop Drawings, Product Data and Samples.

1.04 SUBMITTALS

- A. Product Data
 - 1. Submit manufacturer's product data and installation instructions for each type of acoustical material and suspension system required.
 - 2. Submit manufacturer's written instructions for recommended maintenance practices for each type of acoustical ceiling system required. Include recommendations for cleaning and refinishing acoustical units and precautions against materials and methods that may be detrimental to

finishes and acoustical performances.

- B. Samples: Submit 12" square acoustical panel samples for each type of acoustical unit required. Provide 12" long suspension system and edge molding samples.
- C. Certification: Submit manufacturer's certification of acoustical units fire hazard classification rating and performance requirements.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original, unopened protective packaging, with manufacturer's labels indicating brand name, pattern size, thickness and fire rating as applicable, legible and intact.
- B. Store materials in original protective packaging to prevent soiling, physical damage or wetting.
- C. Store cartons open at each end to stabilize moisture content and temperature.
- D. Do not begin installation until sufficient materials to complete a room are received.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.07 EXTRA MATERIALS

- A. Maintenance Stock: Under this Section furnish to the Owner prior to final acceptance, extra maintenance stock of acoustical materials, consisting of:
 - 1. 1% of quantity for each type, composition, color, pattern and size. Not less than two full box of each.
- B. This extra stock is for the Owner's use after completion of the Project and is not to be used for repair or replacement required during the construction period. Properly package, seal, and identify extra stock material.

PART 2 PRODUCTS

2.01 SUSPENSION SYSTEM

- A. Exposed "Tee" Grid System
 - 1. Description: Cold-rolled electrogalvanized steel, factory applied white finish paint to match ceiling tile.
 - a. 15/16" exposed face; DONN (USG INTERIORS) Model DX;

CHICAGO METALLIC 200 Snap Grid System; ARMSTRONG Prelude.

2. Description: Comply with ASTM C635. Provide systems adequate to support light fixtures, ceiling diffusers, and other normal accessories. Maximum deflection 1/360 of the span. All components of system from one manufacturer, die cut, and interlocking.
 - a. Structural Class: Intermediate duty.
 - b. Type of System: Direct Hung.
 - c. Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1 direct hung.
 - d. Hanger Wires: ASTM A641 galvanized carbon steel, soft temper, prestretched not less than 12 gauge.
 - e. Carrying Channels: 1-1/2" steel channels, hot-rolled or cold-rolled, not less than 0.475 lbs per linear foot, standard finish.
 - f. Members: Provide manufacturer's standard exposed runners, cross runners and accessories of type and profiles indicated, with exposed cross runners coped to lay flush with main runners.
3. Edge Moldings: Hemmed edge wall angles, cold-rolled electrogalvanized steel, factory applied finish to match grid system.

2.02 ACOUSTICAL UNITS

- A. Acceptable Manufacturers: The following models listed are by ARMSTRONG.
 1. Type ACT-1: Optima # 3151, 24" x 48" x 3/4", square edge, NRC .90, light reflectance LR-.90, with white, washable finish; 15/16" grid.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, structure and installation conditions. Do not proceed with acoustical ceiling systems work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling.
 1. Avoid use of less than half widths units at borders.
- B. Coordinate with ceiling layout on drawings.

- C. Notify Architect of discrepancies between ceiling layout on drawings and ceiling layout proposed. Do not proceed until approved by Architect.

3.03 INSTALLATION

- A. Suspension System: Comply with ASTM C636 requirements and be water or laser leveled, maximum deflection of $1/360$ of span and maximum surface leveling tolerance $1/8"$ in $12'-0"$.

- B. Rough Suspension

- 1. Hangers: Ceiling suspension systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines or any other utility lines. Each utility and the ceiling suspension system shall be a separate installation and each shall be independently supported from the building structure.

Where interferences occur, employ trapeze hangers or supports to avoid interferences with appurtenances requiring servicing. Support all four corners of suspension systems at fluorescent light fixtures.

- 2. Wall Molding

- a. Provide edge trim molding at perimeter of acoustical ceiling installation and intermediate vertical surfaces. Use maximum lengths. Miter trim corners to provide tight, accurate joint. Connect moldings securely to substrate surfaces.
 - b. Connect moldings to substrate at intervals not over $16"$ on center and not more than $3"$ from ends, leveling with ceiling suspension system to tolerance of $1/8"$ in $12'-0"$.

- C. Acoustical Units

- 1. Install acoustical lay-in panels level, in uniform plane, with joints accurately cut to ensure a snug and square fit. All panel faces and edges to be free from damage or soiling.
 - a. Fit border units accurately at borders and penetrations.
 - b. Recreate tegular and decorative edges at wall cuts and other cuts.
 - c. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and perimeter moldings.
 - d. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 - e. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 - 2. Coordinate suspension systems grid layout with electrical lighting fixture lay-out and installation.

3.04 CLEANING

- A. After installation, clean soiled or discolored surfaces of acoustical units and exposed suspension members. Comply with manufacturer's recommendations for cleaning and touch-up of minor finish damage.
- B. Adjust all sags and twists which develop in ceiling systems. Remove and replace units which are improperly installed and damaged units which cannot be successfully cleaned and repaired to eliminate evidence of damage.

END OF SECTION

SECTION 09 54 00.13

CEILING BAFFLES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide suspended ceiling baffle system consisting of (PET) polyester fiber type baffles, manufactures suspension system and accessories for a complete installed system. Types include:
 - 1. AB-1: Linear ceiling panels.
 - a. NRC: 0.9
 - b. Thickness: 9mm
 - 2. AB-2: Ridge system pattern – undulating
 - a. NRC: 0.75
 - b. Thickness: 9mm
 - 3. AB-3: Lit baffle modules
 - a. NRC: 1.10
 - b. Thickness: 9mm
 - 4. AB-4: Baffle modules
 - a. NRC: 0.95
 - b. Thickness: 9mm
 - 5. AB-5: Slab modules
 - a. NRC: 1.55
 - b. Thickness: 9mm
 - 6. AB-6: Y shaped lit baffle modules
 - a. Sabins: 16
 - b. Thickness: 9mm

1.02 RELATED SECTIONS

- A. Acoustical Panel Ceiling Grid: Section 09 51 13.
- B. Electrical: Division 26.

1.03 SUBMITTALS

- A. Manufacturer's Data: Submit 2 copies of manufacturer's specifications and installation instructions for each component of the ceiling system. Include reports and other data as may be required to show compliance with these specifications.
- B. Shop Drawings: Submit shop drawing details and reflected ceiling plans of ceiling system and all component parts. Show location of ceiling units and other items of work which are to be coordinated with the ceiling system.

- C. Samples: Minimum 12" length x full width of baffle with specified finish.
- D. Maintenance Instructions: Submit manufacturer's recommendations for removal, replacement and cleaning of each component system of the ceiling system. Include precautions against materials and methods that may be detrimental to finishes.
- E. Delegated Design Submittal: For design of seismic restraints, attachment devices and detail fabrication and assembly for suspended metal grid to comply with performance requirements and design criteria.
 - 1. Show anchorage detail fabrication and attachment; Indicate quantity, diameter, and depth of penetration of anchors.

1.04 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.
 - 1. Mockup to be minimum of four rows 6'-0" long of product.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of final acceptance of the work.

1.05 JOB CONDITIONS

- A. System Layout: Coordinate layout with other work which penetrates or is supported by the ceiling system.
- B. Installer shall consult other trades and Contractors involved prior to start of ceiling work, to determine areas of potential interference. Do not start installation until interference has been resolved to the satisfaction of the Installer.

PART 2 PRODUCTS

2.01 BAFFLE MATERIAL

- A. Baffle: 100% polyester. With and without LED luminaire units.
 - 1. Thickness: As indicated.
 - 2. NRC rating per unit: As indicated in accordance with ASTM C 423.
 - 3. Color: As indicated
- B. Flame Spread Rating: Panels shall have a flame spread rating of 25 or less and smoke-developed rating of 200 or less according to ASTM E84.
- C. Basis of Design Manufacturers: As indicated
 - 1. Other Acceptable Manufacturers: Baffles manufactured by other manufacturers will be considered if materials meet the requirements of the

Basis of Design and the type, sizes and colors are an acceptable match as approved by the Architect

- D. LED Modules: Pre-wired with factory installed branch circuit wiring and over-molded quick connects.
- E. Mounting: As indicated. Provide with manufactures recommended suspension system or cable and cable hardware and/or toggle or hook and wire rope universal support system

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas receiving ceiling system for conditions that might adversely affect the installation.
- B. Verify that all work above ceiling system has been satisfactorily completed prior to start of ceiling installations.
- C. Do not start ceiling installations until all unsatisfactory conditions affecting ceiling systems have been corrected.

3.02 PREPARATION

- A. Provide layouts for inserts, clips and other support items required to be installed by other trades. Furnish inserts, clips and related items to other trades in a timely manner to preclude construction delays.
- B. Coordinate with other trades for proper installation of inserts and related items.
- C. Verify ceiling layouts by actual field measurements.
 - 1. Establish ceiling layout to balance borders and minimize out-of-square conditions.

3.03 INSTALLATION

- A. Install ceiling system in accordance with manufacturer's printed installation instructions, submittals, applicable industry standards, and governing regulatory requirements for the work.
- B. Suspension System Installation
 - 1. Support hangers securely from building structure directly attached to structure, or to inserts or other approved devices.
- A. Lighting: Coordinate lighting fixture with Electrical.

3.04 ADJUST AND CLEAN

- A. Adjust components to provide uniform tolerances.
- B. Replace all ceiling components that are scratched, dented or otherwise damaged.
- C. Clean exposed surfaces with non-solvent, non-abrasive commercial type cleaner.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide resilient flooring as shown and specified. Work includes:

1. Vinyl sheet flooring..
2. Rubber base.
3. Rubber stair treads and landing tiles.
4. Adhesives and accessories to complete the work.

1.02 QUALITY ASSURANCE

- A. Provide each type of resilient flooring and base material produced by one manufacturer, including recommended adhesives and leveling compounds.
- B. Provide each type resilient flooring and base material from same production run. Colors shall be uniform throughout.
- C. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- D. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.
1. ASTM: American Society for Testing and Materials.
 2. FS: Federal Specifications as established by the U.S. Government, General Services Administration.
 3. U.L.: Underwriter's Laboratories.
 4. ADA: Americans with Disabilities Act Accessibility Guidelines.
- E. Slip Retardant Performance: Unless a greater performance is specified under a specific product, all floor materials must have a minimum static coefficient of friction of 0.6.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of resilient flooring, base and accessory required.
- B. Samples

1. Tiles: Submit full sized samples of each type, color and pattern required to illustrate the full range of color variations.
 2. Base: Provide 6" lengths of each type and color.
 3. Sheet Flooring: Manufacturer's standard sample size, but not less than 6" x 9" of each type, color and pattern required to illustrate the full range of color variations.
 - a. Heat Welding Bead: Manufacturer's standard sample size, but not less than 9" long of each color.
 4. Stair Treads: 6" lengths of each type and color.
- C. Submit manufacturer's certification that resilient flooring furnished complies with required fire test performance and has been tested and meets indicated requirements.
- D. Submit manufacturer's written instructions for recommended maintenance practices for each type of resilient flooring, base and accessory material required.
- E. Extra Stock: Furnish extra materials in the following quantities:
1. Base: Furnish 2% of the total quantity (but not less than 2 full sealed cartons) of each type, pattern and color. Provide 5% of colors with less than 5000 square feet. Properly package and identify each material.
 2. Sheet Goods: Furnish 10 linear feet in roll form for each 500 linear feet or fraction thereof, of each product, color and pattern. Package each roll with protective covering and identification labels describing contents.
 3. Stair Accessories: Furnish 5% of the total quantity of each type, pattern and color. Properly package and identify each material.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened labeled containers.
- B. Store, protect, and handle resilient flooring materials in accordance with manufacturer's recommendations to prevent damage, soiling and deterioration.
- C. Store materials in areas to receive resilient flooring for a minimum of 48 hours before installation.

1.06 PROJECT CONDITIONS

- A. Maintain uniform room temperature range not less than 70 degrees F., in areas to receive resilient flooring for minimum 48 hours before installation and 48 hours after installation.
- B. Provide adequate lighting and ventilation during installation and clean-up.
- C. Protect adjoining surfaces from damage and soiling.

PART 2 PRODUCTS

2.01 RESILIENT FLOORING MATERIALS

- A. Vinyl Sheet Flooring Homogeneous sheet flooring shall conform to the requirements of ASTM F1913 Standard Specification for Sheet Floor Covering Without Backing
1. Colors and Manufacturers
 - a. Basis of Design: ARMSTRONG Medintone with Diamond 10 coating.
 2. Description: Unbacked, nonlayered, homogeneous sheet vinyl flooring. Protected by a diamond-infused UV-cured polyurethane finish, the colors and pattern detail are dispersed uniformly throughout the thickness of the product.
 3. Thickness: 0.080 in. (2.0 mm)
 4. Weld Rod: Provide solid color vinyl weld rod intended for heat welding of seams.

2.02 BASE

- A. Rubber Base: Complying with ASTM F1861, Type TP, Group 1, 4" high, 1/8" gage. Provide long length rolls and job formed corners. Standard top set cove (Style B) at resilient and other hard surface flooring and straight toeless (Style A) at all carpeted floors.
1. Colors and Manufacturers
 - a. Basis of Design: As indicated on the drawings.
 - b. Other Acceptable Manufacturers: Rubber base manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the colors are an acceptable match as approved by the Architect.

2.03 STAIR ACCESSORY MATERIALS

- A. Stair Treads and Risers: Homogeneous, rubber treads with textured finish complying with ASTM F2169 TS. Provide Group 2 - contrasting color nosing per ANSI A117.1-2009, Section 504.5.1. where indicated or as required at designated accessible stairs.
1. Thickness: .20".
 2. Hardness: ASTM D 2240 – Not less than 85 Shore A
 3. Abrasion Resistance: ASTM D 3389 – less than 1 gram weight loss
 4. Size: Lengths and depths to fit each stair tread and riser.
 5. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
 6. Colors, Texture and Manufacturers
 - a. Basis of Design: As indicated on the drawings.

- B. Landing Floor Tiles: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

2.04 ACCESSORIES

- A. Leveling Compound: Non-staining latex modified, Portland cement based type, compatible with flooring, as provided or recommended by the flooring manufacturer.
- B. Adhesives: Water resistant, stabilized type as recommended by the resilient flooring and base manufacturer to suit material and substrate conditions.
- C. Resilient Edge/Transition Strips: Provide rubber or stainless steel transition strips by the following manufacturers.
 - 1. Resilient-to-Carpet: Rubber. Colors as selected by Architect.
 - a. ROPPE, #56
 - b. JOHNSONITE/TARKETT, CTA-XX-H
 - c. VPI FLOORING, ACC12
 - 2. Resilient-to-Concrete: Stainless steel
 - a. SCHLUTER Reno U; stainless steel
 - b. GREAT LAKES TILE PRODUCTS; Reducer.
 - c. BLANKE CORP.; Reducer Trim.
 - 3. Where transition types are required for conditions other than those listed above, provide rubber type from the manufacturers listed to create a smooth transition or termination.
- D. Cleaning and Polishing Materials: Polish and neutral cleaner as recommended by the floor material manufacturer.
- E. Existing Adhesive Remover: Non-toxic type; similar to De-Sol-It by ORANGE-SOL or equal by NAPIER ENVIRONMENTAL TECHNOLOGIES, INC., or CITRUS KING.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates and installation condition. Do not proceed with resilient flooring work until unsatisfactory conditions have been corrected.
- B. Subfloor surfaces shall be smooth, level, at the required finish elevation, and within the tolerances specified in Section 03 30 00.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Prepare substrates according to floor manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Perform tests recommended by flooring manufacturer. Proceed with installation only after satisfying manufacturer's recommendations for test results.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install flooring until it is the same temperature as the space where it is to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

3.03 INSTALLATION

- A. Install resilient flooring and accessories with adhesive in strict compliance with the manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce neat joints, laid tight, even and straight. Extend flooring into toe spaces, door reveals and into closets and similar openings.
- B. Base
 - 1. Install at walls, column, casework and other permanent fixtures as scheduled. Install in as long of lengths as practicable. Tightly bond base to backing throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
 - 2. Provide terminal base ends beveled and toes rounded.
 - 3. On masonry surfaces or other similar irregular surface, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- C. Sheet Flooring
 - 1. Install sheet flooring in accordance with latest edition of manufacturers' instructions.

2. Spread only enough adhesive to permit installation of sheet flooring before initial set.
 3. Install flooring wall to wall before installation of floor-set cabinets, casework and similar moveable items.
 4. Extend flooring into door recesses, closets, and similar openings as indicated on drawings.
 5. Where adjacent floor finish is dissimilar, terminate sheet flooring at centerline of doors.
 6. Scribe, cut, and fit to walls, columns, cabinets, pipes, built-in-furniture and cabinets to produce tight joints. Lay flooring to provide a minimum number of seams. Avoid cross seams, filler pieces, and strips.
 7. Sheet flooring shall be installed over covers for telephone conduits, electrical conduits and other similar items which occur within the finished floor areas.
 8. Sheet flooring **MUST** be cut sharp and clean around these covers so that the covers can be removed when required.
 9. Sheet flooring must be applied to covers in a solid application of adhesive.
- D. Edge Strips: Place tightly butted to flooring and secure with adhesive. Install at edges of flooring which would otherwise be exposed.
- E. Stair Treads and Accessories
1. Tightly fit tread nose against face of stair riser or nosing. Fill open spaces at the nosing between the stair and the rubber tread with manufacturer's approved caulk or similar material.
 2. Roll surfaces until a firm bond is obtained.

3.04 CLEANING AND PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. After flooring has set, clean thoroughly. Remove excess adhesive or other surface blemishes from flooring, using neutral type cleaners as recommended by the flooring manufacturer.
- C. Perform initial maintenance according to latest edition of manufacturer's maintenance manual and the following:
- D. Protect installed flooring from damage and staining with heavy duty non-staining Kraft paper or other covering at all traffic lanes. Protect completed work from traffic and damage until final acceptance.

END OF SECTION

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Carpet, installation and all adhesive, edge guards, [pad] and accessories necessary for the installation of:
 - 1. Carpet tile
 - 2. Walk off carpet
- B. Work includes preparation of subsurfaces, cleaning, and protection of finished carpet.

1.02 QUALITY ASSURANCE

- A. Installer: Firm with not less than 5 years of carpeting experience similar to work of this Section.
 - 1. Work not in compliance with the manufacturer's recommended standards and procedures shall be promptly corrected at the Contractor's expense.
- B. Manufacturer: Firm (carpet mill) with not less than 5 years of production experience with similar types specified in this section; and whose published product data clearly indicates compliance of product with requirements of this Section.
- C. General Standard: "Carpet Specifiers Handbook" by The Carpet and Rug Institute; for definitions of terminology not otherwise defined herein, and for general recommendations and information.
- D. Fire Performance Characteristics: Provide carpet that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flammability - ASTM D2859: Passing Methanine Pill Test.
 - 2. Critical Radiant Flux - ASTM E648: Not less than 0.45 watts per square centimeter.
 - 3. Smoke Density - ASTM E662: 450 or less.
- 4. Pile Height: Provide carpet that is ½" maximum as required by ADDAG 4.5.3.

1.03 REFERENCE STANDARDS

- A. Carpet: Comply with the local building authority for flame spread and smoke contribution requirements and tested in accordance with ASTM E84.

1.05 SUBMITTALS

- A. Samples
 - 1. Tiles: Submit full size tiles (samples) of each color and pattern selected.
 - 2. Broadloom: Submit 12" x 12" samples of each color and pattern selected.
 - 3. Accessories: 12" long sample of each type exposed edge stripping and accessory item.
- B. Product Data: Provide for all items. Include, product data covering carpet construction, physical characteristics, durability, resistance to fading, and flame resistance characteristics.
- C. Shop Drawings
 - 1. Broadloom: Submit seam diagram drawings and edge treatments.
 - 2. Tiles: Submit drawings showing layout. Indicate pile or pattern direction and locations and types of edge strips.
- D. Certifications: Contractor shall provide the following:
 - 1. Manufacturer: Before carpet materials are ordered, submit 4 copies of test results from a recognized laboratory and 4 copies of a notarized statement, signed by an officer of the manufacturer, confirming that the carpet products proposed for use are those which have passed the required tests indicated under "Performance Standards" for the carpet and comply with the requirements of State and local fire authorities.
 - 2. Installer: Submit 4 copies attesting that materials actually installed were the same as those certified as meeting specified requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Deliver carpeting materials in original mill protective wrapping, and store inside protected from weather, moisture and soiling.
- B. Investigate and resolve access restrictions, including elevator capacity, entrances and accessibility, to assure proper delivery and installation of materials.
- C. Protect materials against damage of any kind. Damaged products, including soiled fabrics, will be rejected.

1.07 MAINTENANCE

- A. Manufacturers: Provide three (3) copies of maintenance schedules, describing programmed maintenance procedures, including general maintenance,

preventative maintenance, spot removal, traffic lane maintenance and overall cleaning.

- B. Operational Service: Provide manufacturer's take-back program service for carpet installed in project. Service shall reclaim materials for recycling and/or reuse. Service shall not landfill or burn reclaimed materials.

1.08 WARRANTY

- A. Special Project Warranty: Submit a written warranty, executed by the Contractor, Installer and the Manufacturer, agreeing to repair or replace carpeting which fails in materials or workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period is two years after date of substantial completion.

- B. Carpet manufacturer's material wear warranty: Ten years.

1.09 EXTRA MATERIALS

- A. Tiles: Provide quantity of full tiles for each type of material equal to 5 percent of amount installed.
- B. Deliver extra carpet materials to Owner's designated storage space, properly packaged with protective covering and identified with labels describing contents.

PART 2 PRODUCTS

2.01 CARPET

- A. Manufacturers, Styles and Colors
 - 1. Basis of Design: Manufacturers, styles and colors as indicated on the drawings.
 - 2. Other Acceptable Manufacturers: Carpet manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design performance and physical characteristics including but not limited to:
 - a. Color, pattern, style
 - b. Size, weight and gage
 - c. Fiber characteristics, type and content.
 - d. Density, yarn count, twist, stitches, pile weight and characteristics
 - e. Primary and secondary backing
 - f. Treatments
 - . If the, color and style are acceptable matches as approved by the Architect. these additionally approved manufacturers and carpets will be included by Addendum.

- B. Types, Patterns and Colors: As indicated on Drawings.

2.02 WALK-OFF CARPET TILE MAT

- A. Manufacturers, Styles and Colors

1. Basis of Design: Manufacturers, styles and colors as indicated on the drawings.
2. Other Acceptable Manufacturers: Walk off carpet manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design performance and physical characteristics including but not limited to:
 - a. Color, pattern, style
 - b. Size, weight and gage
 - c. Fiber characteristics, type and content.
 - d. Density, count, weight and characteristics
 - e. Backing
 - f. Treatments

- B. Types, Patterns and Colors: As indicated on Drawings.

2.03 ACCESSORIES

- A. Carpet Edge Guard: Non-metallic type. Extruded or molded vinyl or rubber of size and profile indicated. Color as selected by Architect.
- B. Adhesive: Non-toxic, water resistant, white latex base cement formulated for the installation of the manufactured materials. Type as recommended by carpet manufacturer.
 1. Toxicity/IEQ: Adhesive must not have a VOC content greater than 50 g/L less water and exempted solids, as prescribed by South Coast Air Quality Management District Rule 1168.
- C. Seaming Cement: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer, for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.
- D. Miscellaneous Materials: As recommended by manufacturer of carpet and other carpeting accessory products; selected by installer to meet project circumstances and requirements.
- E. Leveling Materials and Crack Fill: Non-staining latex cementitious type, compatible with carpet adhesive, as recommended by the flooring manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Installer must examine substrates for moisture content and other conditions under which carpeting is to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.
- B. Comply with CRI 2011 and with carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- C. Concrete Substrates
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by flooring manufacturer. Do not use solvents.
 - 3. Perform tests recommended by flooring manufacturer. Proceed with installation only after satisfying manufacturer's recommendations for test results.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.02 INSTALLATION

- A. Install in accordance with recommendations of the manufacturers of materials and Carpet and Rug Institute's methods specified in CRI 2011. Carpet manufacturer's current installation instructions shall be kept at job site and be followed explicitly.
 - 1. Comply with manufacturer's recommendations for installation of carpet; maintain uniformity of carpet direction and lay of pile, unless otherwise indicated.
- B. Use modular carpet from the same dye lot in each room.
- C. Lay carpet in accordance with the final shop drawings. No reversing of carpet direction shall be permitted.

- D. Install modular carpet by trimming, cutting and prefitting units. Then apply adhesive in strict accordance with manufacturer's instructions, and place the carpet modules with the pile inclination in the direction as recommended by the manufacturer, or as otherwise indicated on the final layout drawings.
 - 1. Application shall be full spread. Sprayed on adhesive is not permitted.
 - 2. Install using a notched trowel.
- E. Trim protruding ends of open loops so slightly below surrounding pile height.
- F. Use edge molding where carpet terminates under doors and along edge of carpet where it abuts another floor material. Fasten edge moldings securely to the floor with glue manufactured for this specific purpose.
- G. Roll entire area lightly to eliminate air pockets and ensure uniform bond.

3.03 CLEANING AND PROTECTION

- A. Protect installed carpet to comply with CRI 2011 and carpet manufacturer recommendations.
- B. Remove debris, sorting pieces to be saved from scraps to be disposed. Keep premises free and clear of waste material in connection with carpet work.
- C. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed.
- D. Advise Contractor of protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.
- E. Provide adequate protection for adjacent equipment, furnishings and materials.
- F. When entering, passing through, or working in any space in the building that contains finished materials, maintain proper protection for floors, walls, ceilings, fixtures, etc. Repair or replace damaged adjoining work as directed by the Architect at no additional cost to the Owner.

END OF SECTION

SECTION 09 72 16

VINYL COATED FABRIC WALL COVERINGS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wall coverings of the types specified herein in locations indicated.
- B. Provide accessory materials required for proper installation of wall coverings, such as primers, sealers and adhesives.

1.02 QUALITY ASSURANCE

- A. Test panels at job site.
 - 1. Install test panels for full-width and corner applications of wall covering material in areas designated by Architect. Include pattern matching where applicable.
 - 2. Test panels will be actual location for the wall covering involved and if acceptable to Architect, they may remain in place. Replace test panels that are not acceptable to Architect until satisfactory installation is achieved.
 - 3. Accepted test areas will be used as standard of acceptable workmanship for similar work.
- B. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - 2. Flame-Spread Index: 25 or less.
 - 3. Smoke-Developed Index: 50 or less.
 - 4. Fire-Growth Contribution: Materials to have no flashover and heat and smoke release according to NFPA 265.

1.03 SUBMITTALS

- A. Samples
 - 1. Furnish 2 samples of each type and color/pattern selection of wall covering materials specified. Each sample shall be full width by 36" long.
 - 2. Include full description of samples submitted, including fire hazard classification and other properties.
- B. Shop Drawings: Show location and extent of each wall-covering type. Indicate

pattern placement, seams and termination points.

- C. Maintenance Instructions: For type of approved wall covering to be used, furnish 2 copies of manufacturer's printed instructions for maintenance and cleaning. Deliver to the Owner as directed by Architect.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect from damage at all times, with particular care in protecting against edge damage, crushing and staining.
- B. Deliver materials in original package as container of manufacturer, clearly labeled to identify manufacturer, brand name, quality or grade, and fire hazard classification.
- C. Store materials in original undamaged containers or packages, in manner recommended by manufacturer. Maintain temperature in storage area above 40 degrees Fahrenheit for at least 24 hours before installation.

1.05 JOB CONDITIONS

- A. Maintain a constant minimum temperature of 65 degrees Fahrenheit at areas of installation for at least 48 hours before, during and 48 hours after the application of materials.

PART 2 PRODUCTS

2.01 WALL COVERING MATERIALS

- A. Manufacturers, Pattern and Colors
 - 1. Basis of Design: As indicated on the drawings.
 - 2. Other Acceptable Manufacturers: Wall covering manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the color is an acceptable match as approved by the Architect
- B. Types: As indicated on Drawings.
- C. Conformance: Exceeds Fed. Spec. CCC-W-408A, Type II.
- D. U.L. Rating (Maximums).
 - 1. Flame Spread: 20.
 - 2. Fuel Contributed: 5.
 - 3. Smoke Developed: 5.]

2.02 ACCESSORY MATERIALS

- A. Adhesives, Primers and Sealers: As required for installation of wall covering materials. For each type wall covering, furnish wall covering manufacturer's recommended materials manufactured expressly for use with the selected wall covering and compatible with wall surface involved. Provide materials that are mildew-resistant and non-staining to the wall covering.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the surfaces and conditions under which wall covering is to be installed. Report any unsatisfactory conditions, and do not proceed until such unsatisfactory conditions, if any, are corrected. Commencement of work signifies acceptance.
- B. Verify that normal temperature and humidity conditions during installation approximate the interior conditions that will exist when building is occupied.

3.02 PREPARATION

- A. Remove hardware, wall plates, accessories and similar items as applicable to allow wall covering to be installed. Upon completion replace all items.
- B. Prime and size seal, substrates in accordance with the wall covering manufacturer's recommendations for the type of substrate material to be covered. Sand rough spots if necessary and clean as required.

3.03 INSTALLATION

- A. Apply all materials by skilled workmen in strict accordance with manufacturer's instructions for wall covering used.
- B. Place wall covering panels consecutively in the order they are cut from rolls, including filling of spaces above or below openings as required.
- C. Match adjacent panel strips as required, consistent with pattern selected. Install seams vertically and plumb, and at least 6" away from corners. Place wall covering continuously over corners, and assure seams at edges of panels are vertical and plumb.
- D. Trim selvages as required to ensure color uniformity and pattern match at seams.
- E. Remove excess adhesive along finished seams as recommended by manufacturer.
- F. Have finished installation smooth, clean and free from wrinkles, gaps or overlaps. No horizontal seams permitted.
- G. Do not soil or deface wall covering. If cleaning is required, use only materials and

methods recommended by manufacturer of wall covering used.

END OF SECTION

SECTION 09 84 13

FIXED SOUND ABSORPTIVE PANELS

PART 1 GENERAL

1.01 SUMMARY

- A. The work consists of furnishing all labor, materials, accessories and equipment necessary to provide sound absorptive finishes as indicated on project Drawings and as specified below. Sound absorptive finish materials shall be designed to achieve the minimum sound absorption coefficients and minimum NRC ratings specified below.

1.02 REFERENCES

- A. ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM E 795, Standard Practice for Mounting Test Specimens during Sound Absorption Tests.
- C. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. Product Data: For each type of panel edge, core material and mounting indicated, submit Manufacturer's specifications and other data needed to prove compliance with all specified requirements.
- B. Acoustical Test Reports: Submit manufacturer's sound absorption data for specified systems, including; octave band sound absorption values from 125 hertz to 4,000 hertz and Noise Reduction Coefficient (NRC) values for the specified systems. Sound absorption data shall be based on measurements conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP) and in accordance with ASTM C 423 and ASTM E795 standards.
- C. Shop Drawings: For sound absorptive finishes, include mounting devices and details; details at panel head, base, joints and corners; and details at ceiling, floor base and wall intersections. Indicate panel edge and core materials. All materials affected by structural or seismic requirements shall be reviewed and signed by a registered structural engineer showing compliance with all structural load and seismic design criteria.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.

- D. Coordination Drawings: Show intersections with wall base, doors, electrical outlets and switches, and other permanent wall features.
- E. Exceptions: Identify all proposed changes, differences, and/or discrepancies, including verbiage, terms, definitions between Contract Documents and submittals.
- F. Samples for Verification. Prepare Samples from same material to be used for the Work.
 - 1. Fabric: Full width 36-inch long Sample from dye lot to be used for the Work, as follows:
 - a. With specified treatments applied.
 - b. Show complete pattern repeat.
 - c. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch long Sample showing edge profile, corner and finish.
 - 3. Core Material: 12-inch square Sample showing corner.
 - 4. Mounting Device: Full size Sample.
 - 5. Sample Panels: No larger than 36-inches by 36-inches. Show joints and mounting methods.
- G. Maintenance Data: For stretched fabric wall systems to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain removal recommendations.
- H. Warranty: Warranty specified in this Section.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: The Manufacturer shall have successful experience in sound absorptive finish fabrication and installation, including no less than five years experience in the fabrication and installation of materials identical to those required in this project.
- B. Source Limitations: Obtain sound absorptive finishes through one source from a single manufacturer.
- C. Acoustical Performance: Sound absorption tests shall be conducted in accordance with ASTM C 423 – Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method and ASTM E 795 – Standard Practices for Mounting Specimens during Sound Absorption Tests. The test shall be conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP). Acoustical test reports shall include a description of the tested material sample, size of the sample, test setup (including type of mounting used), measurement instrumentation, test procedure and octave band sound absorption coefficients.
- D. Fire-Test Response Characteristics: Provide sound absorptive finishes with the following surface burning characteristics as determined by testing identical products per ASTM 84 by UL or other testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Spread Index: 25 or less.

2. Smoke Development Index: 450 or less.

- E. Mockups: Before installing panels, install mockups for each form from panel and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Install mockups in the location and of the size indicated or, if not indicated, as directed by the Architect.
 2. Maintain mockups during installation in an undisturbed condition as a standard for judging the completed Work.
 - a. Demolish and remove mockups when directed.
 - b. Approved mockups may become part of the completed Work if undisturbed at the time of Substantial Completion.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Comply with sound absorptive wall panel manufacturer's written instructions for minimum and maximum temperature and humidity requirements for shipment, storage and handling.
- B. Protect products during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the requirements of the manufacturer's instructions for storage and handling.
1. Package products at factory prior to shipping using manufacturer's standard method.
- C. Deliver materials and panels in unopened bundles and store in a temperature controlled dry place with adequate air circulation.
- D. Protect panel edges from crushing and impact.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fabric: For each fabric, color and pattern installed, furnish length equal to 10 percent of amount installed but no fewer than 10 yards.
 2. Mounting Devices: Full size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.
- B. Protect products during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the requirements of the manufacturer's instructions for storage and handling.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound absorptive finishes until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work

above ceilings is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Field Measurements: Verify locations of sound absorptive finishes by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound absorptive finishes that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, fabric sagging, distorting or releasing from panel edge; or warping of core.
2. Warranty Period: Three (3) years from date of final acceptance of the work.

PART 2 PRODUCTS

2.01 DIRECT MOUNT CEILING PANEL AP-1

- A. Description: Thermally bonded polyester

1. Thickness: 1".
2. Size: As indicated on drawings.
3. Finish: As selected.

- B. Surface Burning Characteristics - ASTM E84

1. Flame Spread: 15.
2. Smoke Developed: 0.

- C. Sound Absorption Coefficients

Frequency (Hz)	125	250	500	1000	2000	4000
	.10	.30	.65	.85	.95	.95

- D. Noise Reduction Coefficient: .90 according to ASTM C423.

- E. Mounting: Impaling clips and adhesive per manufacturers instructions.

- F. Manufacturers

1. Basis of Design: AUTEX APA.
 - a. Other Manufacturers: Systems by other manufacturers are acceptable provided they meet the specified requirements and are approved by the Architect prior to the bid.

2.02 PET WALL SHAPES AND TEXTURES AP-2, AP-3, AP-4, AP-5

- A. Material: (PET) polyester fiber
- B. Configuration: As indicated.
 - 1. Type 5: Custom artwork as provide by Architect.
- C. Thickness:
 - 1. Types 2, 3 and 4: 9mm
 - 2. Type 5: 1"
- D. Acoustics:
 - 1. Types 2, 3 and 4: NRC 25
 - 2. Type 5: NRC 75
- E. Mounting: Adhesive per manufacturers instructions.
 - 1. Type 5: Adhesive, impaling clips, Z-Clips/Z-Bars, edge clips, Rotofast anchors, and hook & loop as recommended.
- F. Basis of Design Manufacturers: As scheduled.

2.02 WOOL FELT WALL PANELS AP-6

- A. Material: 100% wool felt
- B. Thickness: $\frac{3}{4}$ " with interlocking mount system 1 $\frac{1}{4}$ "
- C. Acoustics: NRC: .6 to .75
- D. Basis of Design Manufacturers: AKUSTIKA Filzfelt

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine materials, substrates, areas and conditions, with the installer present, for compliance with requirements, installation tolerances and other conditions affecting performance of the sound absorptive finishes.
- B. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. Clean sound absorptive finishes and hardware to remove deleterious and soil substances.

3.02 PREPARATION

- A. Measure each area and establish layout of panels and joints as indicated in the Drawings.
- B. Before installation, allow sound absorptive finishes to adjust and become stable in the area in which they will be installed in accordance with the manufacturers installation instructions.

3.03 INSTALLATION

- A. Do not install any work until space is enclosed and weatherproofed, wet work in space is completed and nominally dry, work above ceilings is complete and temperature and humidity is continuously maintained at values near those of final occupancy.
- B. Comply with the manufacturers printed instructions, recommendations and approved shop drawings.
- C. Install support hardware, sound absorptive finishes in accordance with the manufacturers instructions and recommendations. Install panels plumb and if applicable, true in plane.

3.04 INSTALLATION TOLERANCES

- A. Edge Straightness: Plus or minus 1/16-inch over 8-feet.
- B. Variation from Level and Plumb: Plus or minus 1/16-inch over 8-feet.
- C. Variation of Panel-Joint Width: Not more than hairline.

3.05 CLEANING

- A. Clean all surfaces following installation.
- B. Replace material having scratches, abrasions or other defects with unblemished sound absorptive finish assemblies at no cost to the owner.

3.06 PROTECTION

- A. Protection of sound absorptive finishes from damage by other trades after installation shall be provided by the General Contractor.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.01 SCOPE

A. Work Included

1. Surface preparation and painting or finishing of all interior and exterior exposed items and surfaces except as otherwise indicated. Work includes, but is not necessarily limited to, the following:
 - a. Walls, ceilings and soffits.
 - 1) Gypsum board
 - b. Concrete masonry walls.
 - c. Hollow metal doors and frames.
 - d. Exposed structure including deck and all framing.
 - e. Exposed ferrous metal of any type, interior and exterior, including galvanized items.
 - f. Exposed sheet metal, ductwork, conduit and piping in finished spaces; not mechanical equipment or electrical equipment rooms.
 - g. Exposed prime coated or unfinished mechanical or electrical items outside of mechanical equipment rooms. Repaint factory finished mechanical or electrical items where specified.
 - h. Stenciling of fire walls above ceilings.
 - j. Paint existing surfaces and items where indicated on the drawings and where these surfaces and items are located within areas where new work is being performed.
 - k. Exposed cementitious fireproofing.
 - l. Other items noted or specified.
2. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.

B. Mechanical Equipment Rooms: Painting subject to the following requirements:

1. Paint finish on walls and ceiling, when scheduled on drawings, to be applied prior to installation of mechanical/electrical work as much as possible.
2. Spray painting not permitted after electric motors have been installed.

C. Work Excluded: Do not paint the following items unless specifically called for on the drawings or specified herein:

1. Concrete floors.
2. Shop or prime coats on items to which shop or prime coats have been

applied by the fabricator, unless noted otherwise.

3. Exterior concrete.
4. Items with factory finish or natural finish (brick, stone, stainless steel, aluminum, and others) unless noted or indicated elsewhere.
5. Colored concrete masonry units.
6. Wall areas permanently concealed by fixed equipment or accessories.
7. Equipment, sheet metal, ductwork and equipment in mechanical and electrical rooms; painting of these items, if required, provided under Divisions 23 and 26 as applicable.
8. Piping in mechanical rooms, except exposed gas and fire protection piping.
9. Concealed, miscellaneous metal, except for shop prime coat touch-up.
10. Factory finished equipment, except for touch-up, unless otherwise specified herein.
11. Concealed piping.
12. Communication and data wiring in cable trays
13. Items permanently concealed above ceilings.

D. Surface Preparation

1. It is the intention of this specification that new substrates will be ready for decoration as specified herein except for normal construction dust and soiling.
2. Surfaces and materials installed by other trades are required to be acceptable for work specified under Part 3, Surface Preparation. Specifically, new surfaces to be clean, sound, free from loose particles, dirt, loose mortar and grease.
3. Existing Surfaces: Unless otherwise specified, provide all surface preparation required for decoration.

1.02 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to

outdoor ambient temperatures. Examples include installations within unheated shelters.

1.03 QUALITY ASSURANCE

- A. Application: Performed only by skilled, experienced painters.
- B. Provide lead free prime and finish coatings. All top coatings shall be mold and mildew resistant.
- C. Coordination: Provide finish coats compatible with prime paints used. Review other specification sections to ensure compatibility of total coating system with prime paints provided for the various substrates. Provide barrier coats over non-compatible primers or remove primer and reprime as required. Notify the Architect of anticipated problems using coating systems specified on substrates primed in accordance with other section requirements.
- D. Reference Specifications

- 1. The following Society for Protective Coatings (SSPC) specifications are referenced by code number within this Section.

<u>Code</u>	<u>Method</u>
SP-1	Solvent Cleaning
SP-2	Hand Tool Cleaning
SP-3	Power Tool Cleaning
SP-6	Commercial Blast Cleaning
SP-11	Power Tool Cleaning to Bare Metal
SP-16	Brush-off Blast Cleaning of Non-Ferrous Metals

- E. Job Mock-Ups: Mock-ups will serve as standard for acceptance of work. Leave approved mock-ups in place as part of completed project. Manufacturers' representatives shall be available to advise applicator on proper application techniques and procedures. Locate mock-up areas as directed by Architect. Provide the following mock-ups of spaces or areas indicated:
 - 1. Concrete Masonry, Painted Finish: 50 square feet.
 - 2. Ductwork: 6 linear feet of each paint type and ductwork material.
 - 3. Exterior Brick, Painted finish: 50 square feet.
- F. Paint walls prior to installing wall mounted signage.
- G. Prepainting Walk-Through: In areas where ceilings and walls are scheduled or indicated to be field painted, and equipment, ductwork, piping, conduit and other wall/ceiling mounted or suspended items are exposed, the areas are to be reviewed to determine colors of the various items.

1. Attendance: Contractor, painter and Architect.
2. Items to be painted colors other than the background wall or ceiling will be identified.

1.04 SUBMITTALS

- A. Submit a complete selection of manufacturer's color chips indicating color, texture and sheen for approval for each finish specified herein.
- B. Submit a complete schedule for identifying manufacturer and specific brand name or number of products proposed for finishing specified surfaces.
 1. Provide percent of solids by volume content data for each paint material.
 2. Provide paint label analysis and application instructions for each type paint.
- C. Provide one (1) unopened gallon of each type and color of paint and stain required for maintenance purposes. Provide original, unopened, labeled containers with color samples and a list of project use. Extra materials are not to be used for touch-up by Contractor.
- D. Color/Finish Samples
 1. After receiving color chips from the Contractor, the Architect will provide a complete schedule of colors and sheens desired.
 2. Obtain schedule well in advance of commencing work and submit samples of specified finishes for approval.
 3. Submit duplicate samples on the same kind of materials to which finishes will be applied. One half of the sample shall show the completed treatment and the other half shall show the successive steps, taken in producing the finish. When approved, samples will be so marked; one set will be retained by the Architect and one set will be returned for the painter's use.
 4. No finishes shall be applied on the work until samples are approved. Approved samples shall be strictly duplicated in the work. Additional coatings, if required to reproduce approved samples, shall be applied without additional cost to the Owner.
 5. Use representative colors when preparing samples for Architect's review.
- E. Statement From Manufacturer
 1. Contractor, in submitting the list of proposed subcontractors, shall include for approval, along with the name of the painting subcontractor, the names of the manufacturers whose materials the subcontractor proposes to use in the work.
 2. Following tentative approval of the subcontractor and the materials manufacturers, notify the manufacturers, in writing, that the specifications require the manufacturers to submit to the Architect, a statement by a corporate officer of the manufacturer that coatings scheduled by the Architect are proper for the intended use and that the manufacturer's representative will be available to advise the Architect and the Contractor

regarding applications of all coatings.

- F. Close-Out Material List: Provide a list of all paint and coating materials used on the project. Include manufacturer, product number, color and room/location where used.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials on the job site in original, new, unopened packages and containers bearing the manufacturer's name and label, and the following information:
 - 1. Name or title of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Manufacturer's name.
 - 4. Contents by volume, for major pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
- B. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage and deterioration. Store paint materials at minimum of 50° F.
- C. Maintain paint material storage space as clean, non-hazardous and orderly. Place waste and soiled paint rags in tightly covered metal containers; safely dispose of at end of each working day. Take every precaution to avoid fire hazards and spontaneous combustion. Provide acceptable type of fire extinguisher immediately adjacent to paint storage area.

1.06 PROJECT CONDITIONS

- A. Coordinate painting and finishing work with other trades to ensure adequate illumination, ventilation and dust-free environment during application and drying of paint and finish treatments.
- B. Maintain uniform interior building temperature of minimum 50° F for 24 hours before, during and continuously for 48 hours after painting.
- C. Do not apply coatings when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide adequate ventilation as required for specified paint and finish treatment materials in spaces scheduled. Maintain for time periods recommended by material manufacturer to provide proper drying.
- E. Provide adequate illumination on surfaces to be finished. Maintain a minimum 80 foot candle lighting level measured mid-height at substrate surface.

- F. Protect adjoining surfaces against damage or soiling.
- G. Maintain work in neat and orderly condition, promptly removing empty containers, wrappings, soiled rags, waste and rubbish from site.
- H. Material Safety Data Sheets (MSDS): Provide documents available to Owner's Representative and construction personnel at the job site. Comply with MSDS requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Paint: Brands of paint and stain are specified in "Paint and Material Finish Schedule," only to establish a standard of quality. Other paint brands and manufacturers such as BENJAMIN MOORE; BEHR/KILZ; MARTIN SENOUR; PPG PAINTS; PRATT AND LAMBERT; CORONADO PAINT COMPANY, SHERWIN WILLIAMS are acceptable with proof of comparable products and satisfactory experience records for the intended use. Comply with VOC content of materials specified.
 - 1. Colors: As indicated on drawing; colors not indicated to be as selected by Architect.

2.02 MATERIAL GENERAL

- A. Material Compatibility
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.03 ACCESSORY MATERIAL

- A. Application Equipment: Not required to be new, but shall be adequate for the work and workmanship required herein.
- B. Accessories: Provide all required ladders, scaffolding, drop cloths, masking, scrapers, tools, dusters and cleaning solvents as required to perform the work and achieve the results specified herein.
- C. Secondary products not specified by name (i.e. turpentine, thinners, mineral spirits, fillers, linseed oils, etc.) shall be "best grade" or "first line" products.
 - 1. Filler material shall be woodworker's option of material that can be tinted

and worked so as to match adjacent wood surfaces.

2.04 EXTERIOR PAINT AND FINISH MATERIAL SCHEDULE

- A. Apply paint and finish materials to substrate surfaces indicated. Apply touch-up prime coats in addition to shop-applied prime coats. Provide additional job site prime coats when indicated.
- B. Metals - Ferrous: Galvanized and Shop Primed (Semi-Gloss).
 - 1. SW
 - a. Primer: SW ProCryl Universal Metal Primer BB-310 Series One (1) Coat
 - b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating B66-650 Series. Two (2) coats.
 - 2. PPG
 - a. Primer: Pitt-Tech Plus 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer 4020 PF Series. One (1) coat.
 - b. Finish: Pitt-Tech Plus 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.
- C. Metal – Ferrous: Unprimed (Semi-Gloss).
 - 1. SW
 - a. Primer: SW ProCryl Universal Metal Primer BB-310 Series One (1) Coat
 - b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating, B66-650 Series . Two (2) coats.
 - 2. PPG
 - a. Primer: 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer. One (1) coat.
 - b. Finish: 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.
- F. Exterior Brick Masonry
 - 1. SW
 - a. Primer - 1 coat SW Loxon Masonry surfacer - primer
 - b. Finish - 2 coats SW A-100 Exterior Latex Flat (or Satin).
 - 2. PPG
 - a. Primer – 1 coat PPG Perma-Crete Interior/Exterior Alkali Resistant Primer 4-603XI
 - b. Finish – 2 coats Speedhide Exterior 100% Acrylic Latex Flat 6-610XI Series. (or Satin 6-2045XI).Two (2) coats.

2.05 INTERIOR PAINT AND FINISH MATERIALS SCHEDULE

- A. Apply paint and finish materials to substrate surfaces indicated. Apply touch-up prime coats in addition to shop-applied prime coats. Provide additional job site

prime coats when indicated.

B. Gypsum Board and Plaster – Walls.

1. SW
 - a. Primer: ProMar 200 Zero VOC Interior Latex Primer B28W2600 Series.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Eg-shel B20 Series Two (2) coats.
2. PPG
 - a. Primer: SpeedHide zero Interior Zero VOC Latex Sealer 6-4900XI Series. One (1) coat.
 - b. Finish: Speedhide zero Interior Zero VOC Latex Eggshell 6-4310XI Series. Two (2) coats.
3. Surfaces: Gypsum board wall surfaces.

C. Gypsum Board and Plaster – Ceilings/Soffits.

1. SW
 - a. Primer: ProMar 200 Zero VOC Interior Latex Primer B28W2600 Series.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Flat B30 Series . Two (2) coats.
2. PPG
 - a. Primer: Speedhide zero Interior Zero VOC Latex Sealer 6-4900XI Series. One (1) coat.
 - b. Finish: Speedhide zero Interior Zero VOC Latex Flat 6-4110XI Series. Two (2) coats.
3. Surfaces: Ceilings, soffits, bulkheads

D. Concrete Masonry Surfaces (Semi-Gloss).

1. SW
 - a. Filler: Preprite Block Filler B25W25. Minimum 8 mil dft to pin hole free.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Semi Gloss B31 Series. Two (2) coats.
2. PPG
 - a. Filler: Speedhide Int/Ext Acrylic Hi-Fil Block Masonry Block Filler 6-15XI Series. Minimum 8.5 mil dft to pin hole free.
 - b. Finish: Speedhide zero Interior Zero VOC Latex Semi-Gloss Enamel 6-4510XI Series. Two (2) coats.
3. Surfaces: New masonry walls, graphics (do not use in high humidity areas).

E. Metals - Ferrous: Shop Primed and Unprimed.

1. SW
 - a. Primer: S-W Pro Industrial Pro-Cryl Primer, B66-310 Series

- b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating, B66-650 Series. Two (2) coats.
 - 2. PPG
 - a. Primer: Pitt-Tech Plus 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer. One (1) coat.
 - b. Finish: Pitt-Tech Plus 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.
 - 3. Surfaces: Hollow metal doors, frames, door mullions, ferrous metal surfaces.
- F. Metals - Ferrous: Galvanized.
 - 1. SW
 - a. Primer: ProCryl Universal Metal Primer B66-310 Series
 - b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating, B66-650 Series. Two (2) coats. Two (2) coats.
 - 2. PPG
 - a. Primer: Pitt-Tech Plus 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer.
 - b. Finish: Pitt-Tech Plus 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.
 - 3. Surfaces: Hollow metal doors, frames, door mullions, galvanized metal surfaces.
- G. Steel Stairs and Railings: Steel and Iron Finish
 - 1. SW
 - a. Prime Coat: ProCryl Primer B66-310. One coat.
 - b. Finish Coat (All steel exposed to view): Water Based Acrolon 100 Urethane B65-720 Series. Two coats.
 - 2. BENJAMIN MOORE
 - a. Prime Coat: Waterborne Polyamid Epoxy Gray Primer Series M42. One (1) coat.
 - b. Finish Coat (All Steel Exposed to View): Waterborne Urethane Semi-Gloss Finish Series M73S. Two (2) coats.
 - 3. PPG
 - a. Prime Coat: Multiprime Low VOC High Performance Universal Primer 4360 Series. One (1) coat.
 - b. Finish: Amershield Low VOC Polyester Acrylic Polyurethane Enamel AMV-3/01. Two (2) coats.
- H. Exposed Structure - Ferrous (Eg-Shel): Dryfall
 - 1. SW
 - a. Primer: ProCryl Universal Primer, B66-310 Series
 - b. Finish: Low VOC Waterborne Acrylic Dry Fall, B42W82 Two coats.
 - 2. PPG
 - a. Primer: Pitt-Tech Plus 4020 Acrylic Interior/Exterior Primer/Finish

- DTM Industrial Primer 4020 PF Series. One (1) coat.
- b. Finish: Speedhide Interior Super Tech WB Acrylic Dry Fog Latex, 6-725XI. Two (2) coats
- 3. Surfaces: Exposed metal decking, trusses, structural steel, metal joists.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrate surfaces and installation condition. Report condition(s) that might affect proper application.
- B. Do not proceed with painting work until unsatisfactory conditions have been corrected.
- C. Initial application of paint to a surface constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- D. Examine specification sections of other trades and their provisions regarding painting. Surfaces left unfinished shall be painted or finished as part of the work of this Section unless specifically noted otherwise.

3.02 SURFACE PREPARATION

- A. General
 - 1. Broom clean and remove excess dust before painting is started in any area.
 - 2. Broom cleaning is not permitted after operations have begun in a specific area.
 - 3. Surfaces shall be clean, dry and adequately protected from dampness.
 - 4. Surfaces shall be free of any foreign materials that will adversely affect adhesion or appearance of applied coating.
 - 5. Remove any mildew and neutralize the surface prior to applying coating.
- B. Existing Surfaces Scheduled for Painting or Finishing
 - 1. Condition, clean, sand, prime, seal and prepare existing surfaces for application of finish materials specified. Provide only finish coats over existing surfaces except where condition of existing surfaces or type of existing surface requires priming and sealing.
 - 2. Remove loose, blistered, scaled, or crazed finish to bare base material.
 - 3. At conditions where new work adjoins existing work, prepare existing surface extending to the nearest break in the plane of the surface.
- C. Concrete/Brick Masonry and Concrete
 - 1. Remove splatters, dust and dirt by brushing or water washing with clear water.

2. Remove misplaced mortar.
3. Cracks, abrasions and other defects shall be cut out, patched flush, and sanded smooth and sealed before applying prime coat.
4. Existing Surfaces
 - a. Surfaces with minor loose or blistered paint: Remove loose, flaking, and blistered paint; clean as specified. Fill surface cracks with approved latex base filler. Apply primer-sealer over bare substrate and filled cracks.
 - b. Multi-coated surfaces with major loose or blistered paint requiring complete paint removal: Remove paint down to bare substrate using chemicals, pressure methods, or other acceptable methods. Fill contraction and structural cracks with self-bonding filler or elastomeric sealant worked well into the cracks to prevent leaks, then wipe excess materials from the surface. Apply a latex base or other acceptable prime and fill material to fill all defects and holes, wipe excess material off surface; let filler material dry for 24 hours minimum before applying primer.
5. All Surfaces
 - a. Clean all cementitious substrates pursuant to the requirements of SSPC-SP 13.

D. Structural Steel and Miscellaneous Ferrous Metal

1. Bare Metal Surfaces
 - a. Remove grease, oil, dirt and other foreign material prior to prime coat application where necessary according to SP-1, SP-2 and/or SP-3.
 - b. Power tool clean remove rust prior to prime coat application according to SP-11.
 - c. Include all hangers and miscellaneous fabricated items.
2. Shop Primed Surfaces
 - a. Fill open joints or abrasions in shop prime coat with filler; feather edges, sand smooth, and touch-up with primer compatible with shop primer. Extend primer beyond treated area.
 - b. Remove grease, oil, dirt and other foreign material prior to prime coat touch-up where necessary according to SP-1, SP-2 and/or SP-3.
 - c. Include all hangers and miscellaneous fabricated items.

E. Galvanized or Zinc-Coated Items

1. Pretreat surfaces prior to application of prime coat with phosphate pretreatment, similar to Great Lakes Labs, "Clean and Etch", Dupont's Metal Conditioner #5717 or PPG DX 579, unless prime coat material to be used is recommended by its manufacturer for direct application over zinc treated surfaces of the type at hand. Follow manufacturer's directions.
2. Remove dirt or grease on surfaces scheduled for paint finish according to SP-1. Wipe dry with clean cloths.
3. Roughen surface with steel wool as necessary to remove gloss.

F. Gypsum Board

1. Fill minor irregularities with spackling paste.
2. Sand to smooth level surface and dust off.
3. Avoid raising nap of paper.

G. Factory Primed Items: Verify compatibility between factory applied primer and finish painting system. If compatibility cannot be guaranteed, then provide barrier coat compatible with both finishes.

H. Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants. If aluminum does not come from the manufacturer with an approved paint grip finish, consult the coating manufacturer for the appropriate surface preparation requirements. Minimum requirement to meet SSPC SP 16.

3.03 APPLICATION

A. General

1. Only skilled mechanics shall be used.
2. Apply all paint in strict accordance with the manufacturer's instructions. Data sheets take precedence over these specifications if more restrictive.
3. Do not apply until preceding coat is dry to manufacturer's recommendations.
4. Do not apply to any surface unless it is thoroughly dry.
5. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes if moisture content of surface is greater than recommended by manufacturer.
6. Do not use material that has exceeded the pot life stated by the manufacturer.
7. Apply to the following workmanship requirements:
 - a. Neat appearance of finished surfaces.
 - b. Absence of ridges, sags, runs, drops, laps, unnecessary brush marks, holidays, air bubbles and excessive roller stipple.
 - c. Thorough mixing of paint and limited use of thinners.
 - d. Uniformity of film thickness.
 - e. Proper drying time between coats.
 - f. Protection of unpainted and finished surfaces.
8. Coverage and hide shall be complete. When color or undercoats show through final coat, recoat until the paint film is of uniform finish, color, appearance, and coverage, at no additional cost to Owner.
9. Edges of paint or finish adjoining other materials or colors shall be sharp and clean without overlapping.

B. Methods

1. Application may be by roller, brush, spray or other approved means.
2. When utilizing spraying, be careful not to use methods which will affect other trades work in adjacent areas.

C. Mixing

1. Mechanically mix before use.
2. Agitate during application as required.
3. Do not tint or shade in field unless permitted by Architect.

D. Thinning

1. Dilute only as required to achieve suitable application viscosity.
2. Use only type and amount recommended by manufacturer.

E. Approvals: Do not apply succeeding coat of paint until previous coat has been inspected and written approval is given.

F. Electrical Conduits

1. Do not paint any electrical conduit or boxes unless they are exposed and abutting a surface that is to be painted or stained.
2. Conduits and boxes to be painted shall be given a coat of galvanizing pretreatment followed by the paint system for the adjoining surface.

G. Protection of Surfaces

1. Provide covers, drop cloths and masking to protect unpainted surfaces previously finish painted. Use special care in protecting electrical and mechanical items which may be damaged by the painting operations (i.e., overspray and solvents that might damage the internals of the item).
2. If possible, remove items not to be painted such as hardware, accessories, electrical plates, lighting fixtures and/or trim, mechanical grilles and louvers and similar items in contact with painted surfaces.
3. Use caution when painting exterior work to avoid wind carrying overspray, drippings, etc., onto adjacent structures, facilities and vehicles.
4. Following completion of painting, reinstall removed items by workmen skilled in the trade involved and remove all covers, masking and drop cloths.

H. Fire and Smoke Partitions: Conform to OBC 703.7.

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 3 inches high with a minimum 3/8 inch stroke in contrasting color.
2. Stenciled message: "SMOKE PARTITION or X HOUR FIRE PARTITION – PROTECT ALL OPENINGS" as applicable.
3. Locate within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition

4. Use semi-gloss paint of color that contrasts with color of substrate.
5. Locate approximately 12" above ceiling tile.

END OF SECTION

SECTION 10 14 10

INTERIOR SIGNAGE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide the following interior signs:
 - 1. Room numbers with room identification.
 - a. Permanent room locations
 - b. Changeable copy at non-permanent.
 - 2. Accessible Restrooms
 - a. Men
 - b. Women
 - c. Unisex or Family
 - 3. Stairwell identification.
 - 4. Floor level identification (stairwell).
 - 5. Directional/Informational signs.
 - 6. Elevator door jamb plate (floor numbering).
 - 7. Emergency escape directories.
 - 8. Maximum occupancy limit.
 - 9. Elevator fire emergency plaque.
 - 10. Tactile (ADA) exit signs
- B. Work also includes exterior signage at:
 - 1. Exterior stairwell egress locations
 - 2. Applied vinyl lettering at main entrance(s) glass door(s).
 - a. No smoking icon and copy
 - b. Weapons free icon and copy
- C. All signs which identify permanent facilities/accommodations shall be tactile and braille and limited minimally to room numbers, restrooms, stairways, floor identification, elevators, exit and room names as deemed appropriate by the Owner, local jurisdictions, codes, and Fire Marshall.
- D. Intent of this specification is to establish required signage for project occupancy and for bidding purposes. Final design material intent is to be established with Owner staff and their consultants.
- E. All signage types and quantities are to be submitted and approved per local jurisdictions, codes and Fire Marshall before fabrication.

1.02 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Submit manufacturer's product data, where applicable, and complete drawings showing all identifying devices and installation details.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 2. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples: Submit samples for materials, finishes, colors, letter styles, etc., as required for selection and approval by Architect prior to fabrication of identifying devices.
 - 1. Sample for Verification: Full-size sample.
- D. Final signage schedule must be approved by Owner prior to fabrication. Submittal to Owner should be made through the Architect.

1.03 QUALITY ASSURANCE

- A. Signage Standards: Conform to the Americans with Disabilities Act (ADA) Standards and ANSI A117.1 where applicable and to the extent as indicated.
- B. Acceptable Manufacturers: All units are to be custom fabricated; manufacturer's products meeting the specifications will be acceptable. Manufacturers must be regularly engaged in fabrication and installation of signage units and related identifying devices.
 - 1. Fabricator shall make at least one visit to the site before production begins to review all sign locations and installation conditions with Architect and Owner's representative.
 - 2. Fabricator must review all dimensional changes with Architect.
- C. Approvals: All identifying devices shall be approved at the fabricator's shop by the Architect prior to shipment and installation.
- D. Spelling and Braille Accuracy: Responsibility of sign manufacturer.
- E. The Owner has the right to renumber the room numbers during construction. Manufacturer must not begin fabrication of room number plates until room numbers have been approved by the Owner, in writing, through the Architect.
- F. Room identifications will be provided to the Contractor by the Owner during construction.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original shipping cartons with seals unbroken.

- B. Protect materials from physical damage.
- C. Store materials in clean, dry area.
- D. Inspect all materials prior to installation to assure proper function and condition of all items.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Locations, Quantities, Graphics and Copy: As indicated on drawings and/or specified (scheduled) herein.
- B. Sign System: Provide with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles

2.02 MATERIALS

- A. Acrylic Plates: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
 - 1. Colors: As selected by Architect.
 - 2. Thickness: 1/4"
 - 3. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as required.
 - 4. Backer: 1/8" thick white PVC adhered to backside and not visible from front.
- B. Aluminum Sheet and Plate: ASTM B 209 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Changeable Copy: Provide back-up plate laminated to back of face plate to create slot for removable nameplates.
- D. Provide an integral method to create tactile and Braille signs; producing a unitary component. Glued on or laminated letters or Braille cells are not acceptable.

2.03 DESIGN GUIDELINES

- A. Plate Shape: Square cornered; do not bevel edges.
- B. Letter Style: Font as indicated or selected.
 - 1. ADA Signs: All capital letters.
 - 2. All Other Signs: Mixed upper and lower case.
 - 3. Copy Position: 3/4" from left or as indicated.

- C. Tactile Letters and Braille: Grade II braille; raised 1/32" above background surface. Provide Braille clear dome topped. Sign manufacturer shall be responsible for verifying accuracy of spelling, both tactile and Braille.
- D. Letter Size
 - 1. Tactile Signs: Minimum letter size is 3/4" for capital letters. Room numbers to be 1".
 - 2. Non-tactile Signs: Between 3/8" and 1" capital letter height. Larger letters are permitted on directional signs or on signs where reading distance is greater than 15'-0".
 - 3. Overhead Signs: Minimum 3" copy. Mixed upper and lower case is permissible. Non-tactile is permissible.

2.04 SIGNS REQUIRED FOR TACTILE/BRAILLE

- A. Room Numbers and Identification: 6" x 6" plate with 1" numerals on plate with Braille directly below numerals.
 - 1. Permanent Room Identification: Size determined by copy requirements, laid out flush left with 3/4" margin on left, room name.
 - 2. Non - Permanent Room Insert Window: P95 clear acrylic in bottom portion joined together by PVC backer plate. Size to be determined.
- C. Restrooms - Wheel Chair Accessible: Approximately 6" wide x 8" high plate with 3/4" capital letters (MEN or WOMEN), on plate with Braille centered directly below the word. Provide a wheel chair access symbol and a universal man or woman symbol located above the word. No border.
 - 1. Unisex and/or Family: Similar to above.
- D. Stairwell Identification: 7" x 7" plate with 3/4" capital letters centered on plate with stair symbol. Braille centered directly below the type copy.
- E. Floor Level Identification - Inside Stairwells: 10" x 12h" plate with 5" floor level numeral and capital letters (STAIR 1 FLOOR, STAIR 2 FLOOR, etc.) and (1 LEVEL ABOVE EXIT DISCHARGE, 2 LEVEL ABOVE EXIT DISCHARGE, ETC), centered on plate above and below floor level numeral. Braille centered directly below the floor level numeral.
- G. Directional/Informational Signs: Sign and content as selected or indicated. Wall mounted; non-tactile; in upper and lower case. Letter height shall be at least 1" cap height for directional signs. Letter sizes for informational signs may be less than 1".
- H. Elevator Door Jamb Plate: 3-3/4" x 3-3/4" plate with 2" numerals centered horizontally on plate with Braille centered directly below numerals.
- I. Tactile (ADA) Exit Signs: Approximately 6w" x 4" plate with 1" high capital letters on plate. Braille centered directly below the type copy.

2.05 SIGNS REQUIRED FOR NON-TACTILE/BRAILLE SIGNAGE

- A. Plate Shape: Square cornered; do not bevel edges.
- B. Emergency Escape Directory: Provide upper and lower materials and content joined together by PVC backer plate.
 - 1. Upper Description: Brushed aluminum sheet approximately 11" x 4". Text to read, "In Case of Fire Do Not Use Elevators Please Use Stairs" in 1" letters with Braille centered below. Graphics to include stair symbols with running person and red fire symbol.
 - 2. Lower Description: Acrylic plate with 1/8" thick clear acrylic lense with spacers and first surface white vinyl top and bottom masks to hide spacers. Provide with window inserted acetate printed building map. Coordinate with Architect.
- C. Maximum Occupancy Limit: 6" x 6" plate with 3/4" letters indicating "Maximum Occupancy of this space is: (EXAMPLE - 250 People).
 - 1. Occupancy number height: 1"
- D. Exterior Stairwell Identification: 6" x 6" painted aluminum plate with applied vinyl 1" letters. Provide at each egress door.
- E. Exterior Applied vinyl lettering at main entrance(s) glass door(s). White glazing film.
 - 1. No smoking 6" icon and approved copy.
 - 2. Weapons free 6" icon and 1" approved copy

2.06 COPY POSITION

- A. Lines of copy laid out flush left with a margin of 3/4" along the left edge of plate. Exceptions as indicated.
- B. Left hand, right hand and bottom margins are 3/4". Vertical spacing measured between lower case letters is 3/8". Overall width and height of a plate is achieved with multiples of 3/4".
- C. Locate directional arrows in upper left hand corner of plate. Arrows count as one line of copy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount signs plumb and level.

- B. Mount all interior identification devices with 3/4" foam tape on all four edges.
- C. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.02 SIGNAGE SCHEDULE

- A. Room Identification Signs: Each sign will contain 20 symbols/characters arranged in one or two lines. Provide room numbers and identification (permanent or non - permanent as directed) at all door locations.
- B. Restrooms:
 - 1. Women, handicap symbol and international symbol, as applicable, at each restroom.
 - 2. Men, handicap symbol and international symbol, as applicable, at each restroom.
 - 3. Provide baby changing symbol if rooms contains.
- C. Stairwell Identification: Provide at all stair doors.
- D. Floor Identification: Provide inside stairwell at all stair doors.
- E. Elevator Fire Emergency Plaque: Provide at each elevator stop.
- F. Elevator Door Jamb Plates: Two plates required per elevator door, one on each side of the jamb.
- G. Emergency Escape Directory: Provide at each floor. Locations to be determined and approved by local codes and jurisdiction authorities.
- F. Directional/Informational Signs: For bidding purposes, provide one per stair door on each floor and an additional one per lobby and vestibules on the entry floor. Each sign will contain 25 symbols/characters arranged in two lines. Locate as directed by Architect.
- G. Posted Occupancy Limit: Provide at all rooms exceeding 49 occupants.
- H. Tactile (ADA) Exit Signs: Locations to be determined and approved by local codes and jurisdiction authorities.
- I. Sign Locations
 - 1. Single Doors: Locate signs on the wall next to the latch side of the door, 1" from the outside edge of the door frame and with the top edge of the uppermost sign 61-1/2" A.F.F.
 - 2. Pairs of Doors: Locate signs as specified above for single doors, except Architect will direct in field if sign occurs on right or left jamb of opening.
 - 3. Doors with Borrowed Lights: Locate as directed by Architect.

3.03 CLEAN UP

- A. After completion of work remove all debris and tools from the premises, clean all adhesive spatter and run-over from finished surfaces and wash all plated clean of fingermarks and soil. Polish sign surfaces with a soft cotton rag.

END OF SECTION

SECTION 10 14 19

DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wall mounted building identification letters.

1.02 SUBMITTALS

- A. Layout Drawings: Provide full size layout drawing indicating letter style, size and spacing.
- B. Product Data: Submit for each cast dimensional character specified, including details of construction relative to materials, dimensions, gages, profiles, method of mounting, specified options, and finishes.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in manufacturer's original unopened protective covering.
- B. Store in original packing.
- C. Handle so as to prevent damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Material: Cast aluminum; alloy and temper as recommended by sign manufacturer for the casting process used and for the use and finish indicated.
- B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- C. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Furnish inserts, as required, to be set into masonry work.

2.02 DIMENSIONAL LETTERS

- A. Cast Letters: Form individual letters by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements specified for finish, style and size.

- B. Text: As indicated.
- C. Letter Style: As selected
- D. Size: As indicated
- E. Thickness: 1" minimum.

2.03 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.04 FINISH

- A. General: Comply with NAAMA "Metal Finishes Manual" for finish designations and applications recommendations.
- B. All exposed aluminum surfaces: Baked-enamel finish; color as selected by Architect.

2.05 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, letters manufactured by A.R.K. RAMOS, ANDCO INDUSTRIES CORP., ASI SIGN SYSTEMS or VOMAR PRODUCTS, INC. are acceptable

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

3.02 INSTALLATION

- A. Securely install in location indicated on the drawings in accordance with manufacturer's written instructions and recommendations.
 - 1. Install letters level, plumb, true to line and at heights and locations indicated, with surfaces free from distortion or other defects in appearance.
 - 2. Mount letters with 1" projection from wall surface.

3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 21 14

PHENOLIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide phenolic toilet partitions and urinal screens with related components and accessories for complete installations.

1.02 RELATED SECTIONS

- A. Toilet Accessories: Section 10 82 13.

1.03 SUBMITTALS

- A. Shop Drawings: Submit in accordance with the General Conditions and Section 01 33 23. Include the following:
 - 1. Manufacturers product data.
 - 2. Plans, elevations, details of construction, sizes of openings, anchoring devices, leveling details, hardware fittings, and fastenings.
- B. Color Selector: Complete range of manufacturer's colors.

1.04 QUALITY ASSURANCE

- A. Take field measurements prior to fabrication to assure proper fitting.
- B. Provide setting drawings, templates, instructions and directions for installation of anchorage devices.
- C. Installer Qualifications: Minimum five (5) years continuous experience installing toilet compartments on projects of equivalent size, quantity and complexity.
- D. Regulatory Requirements: Conform to ANSI A117.1 code for access for the handicapped operation of toilet compartment door and hardware.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging. Store materials in original packaging to prevent soiling, physical damage or wetting.
- B. Handle so as to prevent damage to finish surfaces.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. General: Material and products to be manufactured regionally AND harvested, extracted, or recovered regionally within a radius of 500 miles from the project site.
- B. Type: Floor mounted, overhead braced type, standard height, width as required to fit between walls or as indicated.
- C. Materials: Provide manufacturer's standard doors, pilasters and panels fabricated specifically for the partition system.
 - 1. Doors, Pilasters and Panels
 - a. Cores: Solid phenolic. All edges shall be polished black.
 - b. Face Finish
 - 1) High pressure, matte finish, melamine surface fused to core.
 - 2) Colors: As selected by Architect.
 - c. Edges: Eased and polished
 - 1. Doors: No sightline profile type. Match pilasters and panels.
- D. Components
 - 1. Doors, Pilasters and Panels
 - a. Stiles: $\frac{3}{4}$ " thick.
 - b. Panels: $\frac{1}{2}$ " thick.
 - c. Doors: $\frac{3}{4}$ " thick
 - d. Fire Classification: ASTM E84, Class II.
 - 1) Flame Spread: 70.
 - 2) Smoke Density: Under 100.
 - 2. Hinges: Gravity type, adjustable to hold door open at any angle up to 90 degrees. 3 hinges per door.
 - 3. Headrail: Aluminum extrusions, anodized with anti-grip configuration; fastened to the pilaster tops.
 - 4. Latch: Minimum 14 gage. Recessed latch unit. Latch units shall have emergency access capability.
 - a. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.
 - 5. Keeper: Minimum 11 gage. Covers top and bottom of latch when door is in closed/locked position.
 - 6. Stops: Minimum 11 gage. 2 required per door.
 - 7. Brackets: U-shaped channels, aluminum, anodized and polished with 3 brackets per connection
 - 8. Shoes: Nominal 4" high, one piece, stainless steel shoe to conceal leveling device on stiles. #4 finish.
 - 9. Coat Hook: BOBRICK B-233

10. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors
11. Coat Hook: Manufacturer's standard at out-swinging doors.
12. Exposed Fasteners: Theft proof, stainless steel, polished finish.

- E. Urinal Screen: Provide wall mounted type consisting of $\frac{3}{4}$ " thick screen panel and required fittings and hardware.

2.02 FABRICATION

A. Reinforcement

1. Provide threaded steel inserts and reinforcement for installation of hardware, fittings, brackets and accessories specified elsewhere.
2. Where grab bars attach to toilet partitions, reinforce as required to support 300 pounds, minimum.

B. Panels, Doors, Posts and Stiles

1. Provide leveling devices at floor, bolted to panels and concealed with removable shoes as specified below.
2. Ease edges for smooth surface, free of sharp corners.
3. Panels and doors to be approximately 58" high; provide bottom 12" above floor.
4. Door Dimensions: Unless otherwise indicated, furnish 24" wide in-swing doors for ordinary toilet compartments and minimum 32" wide (clear opening) out-swing doors for compartments that meet the requirements of the Americans with Disabilities Act (ADA).

2.03 MANUFACTURER

- A. Subject to compliance with specified requirements, provide partitions by one of the following:

1. ACCURATE PARTITIONS CORPORATION.
2. AMPCO, INC.
3. BOBRICK
4. BRADLEY CORPORATION
5. GENERAL PARTITIONS MFG. CORP.
6. GLOBAL STEEL PRODUCTS CORP.
7. KNICKERBOCKER PARTITION CORPORATION.
8. METPAR CORP.
9. SPEC-RITE

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's specifications.
1. Field verify dimensions.
 2. Securely fasten in place, neat, level and plumb.
 3. Evidence of drilling, cutting and fitting to room finish shall be concealed in finished work.
 4. Adjust doors to swing freely and to remain open approximately 6" when unlatched.
 5. Set units with not more than 1/2" between pilasters and panels, and not more than 1" between panels or doors and walls.
 6. Adjust bottoms of doors level when doors are in closed position.
 7. Clean exposed surfaces and touch-up minor finish imperfections using materials and methods recommended by partition manufacturer and as acceptable to Architect.

END OF SECTION

SECTION 10 22 21

DEMOUNTABLE GLASS PARTITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes unitized, movable partition system consisting of aluminum framed butt glazed glass fixed panels and frameless sliding glass doors in configurations shown.

1.02 REFERENCES

- A. American with Disabilities Act (A.D.A.). ICC/ANSI A117.1 Guidelines for Accessible and Useable Buildings and Facilities
- B. American Society for Testing and Materials (ASTM)
 - 1. B221: Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.
 - 2. C1396: Gypsum Wallboard.
 - 3. C1036: Standard Specification for Flat Glass
 - 4. E84: Test for Surface Burning Characteristics of Building Materials.
 - 5. E90: Test for Laboratory Measurement of Airborne Sound transmission Loss of Building Partitions.
 - 6. E413: Classification for Rating Sound Insulation.
 - 7. E1300: Standard Practice for Determining Load Resistance of Glass in Buildings
- C. IFMA X5.6-1986: Standard for Office Furnishings; Panel Systems, Tests.
- D. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.
- E. ICBO: Uniform Building Code
- F. ICC: 2000 International Building Code

1.03 SYSTEM DESCRIPTION

- A. Unitized Movable Partition System
 - 1. Product of manufacturer regularly engaged in Work of this Section.
 - 2. Unitized, full-height, movable partition system for interior use, designed to permit relocation, reconfiguration, and reuse of all parts.
 - 3. Non-progressive; allow for removal and reinstallation of panels from either side of partition and at any point in a given panel run without disturbance of adjacent panels.
 - 4. Panels, corner posts and finished end conditions to be joined with single

flush panel connector.

5. Glass Module sizes available from 6" to 60" increments.
6. Erected and disassembled in a manner to prevent damage to adjacent building surfaces and elements, including floors, walls, ceilings, columns, and window mullions.
7. All panels of like module, regardless of type, to be interchangeable, utilizing the same panel connector post cap.
8. Panel connection system to accommodate addition of slotted standards and brackets for mounting of systems furniture wall units produced by various manufacturers.
9. Single sliding barn style aluminum framed glass doors Door units interchangeable with like sized panels using same connection method as panels.
10. Panels complete with unitized base that is factory installed to eliminate loose hardware on floor when panels are moved.
11. Floor Gripper Plates designed as an integral part of floor channel, not requiring activation or adjustment upon panel installation. Plates allow for left or right adjustment of each panel without lifting panel from the floor.
12. System components constructed and finished at factory, not requiring additional construction or finishing in the field.
13. Spring loaded wall starter channel units to be complete with integrated gasket to ensure tight fit for sound and light seal.

B. Performance Requirements

1. Acoustical Attenuation: Overall STC rating of 34 when tested in accordance with ASTM E90 and classified in accordance with ASTM E413.
2. Vertical Load Capacity: Comply with ANSI/BIFMA X5.6.
3. Lateral Load Capacity: Wall panels to comply with partition design requirements for lateral load resistance as specified by the Uniform Building Code (Sections 1611.5 & 1632), the BOCA National Building Code Sections 1604.5.6, 1606.9, & 1610.6), the Standard Building Code (Sections 1604.5, 1607.6, & 1610.1), or the International Building Code (Sections 1604.3, 1607.13, & 1621). Glass framing to comply with requirements of Chapter 24 of each of the codes listed and with part 9 of the NBCC 1995.
4. Flame Spread Rating: Maximum 25 when tested in accordance with ASTM E84.

1.04 SUBMITTALS

- A. Submit under the provisions of Division 01.
- B. Shop Drawings: Include panel layout in plan and elevation, opening locations, special panels, conditions at adjacent construction, and accessories.
- C. Product Data: Provide data on panel system, components, and accessories.
- D. Samples: Submit 2 samples 12" long x full width indicating trim finish.

- E. Manufacturers Installation Instruction: Indicate procedures, special conditions, and protection.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installation performed by factory personnel or others authorized by partition system manufacturer.
- B. Conform to ICC/ANSI A117.1 (ADA) for mounting heights and location of components and NBCC 1995 Section 3.8.

1.06 PROJECT CONDITIONS

- A. Do not begin installation until site conditions provide complete protection from weather and environmental conditions in building are approximately equivalent to those which will exist after installation:
 - 1. Temperature: 60 to 85 degrees F (16 to 29 degrees C).
 - 2. Relative Humidity: Maximum 70 percent.

1.07 WARRANTY

- A. Provide manufacturers warranty against defects in materials and workmanship for a period of 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Glass partitions series manufactured by DHIVE, DIRT or NXT WALL are acceptable if materials meet the requirements and design, type and style as approved by the Architect and Owner.

2.02 MATERIALS

- A. Aluminum Extrusions: Architectural Grade aluminum prime billet. Provide manufacturer's standard sizes, shapes and profiles for members of the systems and components.
 - 1. Aluminum alloy and temper as recommended by manufacturer to comply with requirements of performance, fabrication, application of finish and control of color. Comply with ASTM B221 for extruded shapes.
 - 2. Provide all miscellaneous extrusions to complete the sliding door and fixed sidelight assemblies.
 - 3. Finish: All exposed aluminum surfaces shall receive an Architectural Class 1, clear anodized coating; AA-M12C22A41, minimum 0.7 mil thickness.
- B. Fasteners: Aluminum or non-magnetic stainless steel. Provide concealed fasteners wherever possible. Provide Phillips flat-head machine screws where exposed. Finish exposed fasteners to match aluminum work. Other concealed

fasteners may be zinc plated or cadmium plated steel.

- C. Slide Door Units shall include fascia, header and track, finished opening frame, and sliding door. Track shall be aluminum. Roller assemblies will be steel, with high quality ball bearing wheels. Hardware assembly to include pneumatic braking Mechanism and pull handles. Slide door track will be fully supported by wall structure, without requiring additional structural support from other architectural elements.
- D. Glass and Glazing: Provide 3/8" thick tempered glass materials complying with Section 08 81 00 requirements. Glazing gaskets shall be manufacturer's standard vinyl extrusion.

2.03 HARDWARE

- A. Prepare and reinforce doors for hardware. Factory fit and install door pulls on each side of door.
- B. Provide ADA compliant automatic drop seals at sliding door leaves.

2.04 SIZES

- A. Panel and door sizes and configurations as indicated on the drawings.

PART 3 PRODUCT

3.01 INSTALLATION

- A. General
 - 1. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded and broken members. Remove and replace members which have been damaged during installation or thereafter before time of acceptance.
 - 2. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength, or result in a visual imperfection or a failure in performance of the work.
- B. Install all components in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Install glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- E. Adjust operating hardware to function properly, without binding and to provide tight proper fit at contact points.

3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Immediately before acceptance of the work, clean the aluminum sliding glass doors thoroughly. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 10 22 26

FOLDING PANEL PARTITIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide sound insulated, motor operated, folding, flat panel operable walls as indicated, complete including required fasteners, fittings and accessories.

1.02 RELATED SECTIONS

- A. Miscellaneous Metals (overhead framing): Section 05 50 00.
- B. Electrical: Division 26.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: The Manufacturer shall have successful experience in the fabrication and installation of sound rated operable partition assemblies, including no less than 5 years' experience in the fabrication and installation of assemblies equal to the size and complexity of this work. Upon request, the manufacturer shall provide references and acoustical test reports for three similar recently completed projects.
- B. Installer qualifications: Sound rated operable partition assemblies must be installed by manufacturer, manufacturer's authorized distributor or an installer qualified in the installation and maintenance of specified equipment as approved by manufacturer.
- C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

1.04 SUBMITTALS

- A. Product Data: Submit Manufacturer's specifications and other data needed to prove compliance with all specified requirements. Product data to include: material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable panel partition, component, and accessory specified. Include data on acoustical performance, surface-burning characteristics, and durability.
- B. Installation Instructions: Submit Manufacturer's recommended installation instructions and procedures.

- C. Shop Drawings: Show location and extent of operable panel partitions. Include plans, elevations, sections, details, electrical diagrams, attachments to other construction and accessories. Indicate dimensions; weights; conditions at openings and for storage; and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, and direction of travel. Show blocking to be provided by others.
- D. Product Certificates: Submit letter signed by manufacturer certifying that operable walls to be furnished on this project comply with the requirements of the specification.
- E. Operation and Maintenance Data: For the following to include in maintenance manuals specified in Section 01 78 23:
 - 1. Panel finishes and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - 2. Seals, hardware, track, carriers, and other operating components.
- F. Acoustical Laboratory Test Reports: Submit Manufacturer's STC values for each of the specified operable partitions. Sound transmission loss and STC values shall be based on measurements conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP) and in accordance with ASTM E90.

1.05 ACOUSTICAL PERFORMANCE REQUIREMENTS

- A. Provide operable partition assemblies (including pass doors, seals, etc) that provide a minimum Sound Transmission Class (STC) of 53 and Noise Isolation Class (NIC) of 42. Sound transmission loss and STC values shall be based on laboratory acoustical testing, which is performed by a National Voluntary Laboratory Accreditation Program (NVLAP) approved testing laboratory. Testing shall be performed in accordance with ATSM E90. NIC values shall be based on field acoustical testing performed by a qualified acoustical consultant who has a minimum of 5-years' experience in sound isolation measurements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect products during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the requirements of the manufacturer's instructions for storage and handling.
- B. Deliver materials in order as required by schedule for installation.
- C. Handle materials in accordance with manufacturer's instructions.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify operable panel partition openings and storage

arrangements by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.08 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Partition Warranty period: Two (2) years.
- C. Suspension System Warranty: Five (5) years.

PART 2 PRODUCTS

2.01 FOLDING PARTITIONS

- A. Manufacturer: Drawings and specifications are based on MODERCO INC Signature 800 Model 843-E. Subject to compliance with the specified requirements, products by EMCO; HUFCOR; KWIK-WALL, MODERNFOLD PANELFOLD and. are acceptable.
- B. Operation: Consists of a series of continuously hinged, motor operated, flat steel panels, top supported with operable floor seals.
 - 1. Final closure accomplished by expanding jamb from panel edge or hinged panel as required by each door condition (i.e. partitions with pocket doors require expanding jamb).
- C. Panel Construction
 - 1. Size: 4 inches thick in manufacturer's standard widths.
 - 2. Panel Skins: 21 gage steel.
 - 3. Core (Frame): 16 gage steel.
 - 4. Top Channel Assembly: Reinforced to support suspension components.
 - 5. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.
- D. Panel Finish: Factory applied, Class 1 rated material, as per OBC with flame spread 0-25 as determined by ASTM E84.
 - 1. Provide reinforced vinyl with woven backing. Color and pattern as selected by Architect.
- E. Sound Seals
 - 1. Vertical Seals Between Panels: Tongue and groove configuration astragals incorporating vinyl acoustical seals.
 - 2. Horizontal Top Seals: Continuous contact extruded vinyl.

3. Bottom Seals: Automatic operable seals providing nominal 2-inch operating clearance with an operating range of +0.50-inch to -1.50-inch which automatically drop as panels are positioned, without the need for tools or cranks.
- F. Suspension System: Continuous "C" channel shape steel track, supported by adjustable steel brackets connected to structural supports with threaded rods.
1. Panels supported by ball-bearing, steel wheel trolley assemblies.

2.02 ACOUSTICAL POCKET DOOR

A. Door Construction

1. Acoustical pocket door of same construction and same finish as partition panels
2. Panel Skins: Class A Flame Spread Rated moisture resistant gypsum board.
3. Core (Frame): Extruded aluminum.
4. Top Channel Assembly: Reinforced to support suspension components.
5. Sound Seals: Gasketed astragal seals in vertical edges and jambs; fixed sweeps on horizontal edges.
6. Hinges: Type and quantity as recommended by manufacturer for door height and weight.
 - a. Finish: US26D.
7. Provide manufacturers standard latching type hardware.

2.03 DRIVE SYSTEM

- A. UL/ULC listed drive unit with NEMA-1 motor enclosure and controls and control enclosure conform to ANSI/NEMA ICS1, ICS 2 and ICS 6. Drive unit located at the storage end.
1. 1.5 HP, 120 V, 1-phase, 60 Hz motor.
 2. Driven by a #35 roller chain.
 3. The travel limits of the partition controlled by limit switches positioned on the track system, ensuring full travel before shut off.
 4. Emergency release to allow manual operation during power outage.
 5. Operation of the partition shall require the use of two simultaneously activated control stations positioned on opposite sides of the partition with a clear unobstructed view during operation of the partition.
 - a. Control stations to be (2) 3-position spring-loaded key switches each side of partition.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that openings have been completely prepared in accordance with

manufacturer's requirements. Notify Architect of conditions detrimental to operable wall installation and operation.

3.02 INSTALLATION

- A. General: Comply with ASTM E557, operable panel partition manufacturer's written installation instructions, Drawings, and approved Shop Drawings.
- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed.

3.03 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.
 - 1. Test and adjust seals, hardware, carriers, tracks, pass doors, pocket doors, exit signs and other operable components. Replace damaged or malfunctioning operable components.
 - 2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

END OF SECTION

SECTION 10 26 00

WALL PROTECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work under this section includes the following:

1. Stainless steel corner guards.
2. Resilient wall panels
3. Resilient corner guards.

1.02 REFERENCE STANDARDS

1. ADA 4.4, 4.26 - Americans with Disabilities Act.
2. ASTM E84 - Surface Burning Characteristics of Building Materials.
3. UL - Underwriters Laboratories Classifications.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Firm with minimum five years experience in successfully producing wall guards and wall panels similar to that indicated for this project.
- B. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
- C. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class 1 characteristics listed below:
1. Flame spread: 25 or less
 2. Smoke developed: 450 or less
- D. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
- E. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- F. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 23.
- B. Shop Drawings: Clearly indicate the following for each type of wall protector:
 - 1. Type of wall protector identified by manufacturer's model numbers including profiles, sizes, accessories and finish.
 - 2. Types and sizes of wall anchors for each type of wall construction.
- C. Samples: 6" long full size samples representative of each type of wall protector specified.
- D. Manufacturer's certification indicating compliance with ADA Accessibility Guidelines for Protruding Objects.

1.05 DELIVERY, HANDLING AND STORAGE

- A. Products shall be delivered to job-site in original unopened packages bearing manufacturer's labels.
- B. Store and protect products in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 STAINLESS STEEL CORNER GUARDS

- A. Description: 16 gauge, Type 304, stainless steel with satin finish. Provide with 1/8" radius corner.
- B. Wing Width: 3 1/2" typical.
- C. Angles: As indicated. Custom angles required.
- D. Length: 4'-0".
- E. Adhesive: Types as recommended by corner guard manufacturer for substrates encountered.
- F. Fasteners: Types as recommended by manufacturer for substrates encountered.
- D. Manufacturer: CONSTRUCTION SPECIALTIES, INC. CO-8 or equal by INPRO, BUCHANAN COMPANY, GAMCO, PAWLING CORPORATION.

2.02 WALL PANELS

- A. Description: Vinyl/acrylic sheet (.040")
 - 1. Color: As selected by Architect.

2. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
3. Mounting: Adhesive.

B. Manufacturer: 4000 (Acrovyn) by CONSTRUCTION SPECIALTIES.

2.03 RESILIENT CORNER GUARDS

- A. Description: Assembly consists of extruded aluminum retainer (0.063") and textured high impact snap-in acrylic cover (0.11").
- B. Vinyl/Acrylic Cover: U.L. classified. Tested in accordance with ASTM E84 meeting both flame spread and smoke development requirements for Class 1 rating.
1. Flame Spread: 20.
 2. Smoke Developed: 250 - 450.
- C. Wing Width: 3".
- D. Angle: 90 degrees.
- E. Length: As indicated
- F. Manufacturer: SM-20 by CONSTRUCTION SPECIALTIES, INC.
- G. Color: As indicated.

2.04 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Adhesive: As recommended by protection product manufacturer. Provide and comply with project VOC and sustainability requirements.

2.05 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven

coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.03 INSTALLATION

- A. General
 - 1. Verify that existing conditions are ready to receive wall protectors.
 - 2. Beginning of work means acceptance of existing conditions.

3.04 CLEANING

- A. Remove protective material from all wall protectors and clean in accordance with manufacturer's recommendations.
- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 GENERAL

1.01 SCOPE

- A. This section covers all toilet accessories. Extent of each type of accessory is indicated on the drawing and specified herein.
- B. Included are accessories for:
 - 1. Toilet rooms.
 - 2. Janitor rooms.
 - 3. Kitchens, Break Rooms and similar areas with sinks.
- C. Coordinate toilet partition mounted items with partition manufacturer for proper fastener reinforcements.
- D. Adult changing station coordination with wall framing and electrical supply. See Section 05 40 00 and Division 26.

1.02 QUALITY ASSURANCE

- A. Provide each type of products of one manufacturer. Provide locks with same keying for all accessory units in the project.
- B. Stamped names or labels on exposed faces of units not permitted.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of toilet accessory required.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery accessory items in manufacturer's original, unopened packaging.
- B. Store and handle materials in accordance with manufacturer's recommendations. Protect against soiling, damage and wetting.

1.05 PROJECT CONDITIONS

- A. Furnish anchoring devices and inserts for installation of toilet accessories. Coordinate delivery of items which must be set or built into other work.

- B. Provide setting drawings, templates and instructions for installation of anchorage devices.

1.06 WARRANTY

- A. Submit mirror manufacturer's written ten year warranty against silver spoilage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Where a manufacturer's product is specified as a Basis of Design, equal products as manufactured by BOBRICK, BRADLEY, AJW, AMERICAN SPECIALTIES, may be used provided the product meets the requirements of the specifications, unless otherwise indicated.

2.02 ITEMS

- A. Toilet Paper Holder – Employee (no substitutions)
 - 1. Double Roll: BOBRICK B-2888.
 - a. Type: Surface Mount.
 - b. Finish: 22 gage stainless steel.
 - c. Description: Dual roll standard core, ADA compliant, tumbler lock.
- B. Toilet Paper Holder – Public (no substitutions)
 - 1. Double Roll: BOBRICK 2892.
 - a. Type: Surface mount.
 - b. Finish: 18 gage stainless steel.
 - c. Description: Dual Jumbo Roll, ADA compliant, tumbler lock.
- C. Soap Dispenser - Horizontal Tank Type: BOBRICK B-2012 (no substitutions)
 - 1. Type: Vandal resistant automatic operated liquid dispenser.
 - 2. Capacity: 30 oz.
 - 3. Finish: Stainless steel.
- D. Handicap Bars: BRADLEY Series 812
 - 1. Diameter: 1-1/2 inch.
 - 2. Material: Stainless steel, standard satin finish.
 - 3. Fasteners: Concealed.
 - 4. Style and Length
 - a. As indicated; where not indicated provide 42" long horizontal and 18" vertical bars.
 - b. Provide both horizontal and vertical bars in conformance with ANSI A117.1, 604.5.

- E. Paper Towel Dispenser: BOBRICK B-2620 (no substitutions)
 - 1. Type: Surface mount with lockable hinged front cover.
 - 2. Capacity: 525 multi or 400 C-fold towels.
 - 3. Material: Stainless steel, 22 ga., type 304.
 - 4. Finish: Satin.
- F. Sanitary Napkin Disposal: BOBRICK B-270 Contura Series. (no substitutions)
 - 1. Type: Surface mounted on toilet partition. Hinged bottom for disposable liner removal.
 - 2. Material: Stainless steel, satin finish.
- G. Robe/Towel Hook: BOBRICK B-233 (no substitutions)
 - 1. Type: Wall mounted, exposed fastener.
 - 2. Material: Stainless steel.
- H. Mirrors
 - 1. Standard Framed Type: BRADLEY Model 780.
 - a. Frame: Stainless steel angle, theft resistant concealed fasteners.
 - b. Glass: Float 1/4" thick with full silver coating, copper coating and organic coating. Warranted by manufacturer 10 years against silver spoilage.
 - c. Size: Width of counter, unless otherwise indicated or scheduled on the drawings.
 - 2. Unframed Type: Section 08 81 00.
- I. Mop Strip: BOBRICK B223 x 36.
 - 1. Description: Stainless steel, satin finish back plate with three spring activated rubber cam mop holders.
 - 2. Location: Provide at each janitors sink. Coordinate height with Architect.
- J. Electric Hand Dryer: DYSON Airblade V. (no substitutions)
 - 1. Casing construction: Polycarbonate-ABS casing
 - 2. Rated power: 1400 W
 - 3. Dry Time: 12 seconds
 - 4. Operation: Touch-free infra-red activation
 - 5. Airspeed: 120 mph
- K. Infant Changing Table (no substitutions)
 - 1. Bacterial-resistant polyethylene with brushed 20 gauge stainless steel exterior. Rated to support static load of 250 lbs, tested to 390 lbs. Pneumatic gas shock mechanism
 - 2. Molded Dual Liner Dispenser: 50 per dispenser

3. Manufacturer: BRADLEY 962.
- L. Step Up Devise: STEP N WASH SNW SS 975 (no substitutions)
 1. Materials: Legs constructed from 14 gauge, type 304 stainless steel. Retractable step constructed from 16 gauge, type 304 stainless steel and reinforced with 2 stainless steel plates and 2 steel support bars. Step also features marine grade non-slip tread, ANSI compliant warning label and easy to read English, Spanish and French instruction label. Load rated at 600 lbs.
- M. Sanitary Napkin Dispenser: HOSPECO EVNT3-W (no substitutions).
 1. Operation: Touchless
- N. Toilet Seat Cover Dispenser: BOBRICK B221
 1. Finish: Stainless steel.
- O. Surface-Mounted Adjustable Height Changing Station: Model KB3000-AHL as manufactured by KOALA KARE PRODUCTS.
 1. Powered-Height Adjustability: Changing surface shall electronically adjust from 12" (300mm) to 41" (1,041mm) from floor.
 2. Unit shall have two sets of built-in electronic controls for height adjustment. One located on face of wall cover and one on the front of changing surface.
 3. Weight Capacity: Tested to support up to 500 lbs. (227 kg.) static load.
 4. Changing Surface shall be polyethylene and meet IK10 standard for resistance to high impact and sharp objects.
 5. Back-Up Battery: Unit shall have a built-in backup battery system that allows for continuous operation in the event of a power interruption.
 6. Emergency Stop: Unit shall include a wall-mounted emergency stop to break power to actuator.
 7. Changing Surface shall be a minimum 75 ¼" (1,911mm) long, and 31 ½" (800mm) wide, and can be opened and closed with one-hand.
 8. Unit shall have a safety rail with a curved dip in the center for easier patient changing by caregiver. Safety rail rotates and locks under changing bed when in closed position.
 9. Unit shall withstand significant exposure to water without damage to electrical components. It shall include a grounded power cord and have a splash-proof control system. Electrical components and wiring shall not come in contact with station users or caregivers.
 10. Changing surface shall not have covered areas to help ensure cleanliness.
 11. Unit shall have ISO 60601-1 and -2 whole product certification.
 12. Durability: Cycle tested through range of motion 28,000 times at 500lbs. Stress tested to 100,000 cycles with 500lbs. bounce load test.
 13. Frame shall be constructed of 2" powder coated steel tubing.

2.03 FABRICATION

- A. Edges: All throat openings and similar type exposed edges of towel dispensers, seat cover dispensers, waste receptacles and similar type accessories to be hemmed or sufficiently rounded to preclude accidental cuts to users.
- B. Miters: Provide one-piece seamless beveled or return flange; open miters, if not welded, must be worked to eliminate sharp edges; edges which may cut or snag are not acceptable.

2.04 SCHEDULE OF ACCESSORIES

- A. Location, quantity and mounting height of accessories as indicated on drawings.
- B. Keyed Units: Key all similar types of units alike. Provide two keys per unit.

PART 3 EXECUTION

3.01 INSPECTION

- A. Installer: Examine substrates, previously installed inserts anchorages necessary for mounting of accessories and other conditions under which installation is to occur.
 - 1. Notify Contractor in writing of conditions detrimental to proper and time completion of the work.
 - 2. Do not proceed with work until satisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions using fasteners which are appropriate for substrate and recommended by manufacturer of unit. Install units and plumb and level, firmly anchored in positions indicated.
- B. Provide concealed fasteners wherever possible of types required for substrate conditions encountered.
 - 1. Metal Stud and Gypsum Board: Screws or bolts anchored to 16 gage (minimum) metal plate blocking or wood blocking located within stud space. See Section 09 21 16 or 06 10 50.
 - 2. Concrete Masonry Units: Integral fasteners (i.e. expansion anchors, etc.).
 - 3. Metal Lath and Plaster and Studs: Toggle bolts.
- C. Lead, plastic or fiber plugs are not acceptable.
- D. Grab Bars: Coordinate grab bar locations as to right hand or left hand installations with field conditions.

1. Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.
- E. Upon completion of installation, adjust each accessory unit for proper operation and clean exposed surfaces. Turn over keys to designated Owner's personnel.

END OF SECTION

SECTION 10 41 16

EMERGENCY KEY CABINETS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide recessed cabinets for emergency access as shown.

- 1. Knox box

1.02 QUALITY ASSURANCE

- A. Reference Standards: Comply with the current edition of applicable provisions of the following published specifications and standards unless noted otherwise. Key boxes shall bear UL label.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.

- 1. Include roughing-in dimensions, details showing attachment-mounting methods, relationships of box and trim to surrounding construction, door hardware, and cabinet type and style.

1.04 DELIVERY STORAGE AND HANDLING

- A. Deliver key boxes to site in good condition, in original unopened packaging, and with labels intact. Inspect materials upon delivery and replace damaged or contaminated materials.

- 1. Key boxes shall be shipped to contractor for installation. Coordinate with Owner shipping of keys and delivery.

PART 2 PRODUCTS

2.01 KNOX BOX

- A. Recessed mount, plate steel housing, 1/2 inch thick steel door with interior gasket seal and stainless steel hinge, flange, and tamper-resistant fasteners; finish to be selected by Architect. Coordinate size and location with local Fire Department authority and Architect.

- 1. Basis of Design Product: KNOX COMPANY; Knox Box, Series 3275 or approved equal.
 - 2. Key Capacity: 10

2.02 CABINET FABRICATION

- A. General: Materials shall be free from defects impairing strength, durability or appearance.
- B. Sections and shapes shall be rolled, formed, drawn or extruded as required for respective functions.
- C. Molded work shall have sharply defined profile and shall be clean and straight. Plain work shall be leveled, straight and surfaces true and smooth. Edges, angles, and corners shall be square, clean and sharp, unless otherwise detailed.
- D. Fastenings, exposed metal fastenings, and accessories, unless Underwriters' prohibit for safety, shall be of same materials, texture, color and finish as the base metal to which applied.
- E. Molds, trim, frames and other metalwork shall be proper dimensions to receive masonry block and tile, plaster, ceramic tile, etc.

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate location of cabinets prior to construction of concrete masonry walls. Verify recessed type installations and coordinate these locations with the masonry construction.
 - 1. Provide mason with rough opening size of cabinets.

3.02 INSTALLATION

- A. Install cabinets where indicated or as directed by Architect in accordance with manufacturer's recommendations for wall substrate type encountered

END OF SECTION

SECTION 10 43 13

DEFIBRILLATOR CABINETS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide automated external defibrillator (AED) and cabinet as shown.

1.02 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.
 - 1. 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.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind KT, Condition A, Type I, Quality q3, 1/8 inch, Class I (clear).

2.02 DEFIBRILLATOR AND CABINETS

- A. Basis of Design: HEARTSINE Samaritan PAD 450P. Provide with the following:
 - 1. 2D AED wall sign
 - 2. Emergency fast pack (1 pair-gloves, 1- razor, 1- cpr micro mask, 1- mini bandage scissors, 1- antiseptic towelette, 1-5x9 compress 1-2 in. gauze roll)
 - 3. Adult battery/pad set
 - 4. Pediatric battery/pad set.
 - 5. Include (1) spare adult battery/pad for each AED and (1) inspection card.

- B. Cabinet Type: Recessed Suitable for mounting AED.
- C. Manufacturers
 - 1. POTTER ROEMER LLC;
 - 2. J. L. INDUSTRIES, INC.
 - 3. LARSEN'S MANUFACTURING COMPANY;
- D. Cabinet Size: 14" x 14" x 6-3/4" All cabinet components and equipment shall be accessible, removable and replaceable with the cabinet door in a 90 degree position.
- E. Cabinet Material: Stainless-steel, sheet# 4 finish.
- F. Door Glazing: Tempered float glass.
- G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

2.03 CABINET FABRICATION

- A. Provide box with trim, frame, door and hardware to suit cabinet type, trim style and door indicated. Weld all joints and grind smooth; miter and weld door frames. Fabricate trim in one piece with corners mitered, welded and ground smooth. Open miters are not acceptable.

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate location of cabinets prior to construction of concrete masonry walls. Verify recessed type installations and coordinate these locations with the masonry construction.
 - 1. Provide mason with rough opening size of cabinets.

3.02 INSTALLATION

- A. Install cabinets where indicated or as directed by Architect in accordance with manufacturer's recommendations. Mount at heights indicated, when not indicated as directed by Architect.

3.03 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide fire extinguishers and cabinets as shown and specified.
 - 1. Provide fire extinguishers with wall brackets in non-finished areas (i.e. mechanical rooms, electrical rooms, etc.).

1.02 QUALITY ASSURANCE

- A. Provide fire extinguishers complying with Fire Protection Association (NFPA) Pamphlet No. 10.
- B. Provide only new portable fire extinguishers fully loaded, tested and approved by Underwriter's Laboratories (UL), and ready for use.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Portable Fire Extinguishers
 - 1. AMEREX CORP.
 - 2. ANSUL INC.
 - 3. BUCKEYE FIRE EQUIPMENT COMPANY
 - 4. WALTER KIDDE, THE FIRE EXTINGUISHER CO.
 - 5. J. L. INDUSTRIES
 - 6. LARSEN'S MANUFACTURING COMPANY
 - 7. POTTER-ROEMER
 - 8. WATROUS
- B. Fire Extinguisher Cabinets
 - 1. J.L. INDUSTRIES
 - 2. LARSEN'S MANUFACTURING COMPANY
 - 3. POTTER-ROEMER
 - 4. WATROUS
 - 5. THE WILLIAMS BROTHERS CORP.

- B. Where a specific manufacturer's product is specified herein it is to establish a level of quality. Products by the other manufacturers listed are acceptable providing they meet these specifications.

2.02 FIRE EXTINGUISHERS

- A. Multipurpose Dry-Chemical Type: Fabricate in accordance with NFPA No.10, 10A, and 10L and UL Standards, except hose, gauge face cover, and horn cone parts shall be metal. No plastic or nylon valves, trigger/handle, casing, or gauge will be acceptable. Fire extinguishers, unless indicated otherwise, shall be 10 lb. multi-purpose dry chemical type for use on A, B, and C fires (4A-60BC), with hose and horn.

- 1. Provide this type throughout facility, unless noted otherwise.

- B. Size: 21-1/2" high x 8-1/2" wide x 5" deep.

2.03 FIRE EXTINGUISHER CABINETS

- A. Provide steel construction

- B. Basis of Design: Drawings and specifications are based on LARSEN Architectural Line with full glass door. LARSEN catalog numbers are listed to establish a standard of quality and mounting type. Equal products may be provided from the listed acceptable manufacturers. Provide the following wall mounting types where a specific type of cabinet is indicated on the drawings.

- 1. Recessed - Steel: 2409-R, Flat Trim.
 - 2. Doors: Full glass

- C. Coordinate final model size with fire extinguisher.

- D. Finish: Baked enamel, white.

- E. Mounting Brackets: Provide manufacturer's standard plated finish, heavy duty mounting brackets for surface mounted fire extinguishers. Provide proper size and type for capacity of extinguishers indicated.

- F. Fire Rated Cabinets: Listed and labeled to meet requirements of ASTM E814 for fire resistance rating of wall where it is installed.

- 1. Construct fire rated cabinets with double walls fabricated from 0.0478 inch thick, cold rolled steel sheet lined with minimum 5/8 inch thick, fire barrier material.

- G. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate the words "FIRE EXTINGUISHER" vertically on cabinet door.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

H. Locks

1. Exposed to Public: Provide cylinder locks on all access doors; 7-pin removable core cylinders. Key in accordance with Section 08 71 10.

2.04 CABINET FABRICATION

- A. Provide standard steel box with trim, frame, door and hardware to suit cabinet type, trim style and door indicated. Weld all joints and grind smooth; miter and weld door frames. Fabricate trim in one piece with corners mitered, welded and ground smooth. Open miters are not acceptable.

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate location of fire extinguisher cabinets prior to construction of concrete masonry walls. Verify recessed type installations and coordinate these locations with the masonry construction.
 1. Provide mason with rough opening size of cabinets.

3.02 INSTALLATION

- A. Install fire extinguishers and fire extinguisher cabinets where indicated or as directed by Architect in accordance with manufacturer's recommendations. Mount at heights indicated, when not indicated as directed by Architect.
- B. Securely anchor brackets and cabinets to substrate construction with toggle bolts or expansion anchors. Lead, wood or plastic plugs and fasteners are not acceptable.
- C. Fire extinguishers are to be fully charged and ready for use when building is turned over to the Owner. Extinguishers shall be certified as fully charged by an approved fire extinguisher service company and shall be tagged or labeled as such.

3.03 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.

- 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 10 51 13

METAL LOCKERS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide metal lockers as shown and specified.
- B. Provide five (5) per cent of lockers as ADA compliant. Coordinate location with Architect. Location to be coordinated with locker design and placement of shelves.

1.02 QUALITY ASSURANCE

- A. Provide lockers as complete units produced by one manufacturer, including necessary mounting accessories, fittings and fastenings.
- B. Contractor responsible for obtaining dimensions of locker space prior to manufacture and installation.
- C. Reference Standards
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM A366 "Commercial Quality (CS) Steel, Carbon, (0.15 Maximum Percent) Cold-Rolled".
 - b. ASTM A569 "Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial".
 - c. ASTM A653 "Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process".
 - d. ASTM D2092 "Standard Guide for Zinc-Coated (Galvanized) Steel Surfaces for Painting".
 - 2. Americans with Disabilities Act Accessibility Guidelines (ADA or ADAAG).

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.
- B. Submit shop drawings indicating materials, sizes, layouts, accessories, color, numbering and methods of installation.
- C. Submit color charts for color selection.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver lockers until buildings are permanently enclosed and ready for

locker installation.

- B. Protect lockers from damage during delivery, storage, handling and installation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: ASI, LYON METAL PRODUCTS, INC., PENCO, DeBOURGH, LIST INDUSTRIES, REPUBLIC.

2.02 MATERIALS AND COMPONENTS

- A. Galvanized Sheet Steel: ASTM A653 commercial quality, minimized spangle, galvanized steel sheet with not less than Z275 G60 zinc coating. Prepare surface of sheet for painting in accordance with ASTM D2092, Method A.

- 1. Provide for all lockers located in moist or humid areas (i.e. Locker Rooms and Drying Rooms).

- B. Sheet Steel: Cold-Rolled Steel Sheet: ASTM A 1008 "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable," Commercial Steel (CS) Type B, suitable for exposed applications.

- 1. Provide for locker in areas other than those listed above.

- C. Fasteners: Cadmium, zinc or nickel plated steel. Exposed heads slotless type. Provide self-locking nuts or lock washer for nuts on moving parts.

- D. Hooks: Ball end, cadmium plated, forged steel.

- E. Identification Plates: Provide each locker opening with aluminum number plate with approximately 3/8" high numerals. Rivet plate to door frame or door. Number lockers as directed by Architect.

2.03 SOLID DOOR TYPE LOCKERS

- A. Lockers

- 1. Type: As indicated.
 - 2. Unit Size: As indicated.

- B. Lockers shall have a "quiet" lock bar assembly. Moving parts within door shall be cushioned by rubber or other means to achieve maximum sound suppression.

- C. Frames: Minimum 16 gage channels or 12 gage angles, with corners welded to form a rigid one-piece structure. Form door stops at vertical members.

- D. Backs and Sides: Minimum 18 gage steel. Flange backs on vertical edges and

sides where they enter member with backs, making double flanged rear corners. Provide all lockers with full back panels.

- E. Tops and Bottoms: Minimum 18 gage steel, flanged edges.
- F. Doors: Minimum 16 gage steel, flanged at all edges. Construct doors to prevent springing when opening and closing. Fabricate doors to swing 180 degrees. Provide louverless solid door fronts with door perimeter ventilation equal to vent area provided by standard door louvers. Provide rubber door silencers at latches.
 - 1. Provide door arrangement as indicated.
- G. Door Hinges: Heavy duty, not less than 0.050" thick steel, full loop, five knuckle, tight pin, minimum 2" high. Weld hinges to inside of frame and secure to door with minimum two factory installed fasteners, completely secured and tamperproof when locker door is closed.
- H. Latching Device: Positive automatic type locking device of pre-locking type.
 - 1. Locking - Padlock: Manufacturer's standard recessed handle type containing hole for padlock attachment.
- I. Equipment: Provide one hat shelf approximately 9" below top of locker, one double prong back hook and one single prong wall hook on each side of each locker opening.
 - 1. ADA Compliant Lockers: Provide shelf at a maximum of 54" above floor (where side access is permitted) or 48" above the floor (where front access only is permitted); provide additional shelf where bottom of locker is less than 9" above the floor.
- J. Exposed Sides: Provide minimum 16 gage end panels.
- K. Provide all required closures and trims. Minimum 16 gage.

2.05 FABRICATION AND ACCESSORIES

- A. Construction: Fabricate lockers square, rigid, without warp and with exposed metal faces flat and free of dents or distortions. Make all exposed metal edges safe to touch.
- B. Solid Door Type: Weld frames together. Unless otherwise indicated, weld, bolt or rivet other joints and connections as standard with manufacturer.

2.06 STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust and other contaminants that could impair paint bond.
- B. Baked Enamel Finish: Immediately after cleaning and pre-treating, apply

manufacturer's standard baked-on enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum 1.4 mils dft on doors, frames and legs and 1.1 mils dft on other surfaces.

- C. Colors: As selected by Architect. Paint interior the same color as exterior.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lockers in accordance with manufacturer's instructions. Install units plumb, rigid and level, located as indicated on drawings.
- B. Apply fastenings through back up reinforcing plates where necessary to prevent metal distortion. Conceal fasteners whenever possible.
- C. Install recessed locker trim. Provide flush hairline joint against adjacent surfaces. Install trim with concealed fasteners.
- D. Touch-up marred finished, using materials as recommended or furnished by manufacturer. Replace units that cannot be satisfactorily repaired as directed by the Architect.
- E. Adjust doors and latches to operate easily without binding. Verify satisfactory operation of integral locking devices.

END OF SECTION

SECTION 10 56 23

WIRE SHELVING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wall braced, open wire shelving units as specified herein and indicated on the drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data and layout drawings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver shelving items in manufacturer's original unopened shipping cartons.
- B. Protect materials from damage during storage and handling and after installation.

PART 2 PRODUCTS

2.01 WIRE SHELVING

- A. General: Provide manufacturer's standard storage shelving systems and components. Where components are not otherwise indicated, provide manufacturer's standard components as required for a complete system.
- B. Description
 - 1. Type: Adjustable, add-on type units as required. Provide all required wall uprights, shelf brackets, shelves, hardware and fasteners.
 - 2. Weight Total unit: 2,000 lbs
- B. Size and Quantity: As indicated on drawings.
- C. Finish: Chrome plated.
- D. Manufacturer: METRO Super Erecta Shelving; GILLIS ASSOCIATE INDUSTRIES (GAI), EAGLE SHELF or NEXEL SHELVING.
- E. Shelves: Open wire type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate as indicated on drawings.
- B. Clean and adjust before acceptance by Owner.
- [C. Janitor's Closets: Provide a minimum of one (1) three-shelf unit per room unless more units are indicated.]

END OF SECTION

SECTION 10 75 16

GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes ground-set flagpoles made from aluminum.
- B. Owner-Furnished Material: Flags.
 - 1. Maximum flag size: 5' tall x 8' long

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: For flagpoles.
 - 1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
 - 2. Include section, and details of foundation system.
- C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.
- D. Delegated-Design Submittal: For flagpole foundations.
 - 1. Delegated-Design Submittal shall be signed and sealed by a structural engineer licensed in the State of Ohio

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.
- B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Wind Loads: 90 m.p.h. with Exposure B, Wind Load Importance of 1.15 according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles" or the Ohio Building Code, whichever is more stringent.
 - 2. Base flagpole design on polyester, nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.03 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: Cone or Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.
 - 1. Admiral Flagpole.
 - 2. American Flagpole and Flag Co.
 - 3. Baartol Company.
- B. Exposed Height:
 - 1. 30 feet. Quantity: One (1)
- C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
 - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.

- 1. Flashing Collar: Same material and finish as flagpole.

2.04 FITTINGS

- A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

- 1. 0.063-inch spun aluminum with gold anodic finish.

- B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

- 1. Halyard Flag Snaps: Stainless-steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.

2.05 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

- B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

- C. Sand: ASTM C33/C33M, fine aggregate.

- D. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Section 079200 "Joint Sealants."

- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.06 ALUMINUM FINISHES

- A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
- E. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
- F. Anchor Bolts: Locate and secure anchor bolts in forms with templates and by tying to reinforcement.
- G. Place concrete, as specified in Section 033000 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- H. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.02 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION

SECTION 11 31 00

APPLIANCES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide appliances where indicated on drawings consisting of:

1. Reach-in Refrigerator
2. Refrigerator/Freezer
3. Microwave

1.02 RELATED SECTIONS

- A. Electrical Rough-In: Included under Electrical Contract, Division 26.

1.03 SUBMITTALS

- A. Manufacturer's Product Data: Submit for all items in accordance with the General Conditions and Section 01 33 23.

PART 2 PRODUCTS

2.01 ITEMS

- A. Manufacturers listed are to establish a standard of acceptable quality and basis of design. Dimensions of basis of design products are critical for compliance with ADA/ANSI requirements and casework layouts as indicated in drawings. Except where no substitution is indicated, similar products by other manufacturers listed below are acceptable provided they are an acceptable match in performance, characteristics and exact dimensions. All proposed substitutions to be approved by Architect.

1. KENMORE
2. KITCHEN AID
3. AMANA
4. GENERAL ELECTRIC
5. MAYTAG
6. FRIGIDAIRE

- B. Reach-in Refrigerator – No substitutions:

1. Manufacturer: KOOLMORE RIR-1D-SS-19C
2. Capacity: 15.5 cu ft.
3. Control: Digital temperature controls and display. Preprogrammed.

- 4. Material: Stainless steel body with self-closing door and stay-open feature
- C. Refrigerator/Freezer: GENERAL ELECTRIC Model GYE22GYNFS; counter depth, French door. 7.16 cu ft. freezer. 15 cu ft. refrigerated.
- D. Microwave: GENERAL ELECTRIC Model JES1657SMSS 1.6 cu ft. countertop.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all items in accordance with manufacturer's instructions.
- B. Provide all required accessories and fasteners to ensure a complete installation.

END OF SECTION

SECTION 11 51 16

BOOK DEPOSITORIES

PART 1 GENERAL

1.01 SCOPE

- A. Provide through wall book depository system, including interior wall trim, faceplate, attached chute housing with entry chute; slide chute, and air blocking system for wall system thickness as required.
- B. Provide arrangements, layouts and quantities as indicated on drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data, layout drawings and installation instructions in accordance with the General Conditions.

PART 2 PRODUCTS

2.01 BOOK DEPOSITORY

- A. Door: Mounted into a built in weather hood and opens inward and up. Door to be weather resistant with gravity and weight balanced allowing it to automatically close after materials have passed through. Lockable from interior.
- B. Construction: 16-gauge stainless steel exterior faceplate and depository door. Brushed stainless steel finish with graffiti resistant clear coat.
 - 1. Overall Dimensions: 20" W x 17- 3/16" D x 18- 3/16" H
 - 2. Depository opening: 15- 1/8" W x 3- 7 /8" H
- C. Chute: Four sides, extends from the faceplate and will cover the wall rough cuts when installed. Entry chute to have an upward angle to prevent theft. Provide air blocking devise/panels.
- D. Fabrication: Provide units completely factory assembled, requiring no field assembly. Hone all edges.
- E. Basis of Design Manufacturer: KINGSLEY # 10-8900 (walk up) and 10-8175 (drive up).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and attach assembly in accordance with the manufacturer's recommendations. Anchor units securely to wall structure. Trim opening with flanged trim provided by manufacturer and seal as recommended.

END OF SECTION

SECTION 12 24 13

WINDOW ROLLER SHADES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work includes:

1. Manually operated interior roller-screen solar shades as indicated on the drawings.
2. Motor operated interior roller screen solar shades as indicated on the drawings.
3. Motor operated, double-shade system, interior roller-screen room darkening and solar shades on same bracket allowing for independent control of each shade as indicated on the drawings.

B. Work also includes furnishing the following for installation by others:

1. Extruded aluminum ceiling pocket trim assemblies for installation under Section 09 51 13 Acoustic Ceiling Systems.
2. Electrical control components including switches, relays, etc as necessary to provide control characteristics as specified elsewhere in this section.

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 11 50.
- B. Acoustic Ceiling Systems (installation of ceiling pocket trim): Section 09 51 00.
- C. Electrical: Division 26.

1.03 PERFORMANCE REQUIREMENTS

A. Fire Test Characteristics: Provide shade fabrics tested in accordance with:

1. Flame Resistance Ratings: Passes NFPA 701.

B. Anti-Microbial: Provide shade fabrics tested in accordance with:

1. ASTM G22 – Results for ATCC6538 and ATCC13388 indicating minimum 5mm indicating “No Growth Contact Area”.
2. ASTM G21 – Results for ATCC9642, ATCC9644, ATCC9348 and ATCC9645 indicating “No Growth”.

- C. Electrical: Control systems and components approved AS A SYSTEM by either Underwriter Laboratories (UL) or Electrical Testing Laboratories (ETL).

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data sheets, performance data and installation instructions for each item.
- B. Shop Drawings
 - 1. Show location and extent of roller shades.
 - 2. Include elevations, sections, details and dimensions.
 - 3. Show installation details, mountings, attachment to other work, operational clearances and relationship to adjoining work.
 - 4. Complete wiring diagrams including connection details for all components supplied by this section for installation and connection by Division 26.
- C. Coordination Drawings: Coordinate with reflected ceiling plans. Show the following:
 - 1. Ceiling suspension system members and attachment to building structure.
 - 2. Ceiling mounted or penetrating items.
 - 3. Shade mounting assembly and attachment.
 - 4. Size and location of access to shade adjustable components.
- D. Samples
 - 1. Selection Samples
 - a. Submit 3" x 5" shade cloth fabric swatches for initial fabric color selection from manufacturer's full range of available fabrics.
 - b. Submit aluminum finish color samples from manufacturer's full range of colors.
 - 2. Verification Samples
 - a. Submit one fully operational window shade sample of each type required; approximately 30" x 30" complete with selected shade cloth.
 - b. One complete set of all shade components, unassembled.
- E. Test Reports, Design Data and Certifications: Current reports from independent testing laboratories demonstrating compliance with Article 1.03.
- F. Installation Instructions: Submit for types of shades and mounting substrates encountered.

1.05 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: 20 years minimum experience manufacturing products comparable to those specified.

2. Installer: 5 years minimum experience installing products comparable to those specified.
- B. Do not fabricate shades without obtaining field dimensions for each opening. Coordinate construction of surrounding conditions to allow for timely field dimension verification.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver shades until painting, wet work, grinding and similar operations which could damage, soil or deteriorate shades have been completed in installation areas. If, due to unforeseen circumstances, shades must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.
- B. Deliver shades to project in labeled protective packaging. Label each shade for the appropriate opening. Schedule deliveries to prevent delays to completion of work but to minimize on site storage time.
- C. Store shades in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic and other potential damage.

1.07 WARRANTY

- A. Provide manufacturer's warranty for the installed systems. Warranty shall provide for repair or replacement of defective roller shade system components, including excessive deterioration or failure of system components. Repair or replacement shall include all costs associated with verifying failures, removal of deteriorated or defective products, replacement, testing, transportation, travel and other expenses related to corrective measures.
 1. Warranty Period: 5 years from date of substantial completion.
- B. Shade Motors and motor control system electrical components: Provide Manufacturer's warranty. Warranty period to be 5 years from Date of Substantial Completion for shade motors and two years for all other control components containing provisions that installation will remain operational without fault for the warranty period and include all operating parts.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and specifications are based on shades manufactured by MECHOSHADE SYSTEMS INC.
- B. Other Acceptable Manufacturers: Shades manufactured by HUNTER DOUGLASS ARCHITECTURAL are acceptable providing the shade assemblies meet the requirements specified herein and the profile/arrangements indicated on the

drawings.

2.02 COMPONENTS

- A. Shadebands: Construction of shade bands includes fabric, hembar and hempocket, and the attachment of the shade band to the roller.
 1. Visually transparent single-fabric shade cloth; MECHOSHADE Soho 1900 Group, single thickness non-raveling 0.03" thick vinyl fabric, woven from 0.18" extruded vinyl yarn comprised of 21% polyester and 79% reinforced vinyl; colors as selected by Architect.
 - a. Dense Basket Weave: Dense basket 2 x 2 weave pattern; colors and % as indicated.
 2. Double shade system incorporating two independently operable shades on one bracket.
 - a. Solar Shade: Dense basket 2 x 2 weave pattern; colors and % as indicated.
 - b. Black-Out Shade: Equinox series vinyl coated fabric; colors as selected by Architect.
 3. Hembars and Hempockets: Fabric hempocket with RF-welded seams (including welded ends) and concealed hem weights. Provide continuous hem weights of appropriate size and weight for shadeband inside sealed hempocket.
- B. Manually Operated Hardware and Shade Brackets:
 1. Provide for regular and offset drive capacity (chain fall at front or rear of bracket) on all shade drive end brackets.
 2. Provide shade hardware system that allows for removal of shade roller tube from brackets without removing hardware from opening.
 3. Provide shade hardware that allows for removal and re-mounting of the shade band without having to remove shade tube, drive or operating support brackets.
 4. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connections are not acceptable.
 5. Provide hardware construction of minimum 1/8" thick cadmium plated steel or heavier as required to support 150% of the full weight of each shade.
 6. Drive Bracket/Brake Assembly: Manufacturer's standard type that disengages to 90% during the raising and lowering of the shade and is capable of withstanding a pull force of 50 pounds in the stopped position.
- C. Motorized Shade Hardware and Shade Brackets:
 1. Provide shade hardware constructed of minimum 1/8" thick (3.175 mm). cadmium plated steel or thicker as required to support 150% of the full weight of each shade.
 2. Provide shade hardware system that allows for removal of shade roller tube from brackets without removing hardware from opening or without requiring end or center support brackets to be removed.

3. Provide shade hardware that allows for removal and re-mounting of the shade band without having to remove shade tube, or drive or operating or support brackets.
4. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets regardless of mounting position (inside or outside mount).
5. Provide shade hardware system that allows for removable regular roll fascia(s) to be mounted continuously across two or more shades without requiring exposed fasteners.
6. Provide shade hardware system that allows for operation of multiple shadebands offset by a maximum of 12° from the motor axis between shadebands, 6° on each side of the radial line, by a single motor (Multi-banded shades) subject to manufacturer's design criteria.
7. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connections for drive mechanism to shade roller tube shall not be accepted.

D. Shade Roller and Shade Cloth Attachment

1. Extruded aluminum; diameter and wall thickness to support shade fabric as determined by manufacturer.
2. Provide for positive mechanical engagement with drive/brake mechanism.
3. Provide for positive mechanical attachment of shade band to roller tube without use of adhesives, adhesive tape, staples or rivets. A mounting method that does not allow the shade band to be removed from the shade tube while installed is not acceptable.
4. Attach shade bands to tube in a manner that allows removal and replacement of the shade band without removing either the tube from the brackets or without removing shade brackets.

E. Drive Chain: #10 Qualified stainless steel chain rated to 90 pound minimum breaking strength.

F. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Electric Motor: Manufacturer's standard tubular, enclosed in roller.
 - a. Electrical Characteristics: Single phase, 110 V, 60 Hz.

3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
 - a. Individual/Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
5. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.

G. Accessories

1. Provide extruded aluminum pocket closure assemblies for use with drywall or other framed shade pocket construction as indicated on the drawings.
2. Provide extruded aluminum fascia for all shades mounted below the ceiling. Colors as selected by Architect.
3. Black-Out Shades: Designed for eliminating all visible light gaps when shades are fully closed
 - a. Side and Sill Channels: Extruded aluminum with light seals; designed to eliminate light gaps at sides and bottom of shades. Finish as selected by Architect.
 - b. Shade Band Retention System: Manufacturer's standard design for guiding shade band material through range of travel and holding shade band flat with edges of material within side channels.

2.03 FABRICATION

- A. Fabricate units to completely fill openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise. Comply with manufacturer's edge clearance standards and recommendations.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8" in either direction per 8' of shade height due to warp distortion or weave design.

2.04 FINISHES

- A. Aluminum Components: Baked enamel; colors as selected by Architect.
- B. Steel Components: Baked enamel; colors as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate and conditions for installation. Do not begin installation until conditions are satisfactory. Beginning installation indicates acceptance of site conditions by contractor. Notify Architect upon inspection when the project conditions are unacceptable for shade installation. Beginning of installation means acceptance of substrate and project conditions.

3.02 INSTALLATION

- A. Install units to comply with manufacturer's instructions for the type of mounting and operation required. Provide units plumb, true and securely anchored in place with recommended hardware and accessories to provide smooth, non-binding operation.
- B. Install unit within the following tolerances:
 - 1. Maximum variation of gap at window opening perimeter: $\frac{1}{4}$ " per 8' (+/- 1/8") of shade height.
 - 2. Maximum offset from level: 1/16" per 5' of shade width.

3.03 ADJUSTING

- A. Adjust drive/brake mechanism for smooth operation. Adjust shade and shade cloth to hang flat without buckling or distortion. Replace units or components that do not hang properly or operate smoothly.

3.04 CLEANING

- A. Touch-up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be repaired to the Architect's satisfaction.
- B. Clean exposed surfaces, including metal and shade cloth, using non-abrasive materials and methods recommended by manufacturer. Remove and replace work that cannot be cleaned to the Architect's satisfaction.

3.05 DEMONSTRATION

- A. Demonstrate operation and instruct Owner's personnel in the proper operation and maintenance of the shade systems.

END OF SECTION

SECTION 12 33 55

PLASTIC LAMINATE FACED CASEWORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide plastic laminate casework as indicated on drawings. Countertops, fixed and adjustable shelving, and custom pieces are specified under Section 06 40 00.
- B. Accessories common to casework are included as work of this section.

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50.
- B. Countertops: Section 06 40 00.
- C. Custom Casework: Section 06 40 00.
- D. Vinyl Base: Section 09 65 13.

1.03 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of millwork with a satisfactory record of performance on projects of comparable size and quality. Fabricator shall be acceptable to the Architect.
- B. Installation: Performed only by experienced skilled finish carpenters.
- C. Catalog Standards
 - 1. Manufacturer's catalog numbers, where shown, are for convenience in identifying cabinet work.
 - 2. Use of a specific manufacturer's catalog numbers is not to preclude the use of any other acceptable manufacturer's product or procedures that may be equivalent.
- D. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard:
 - 1. ANSI: American National Standards Institute.
 - 2. AWI: Architectural Woodwork Institute.
 - 3. NEMA: National Electrical Manufacturer's Association.
 - 4. ASTM: American Society for Testing and Materials.
 - 5. CS: Commercial Standard.

- E. Quality Grade: Materials and fabrication shall be "custom grade" in accordance with "Quality Standard Illustrated," of the AWI conforming to the following sections:

- 1. Section 200: Plywood and particleboard.
- 2. Section 400: Casework.

1.04 DEFINITIONS

- A. Exposed Portions of Casework: Include surfaces visible when doors and drawers are closed. Bottoms of casework more than 4 feet above floor and tops less than 6 feet 6 inches above floor shall be considered as exposed. Visible members in open cases or behind glass doors also shall be considered as exposed portions.
- B. Semi-Exposed Portions of Casework: Includes those members behind opaque doors, such as shelves, divisions, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors. Tops of casework 6 feet 6 inches or more above floor shall be considered semi-exposed.
- C. Concealed Portions of Casework: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's/fabricator's data and installation instructions for each type of casework unit.
- B. Samples: Submit samples of specified finishes.
- C. Shop Drawings
 - 1. Submit shop drawings for casework showing plans, elevations, ends and cross sections.
 - 2. Show details and location of anchorages and fitting to floors, walls and base.
 - 3. Include layout of units with relation to surrounding walls, doors, windows and other building components.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect casework during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver casework until concrete, masonry and other similar wet work has been completed and is thoroughly dry, outside door openings are permanently watertight, exterior windows are glazed and, in case of temperature dropping below 60 degrees F., until temporary heating and ventilating systems are in operation.

- C. Store casework in dry, well-ventilated spaces with constant minimum temperature of 60 degrees F., and maximum relative humidity of 55%.

1.07 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Obtain measurements and verify dimensions and details before proceeding with finish carpentry.

1.08 WARRANTY

- A. Plastic laminate faced casework to be guaranteed by manufacturer, and Contractor jointly and severally to the Owner for three years, to be free of defects due to faulty materials, workmanship, or performance.
- B. Warranty not to include damage sustained as a result of abuse, negligence, use beyond that of it's intended function by the Owner, acts of God, or unnatural events or causes beyond the control of the manufacturer.
- C. Include repair and replacement of defective materials and components at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Particle Board (Substrate for Laminate Surfaces): High density industrial grade with a minimum density of 45 pounds per cubic foot and a moisture content between 9% maximum and 6% minimum, meeting or exceeding ANSI A208.1 Grade M-3 or ASTM D1037.
- B. Fiberboard: Uniform, medium density conforming to ANSI A208.2. Maximum moisture content of 8%. Meet the following minimum standards:
 - 1. Internal Bond: 125 psi.
 - 2. Modulus of Rupture: 4,000 psi.
 - 3. Modulus of Elasticity: 400,000 psi.
 - 4. Screw Holding Power: 325 pounds.
 - 5. Density: Minimum 50 pounds per cubic foot.
- C. Hardboard: Tempered, smooth both sides; conforming to ANSI/AHA A135.4 Class 1.
- D. Lumber: Optional framing material for concealed framing. Conform to AWI requirements premium grade; provide in suitable species of manufacturer's option.
- E. Plastic Laminate: Conform to the requirements of the National Electrical

Manufacturer's Association (NEMA) Publication Number LD-3. Plastic laminate shall be WILSONART, FORMICA, PIONITE, or NEVAMAR. Colors, patterns and finishes shall be as selected by Architect from the manufacturer's full range of standard colors, patterns and finishes. Manufacturer, finish and color to match plastic laminate specified in Section 06400.

1. General Purpose Horizontal Grade: 0.05 inches thick.
2. General Purpose Vertical Grade: 0.028 inches thick.
3. Backing Sheet Grade: 0.02 inches thick.
4. Post-Forming Grade: 0.042 inches thick.
5. Cabinet Liner: 0.02 inches thick.
6. Fill and seal plastic laminate joints with Seamfil by KAMPEL ENTERPRISES, INC. or FormFill by FORMFILL PRODUCTS (UNIKA USA). Colors specifically mixed by manufacturer to match plastic laminate.

F. Pressure Fused Laminate/Interior Surfacing

1. Melamine resin impregnated, 100 gram PSM minimum, surface laminated to core under pressure.
2. Meet NEMA LD3.1-1991 GP28 standards and NEMA LD3-1991 CL20 standards.
3. White pressure fused laminate for cabinet interiors behind door and drawers, interiors of all open cabinets unless otherwise specified, and underside of wall cabinet unless otherwise specified.
4. Shall be balanced at all concealed surfaces with phenolic backer. Unsurfaced coreboard not allowed.

G. Hardware Items: All exposed hardware to be satin stainless steel finish.

1. Drawer Slides: Self-closing, side mounting type with nylon tire, steel ball-bearing rollers. Manufactured by BLUM, GRASS, AMEROCK, KNAPE & VOGT; ACCURIDE. Load capacity as follows:
 - a. 75 pounds: Drawers up to 3-1/2 inches deep: Similar to ACCURIDE Series 2132.
 - b. 100 pounds: Drawers up to 8 inches deep: Similar to ACCURIDE Series 2832.
 - c. 150 pounds: Drawers over 8 inches deep, all file drawers: Similar to ACCURIDE Series 4034.
2. Drawer and Door locks: 5-pin tumbler removable core, dead bolt. BEST; NATIONAL LOCK; CORBIN. Key and masterkey locks as directed by Architect.
Provide 2 keys per cylinder and 5 masterkeys per master set.
3. Concealed Hinges: European style, self-closing, type as required for construction. Metallamet by HAFELE; similar by GRASS; PRAMETE; BLUM.
4. Continuous Hinge: 780 HD Roton Hinge by HAGER. Aluminum with finish as selected by Architect.
5. Drawer and Door Pulls: EPCO Edge Pull DP47.

6. Adjustable Cabinet Shelf Supports: Provide metal pilaster type or hardwood drilled type, manufacturer's standard.
 - a. Metal Type: KNAPE & VOGT (KV) steel nickel plated.
 - 1) Standards: KV #255 NP for dado installation.
 - 2) Clips: KV #256 NP.
 - b. Wood Type: Provide hardwood verticals with adjustment holes located 1/2" on center. Provide shelf clips of type that locks shelf in place.
 7. Catches: Magnetic, STANLEY #45 or equal by NATIONAL LOCK or EPCO.
- H. Glue: Waterproof adhesive (phenol, resorcinol or melamine) base meeting requirements of CS 253 for "Wet Use" unless otherwise specified in specific sections.
- I. Plywood: Birch hardwood plywood conforming to AWI Section 200 for veneer core material, AWI "custom" grade, provide with waterproof glue.

2.02 FABRICATION - CASEWORK

- A. General: Except as specified hereinafter, fabricate all work in accordance with AWI quality standards as specified. Work not specified with a level of quality shall be not less than "Custom" quality per AWI.
1. "Flush Overlay" frameless design as shown in AWI Architectural Casework Details.
 2. Provide complete factory-fabricated and finished components which, when assembled on site, will provide an integral system of storage and work surfaces.
 3. Provide locks where indicated.
 4. Make cut-outs and other provisions for the work of other trades and as indicated or required for installation.
 5. Assemble cabinets with accurate router grooves 1/8" deep with glue and nails and screws.
 6. Apply plastic laminate to exposed ends after assembly to conceal screws in end cabinet.
 7. All particle board panels to be balanced construction.
- B. Subbases: Provide continuous plywood closed bases capable of being leveled to meet site conditions; subbase to be unfinished to receive resilient base. See Section 09 65 13.
- C. Base Cabinets
1. Sides and Bottoms: Construct of 3/4" thick particle board with interior of cabinet finished with cabinet liner or polyester laminate. Provide balanced constructed panels with neutral colored backer sheet at concealed conditions and finish laminate at exposed conditions.
 2. Backs: Standard 1/4" prefinished hardboard. Install in housed joints in

surrounding panels. All backs exposed to view to be neutral colored except where indicated to match vertical color surfaces.

Rear, unexposed side of backs to receive continuous hot melt glue at joint between back and sides/top/bottom for sealing against moisture and vermin, and to further contribute to cabinet stability.

3. Frame: Provide frame construction of 3/4" thick particle board or lumber dadoed into sides at the following:
 - a. As sub-top.
 - b. At all locked drawers and doors.
4. Runners: Provide runners or frame construction between all drawers.
5. Shelves: Provide fixed and adjustable shelves with particle board core where indicated on drawings. Provide shelves adjustable on 1/2" centers. Except for exposed shelving conditions, finish shelves with neutral colored polyester laminate or liner grade laminate. Finish front and rear edges with PVC "T" edge.
 - a. Shelves under 36" wide: 3/4" thick, except all open shelves to be 1" thick.
 - b. Shelves 36" to 42" wide: 1" thick.
 - c. Shelves over 42" wide: Construct in accordance with AWI Section 400 to support minimum 30 lbs./running foot of shelf with deflection limited to 1/4" or provide intermediate supports to limit the span to ranges specified above.
6. Finish
 - a. Casework Edges: Except where cabinet design requires matching laminate edges and/or "T" edge, finish front edges of sides, frames, and bottom with PVC sheet, black, gray or neutral colored as approved by Architect.
 - b. Exposed Exterior of Casework: Finish exposed portion of cabinet with vertical grade plastic laminate in solid color finish as selected by Architect.
 - c. Interior of Casework
 - 1) Semi-Concealed (behind doors): Neutral colored polyester or cabinet liner laminate.
 - 2) Exposed: Vertical grade laminate to match exposed casework.
 - d. Shelves: Same as specified for interior of casework. "T" edge typical except where cabinet design requires matching laminate self edge.

D. Drawers

1. Body: Construct of fiberboard with polyester laminate finish on faces and PVC on exposed top edges. Subfronts, sides and back fabricated with shouldered lock joint or dado construction and routed to receive bottom.
 - a. Sides and Back: 1/2" thick.
 - b. Subfront: 5/8" thick.
2. Bottom: 1/4" thick prefinished hardboard, housed and glued, into front, sides and back. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity. Reinforce

- drawer bottoms as required with intermediate spreaders.
3. Front: 3/4" thick particle board front finished with vertical grade plastic laminate on exposed face and cabinet liner laminate on interior side; total thickness 13/16" thick. Except where cabinet design requires self edge matching laminate edges (see cabinet design), edges to be finished with PVC "T" edging, black, gray or neutral color as selected by Architect; corners rounded.
 - a. Where adjacent door sizes require core thickness in excess of 3/4", provide drawer fronts to match door thickness. Verify conditions with Architect.
 4. Install on proper sized slides specified herein.
- E. Doors: Construct and finish same as drawer fronts except core construction to vary as follows:
1. Doors over 30" x 48": Construct from 1" to 1-1/4" thick particle board core.
 2. Doors over 36" x 60": Construct as 1-3/8" thick hollow core units in accordance with AWI Section 1300.
- F. Wall Cabinets: Construct and finish same as base cabinets except provide suitable hang rail of 3/4" plywood secured to cabinet frame.
1. Where wall cabinets close to soffit or ceiling, provide fascia scribed to conditions and leveled on bottom to permit level installation of cabinets. Finish of fascia to match cabinet.
- G. Design
1. Configuration of casework is indicated on drawings.
 2. The detailing and design required to provide rigid, solid and structurally adequate casework is the responsibility of the fabricator; within parameters of AWI specifications and as approved by Architect.
 3. The following conditions require special attention:
 - a. Casework exceeding 42" in width between supports.
 - b. Sink and/or equipment cutouts and supports.
 - c. Countertops exceeding 24" unsupported.
 - d. Wall and Ceiling Mounted Casework: Provide integral framing in casework of size, strength, and in locations which allow unit to be screw attached to proper substrate and remain rigidly in place.

PART 3 EXECUTION

3.01 CASEWORK INSTALLATION

A. General

1. Install plumb, level, true and straight with no distortions so that doors and drawers will fit openings properly and be accurately aligned.

2. Shim as required using concealed shims.
3. Where casework abuts other finished work, scribe and apply filler strips for accurate fit with concealed fasteners.
4. Where possible, assemble units into one integral unit with joints flush, tight and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16".
5. Anchor cabinet units securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction. Comply with manufacturer's instructions and recommendations for support of unit.
6. Adjust casework and hardware so that doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

B. Base Cabinets

1. Fasten each individual cabinet to floor at toe space, with fasteners spaced at 24" on center.
2. Bolt continuous cabinets together.
3. Secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.

C. Wall Cabinets

1. Verify that wood blocking has been installed at required locations.
2. Bolt continuous cabinets together.
3. Secure individual cabinets with not less than 2 fasteners into wall (wood blocking), where they do not adjoin other cabinets.

3.02 CLEANING AND PROTECTION

- A.** Repair or remove and replace defective work as directed upon completion of installation.
1. Patch surfaces damaged by installation to prior condition as approved or replace damaged units as directed.
- B.** Clean shop-finished surfaces, touch-up as required, and remove or refinish damaged or soiled areas, as acceptable to Architect.
1. Dust cabinet interiors. Clean exterior surfaces to original condition.
- C.** Advise Contractor of procedures and precautions for protection of materials and installed casework from damage by work of other trades.

END OF SECTION

SECTION 12 52 19

UPHOLSTERED SEATING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Extent of upholstered seating is as indicated on drawings.

1.02 QUALITY ASSURANCE

- A. Fabricator/Installer Qualifications: Demonstrate five years successful experience in fabrication and installation of fabric covered upholstered seating similar in scope, type and quality required for this project. Submit photographs, drawings and samples as Architect may require for verification.
- B. Mock-Up: Construct one foot long full scale mock-up of fabric covered seat and back cushion assembly. Use materials, fabrication and installation methods identical with those required for the work.
 - 1. Submit to Architect's office.
 - 2. Use mock-up to establish comfort criteria as acceptable to Owner. Reconstruct or alter as required, varying foam configuration, until acceptable to Owner and Architect.
 - 3. Document final accepted mock-up construction in revised shop drawings as acceptable to Architect. Use accepted mock-up construction for work to be fabricated and installed.
 - 4. Relocate mock-up to site as standard for judging completed work. Mock-up shall remain the property of the Owner.
- C. Fire Performance Characteristics: Provide seating which complies with the following:
 - 1. Padding: Provide new (prime manufacturer) polyurethane foam with an average burn length not exceeding 8" and average flame time after removal of flame source not exceeding 15 seconds, with drippings from test specimen not continuing to flame for more than 5 seconds after falling, when tested vertically; in compliance with Federal Test Method Standard 191, Method 5903.2.
 - a. Comply with California Technical Bulletin #117.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each product and process specified as part of this Section and incorporated into upholstered seating during

fabrication and installation.

- B. Shop Drawings: Submit shop drawings showing location of each component, dimensioned plans and elevations, large scale details, attachment devices and other components.
- C. Samples: Submit 12" square samples of required fabric.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect upholstered seating during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver upholstered seating until painting, wet work, grinding and similar operations which could damage, soil or deteriorate upholstery have been completed in installation areas. If, due to unforeseen circumstances, upholstered seating must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.05 PROJECT CONDITIONS

- A. Coordinate installation of upholstered seating with preparations for project Substantial Completion and closeout. Delay installation until space enclosures and other general finish work have been completed, continuing construction traffic in seating areas will be minimal, and ambient conditions are being maintained by operation of HVAC system.

1.06 WARRANTY

- A. Provide warranty executed by fabricator and installer, agreeing to repair or replace defective materials and workmanship as acceptable to Owner and Architect during two year warranty period following Substantial Completion. Defective is defined to include deterioration of covering materials when subjected to normal use and wear, loosening and tearing of seams and premature deterioration of cushioning materials.

1.07 EXTRA STOCK

- A. Deliver stock of maintenance materials to Owner. Provide maintenance materials from same manufactured lot as materials installed. Enclose in protective packaging with appropriate identifying labels.

- 1. Upholstered Seating: Provide twelve yards of fabric for future replacement.

PART 2 PRODUCTS

2.01 SUPPORT MATERIALS

- A. Plywood: Conform to Section 06 10 00. APA-BC or CD Plugged Grade; fire-retardant treated; Product Standard PS-1.
- B. Lumber: Conform to 06 10 00. Fire-retardant treated; Product Standard PS-20.
- C. Fasteners
 - 1. Nails: Type, size and finish as required for each use. Comply with FS FF-N-105.
 - 2. Screws: Type, size and finish as required for each use. Comply with FS FF-S-111.
 - 3. Other Fasteners: As indicated on the drawings.
- D. Steel Angles and Shapes: Conform to Section 05 50 00; ASTM A36.
- E. Clips: Interlocking "Z" profile spring steel units, or similar type units, specifically designed for securing upholstered seating.

2.02 UPHOLSTERY MATERIALS

- A. Foam: Fire-retardant composition polyurethane foam using soft density HR-10 for back cushions and medium density HR-30 for seat cushions.
- B. Fabric: Expanded vinyl on Jersey Knit; minimum 50 mils thick with protective finish. Comply with FS CCC-A-680, Class 2. Fabric to be anti-static treated, resistant to mildew, oils and sulfides, and with flame resistant characteristics of the OBC.
 - 1. Manufacturer/Product/Color: As indicated on the drawings.

2.03 FABRICATION

- A. Fabricate units to seating dimensions, profiles and details indicated, complying with shop drawings and final accepted mock-ups.
- B. Complete fabrication, assembly and other work 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.
- C. Measurements: Before proceeding with fabrication of upholstered seating required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
- D. Fabricate work to be flat and smooth, free of wrinkles, bubbles, puckering and other defects.
- E. Fabricate each cushion from a single piece of foam. Shape foam to contours

indicated with smooth surfaces and straight edges. Fabricate foam cores for uniformity of size, shape and appearance. Pieces of same size and type to be interchangeable.

- F. Provide box end construction for cushions with saddle stitched joinery. Wrap fabric around cushion, front to back for roll over front and back.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which upholstered seating is to be installed. Notify General Contractor, in writing, of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 INSTALLATION

- A. Install seating plumb, level, true and straight with no distortions.
- B. Anchor upholstered cushions with clips as indicated.

3.03 ADJUSTMENT, CLEANING FINISHING AND PROTECTION

- A. Repair damaged and defective upholstered cushions where possible to eliminate defects, both functionally and visually. Where not possible to repair, replace upholstered cushions. Architect will decide if repairs are acceptable.
- B. Clean upholstery using only recommended procedures. Replace upholstery which cannot be satisfactorily cleaned.

END OF SECTION

SECTION 14 21 23

ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment and services necessary to furnish and install all traction machine roomless passenger elevators. The elevator system as described shall be installed with all needed accessories as required to provide a complete installation.

1.02 RELATED SECTIONS

- A. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 05 50 00 - Metal Fabrications; pit ladder, divider beams, lintels for door support.
 - 2. Division 23 - Heating, Ventilating, and Air Conditioning; ventilation and temperature control of elevator equipment room.
 - 3. Division 26 - Electrical; electrical service to main disconnect in elevator machine room (shunt trip type) including electrical power for elevator installation and testing; electrical service for machine room, machine room and pit GFIC convenience outlets; non-GFIC outlet dedicated for sump pump, lighting in elevator pit; telephone service to machine room. If electrical requirements differ from those indicated on the Electrical Drawings, the Elevator Supplier must pay the Electrical Contractor for costs to accommodate this change. Power changes should be brought to the Architect's attention during bidding for inclusion in an Addendum.
 - 4. Division 26 - Fire Alarm Systems; fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine room.
 - 5. Division 26 - Telephone System to machine room.
 - a. Provide cellular communication.
 - 6. Division 27 and 28 – Access control and position switches.

1.03 QUALITY ASSURANCE

- A. Manufacturer
 - 1. Regularly engaged in designing, engineering, manufacturing, installing and servicing elevators of the type and character specified.
 - 2. Have a history, during the last ten (10) years, of not less than 50 successful installations and satisfied Owners where continuous maintenance service was performed. Such history to be fully documented, upon request, listing project name, date of installation, address, architect, owner, name and phone number of owner's facilities manager or maintenance superintendent.

3. Provide evidence that a service office with qualified service personnel is located within 50 miles of the installation and warehouse parts is maintained within 50 miles. Where service facilities are further than the specified distances, manufacturer to provide response time of not more than 1-1/2 hours to request of service.
- B. Installer: Manufacturer or an authorized agent of the manufacturer with not less than 5 years of successful experience installing similar elevators.
- C. Handicapped Provisions: Comply with National Elevator Industry Inc. (NEII) "Suggested Minimum Passenger Elevator Requirements for the Handicapped", and A.D.A. requirements, including clearances, handrails, locations for signal equipment and similar provisions.
- D. Codes and Standards: Perform all work in accordance with the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks (ASME A17.1), the National Electrical Code and the OBC.
- E. Regulatory Requirements
 1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. OBBC.
 3. NFPA 70 National Electrical Code.
 4. NFPA 80 Fire Doors and Windows.
 5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG).
- F. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware and operation shall comply with ASTM E152, UL 10B and NFPA Standard 80. Provide entrance assembly units bearing UL Class B labels.
- G. Obtain and pay for all required permits, inspections and fees. Arrange for and make required inspections and tests. Obtain certificates and operating permits and turn over to University upon acceptance of work.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each principal component or product and include certified test reports on required testing. List and describe features of the control system, performances and operating characteristics.
- B. Shop Drawings: Submit plans, elevations and details of car enclosures and hoistway entrances. Include:
 1. A comparison of maximum loads imposed on the building structures at points of support and all similar considerations of the elevator work.
 2. Access control and position switch coordination.
- C. Maintenance Manuals: Submit bound maintenance manual for each elevator or type of elevator with operating and maintenance instructions, parts listing,

recommended parts inventory listing, purchase source listing, emergency instructions and similar information.

- D. Samples: Submit samples of exposed finishes of car enclosures, hoistway entrances, and signal equipment; 8" squares of materials and 12" lengths of running materials.
- E. Inspection certificates and operating permits required by governing authorities to allow normal, unrestricted use of elevator.
- F. Deliver permit to operate elevator to Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials to the site until areas in which they are to be installed are ready to receive them in place for final installation.
- B. Wrap, carton and crate factory finished materials in a manner to protect finishes.
- C. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling or deterioration.
- D. Fully protect movable and operating equipment from weather damage.

1.06 PROJECT CONDITIONS

- A. Painting
 - 1. Paint all equipment that is not factory finished.
 - 2. Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.
- B. Temporary Use
 - 1. Provide all necessary protection to prevent damage to each elevator used for construction purposes before Contract Completion.
 - 2. Provide temporary enclosures, coverings, guards, barriers and other devices required to protect the elevator car enclosures, hoistway entrances, signal fixtures and related materials, components and finishes from damage. Protective materials, methods and procedures shall be approved by the elevator manufacturer and paid for by the user.
 - 3. Maintenance during use, including cleaning, lubricating and adjusting equipment and components for proper elevator operation shall be performed only by the elevator manufacturer. Cost for maintenance shall be paid by the user.
 - 4. Elevators shall be free of damage or deterioration at time of Contract Completion. Cost to repair damaged materials and finishes and replace worn or defective components to restore elevators to their original condition shall be paid by the user.

1.07 MAINTENANCE

- A. Provide full preventative maintenance for a period of one year beginning on the date of final acceptance of work.
 - 1. Frequency: Regular and systematic inspections not less than once per month.
 - 2. Duration: One hour per visit.
 - 3. Personnel: Competent and trained employees of the elevator manufacturer.
 - 4. Maintenance: Includes necessary adjustments, greasing, oiling, cleaning, supplies and parts to keep equipment in proper operation, except such parts made necessary by misuse, accidents or negligence not caused by the manufacturer.
 - 5. Work Period: Perform all work during regular working hours of the manufacturer's maintenance personnel.
- B. Maintenance Service: To be performed solely by the successful elevator manufacturer and not assigned or transferred to any agent or subcontractor.
- C. Provide twenty-four emergency callback service as part of the maintenance service. Respond to all calls within 45 minutes after notification, including evenings and weekends. Trapped passengers require immediate response and are to be treated at the highest emergency level. Failure to respond promptly or to provide competent service will be cause to hire another contractor to perform the work at the expense of the installing contractor.
- D. Contractor to have a service office and full-time service personnel within a 50 mile radius of project site. Service office shall have been functioning with full-time personnel for a minimum period of 5 years before the bid date.
- E. Extended Maintenance Proposals: Maintenance service beginning after base bid one year period consisting of regular examinations, adjustments and lubrications as specified herein. Provide separate proposal for period of:
 - 1. 5 years.
 - 2. 10 years.

1.08 WARRANTY

- A. Provide special project guaranty, signed by the Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of the elevator work for a period of one year after date of Contract completion.
- B. "Defective" is hereby defined to include, but not be limited to, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
- C. Repairs to be made at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

- A. Manufacturer
 - 1. Basis of Design:
 - a. Elevator - **4000** lbs. This specification is based on elevator EcoSpace by KONE.
 - 2. Similar products/models by THYSSEN KRUPP, OTIS are acceptable providing they meet the requirements specified herein and include in their scope all changes to building physical dimensions or electric service beyond what is indicated on the drawings.
- B. Elevator: Performance Requirements for elevators are defined as follows:
 - 1. Speed: 150 fpm (All). Variation above or below the referenced speed is permitted depending upon load.
 - 2. Hoistway Entrances:
 - a. **4000** lbs Elevators: 3'-6" x 7'-0"
 - 3. Power Supply: As indicated.
 - 4. Platform Size (inside clear):
 - a. **4000** lbs Elevators: 6'-8" wide by 5'-6 ½" deep
 - 5. Landings and Openings: 2
 - 6. Cab Height: 8'-0".
 - 7. Power: 480 volt, three phase, 60 hertz.
 - 8. Car Lighting: 125 volt single phase, 15 ampere, 60 hertz.

2.02 MATERIALS, GENERAL

- A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- B. Steel
 - 1. Shapes and Bars: ASTM A 36.
 - 2. Sheet: ASTM A 366, cold-rolled steel sheet, commercial quality, Class 1, matte finish, stretcher leveled.
 - 3. Finish: Shop primed.
- C. Stainless Steel
 - 1. Shapes and Bars: ASTM A 276, Type 304 (18-8).
 - 2. Tubing: ASTM A 269, Type 304 (18-8).
 - 3. Sheet: ASTM A167, Type 304 (18-8).
 - 4. Finish: NAAMM No. 4 satin finish.
- D. Plastic Laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.
 - 1. Color/Pattern: As selected by Architect.

- E. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- F. Fire Retardant Treated Particleboard Panels: Minimum 3/4" thick backup for plastic laminate veneered panels, provided with suitable anti-warp backing; to meet ASTM E84 Class "A" rating with flame-spread rating of 25 or less.

2.03 EQUIPMENT/COMPONENTS

- A. Mechanical Equipment.
 - 1. General: Incorporate all necessary standard components required for such application all in accordance with applicable code(s).
 - 2. Hoisting Machine: Include an AC drive motor, direct current electro-mechanical brake and integral traction drive sheave, mounted to the back of the car guiderail at the top landing.
 - a. Provide equipped with an electric drive motor especially designed for elevator service, developing high starting torque with low starting current.
 - b. Motor Horsepower: In accordance with the duty specified.
 - 3. Machine Brake: Electrically released and spring applied. The drive sheave shall be accurately turned and grooved for the quantity and size of Hoist Ropes applicable to this service.
 - 4. Traction steel hoist device: Size and number appropriate to insure proper wearing qualities, shall be provided. As a minimum, the number and size of ropes shall comply with the factor of safety requirements of the ASME/ANSI A17.1 Safety Code for Elevators.
 - 5. Elevator System shall include a car frame, car safety, overspeed governor and pit buffers for both car and counterweight; all integrated into this system in accordance with application criteria.
 - 6. Hoisting Machine
 - a. Located within the hoistway and mounted on the car guiderail furnished by the elevator contractor.
 - b. Mounting of Hoisting Machine: Incorporate isolation to minimize the transmission of noise and/or vibration to the building structure.
 - 7. Counterweight: Provide elevator suitably counterbalanced with adequate weights contained in a structural steel frame. This Counterweight shall be equal to the weight of the complete elevator car plus a percentage of the capacity load.
 - 8. Counterweight Guard: Manufacturer's appropriate design and size; provided in place at the bottom of the hoistway.
- B. Additional Equipment
 - 1. Guide Rails: Provide elevator car and counterweight guide rails erected plumb, and securely fastened to the hoistway framing. Design and provision of hoistway framing shall be of adequate strength and properly positioned to withstand loads applied in conjunction with data provided by the elevator contractor.
 - 2. Roller Guides: Provide mounted to the top and bottom of both the car and counterweight frame. Each roller guides assembly shall be arranged to maintain constant contact on the rail surfaces.

C. Power and Operational Controls

1. Power Control: Digital, solid state based control system. Provide smooth, accurate speed regulation and efficient operation. Interface with the microcomputer elevator logic providing closed loop position control.
 - a. Design power control system to vary the alternating current power supply to the AC hoist motor providing smooth acceleration and deceleration regardless of elevator load and shall use I.G.B.T. technology in the power stage in order to deliver power to the motor in a quiet mode, minimizing the need for external power filters for quiet operation.
 - b. Solid state load/torque balancing circuitry shall be incorporated to automatically monitor car load prior to start and adjust the hoist motor torque to assure smooth car start-up.
 - c. Power control shall be fully factory pre-set, minimizing the need for field adjustment. Computer inputs shall tailor the power control to the specific elevator design parameters. Provision shall be made for minor field adjustment. Such adjustments shall generally be non-interacting.
2. Elevator Operation - Selective Collective Control: Pressure upon one or more car buttons shall send 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, provided the hoistway door interlock and car door switch circuits are completed. During this operation, the car shall also answer calls from the landings which are in the prevailing direction of travel. Each landing call shall be canceled when answered.
 - a. Pressure upon a hall button at a floor above the car location shall cause the car to start up and answer any up calls as they are reached by the car irrespective of the sequence the buttons have been pressed. The car shall not stop at floors where down buttons only had been pressed. If no further car or up hall calls are registered, the car shall reverse its direction preference to response to car calls or down hall calls.
 - b. The car shall start down to answer calls below the car and shall not stop where only up calls are registered. When traveling up, the car shall reverse at the highest call and proceed to answer calls below it. When traveling down, the car shall reverse at the lowest call and answer calls above it.
 - c. Should both an up and a down call be registered at an intermediate landing, only the call responding to the direction in which the car is traveling shall be canceled upon the stopping of the car at the landing. Terminal limit switches shall be provided in the hoistway designed to automatically stop the car at or near the closest terminal landing.
3. Up-Fall Protection: Provide a system which monitors for unintended upward movement of the elevator system. In the event unintended upward movement occurs the system shall engage a braking system to stop a car with up to 125% of rated capacity. The main car brake, rope brakes and sheave wedges are not acceptable alternatives.

4. Passenger Rescue Feature: Provide a device in the machine room to move the elevator car to a floor landing in the event of controller or power failure. This device must be speed controlled to prevent an overspeed condition. A line of sight must also be provided between the Passenger Rescue Feature and the elevator car.
5. Auxiliary Operations and Controls include the following:
 - a. Independent Service
 - b. Fireman's Control Phase I and Phase II
 - c. Home Landing
 - d. Zoned Access at bottom floor
 - e. Sequence starting (under emergency power)
6. Access Control: Coordinate and integrate key reader operation system with Division 28.

2.04 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.
 1. Manufacturer's standard entrance design, bearing Underwriters' Laboratories "B" labels, and consisting of 14 gauge frames with 2 inch profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
 2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
 3. Doors: Flush construction.
 - a. Stainless steel: ASTM A 167, Type 304 stainless steel panels, No. 4 satin finish.
 4. Frames: Formed construction.
 - a. Stainless steel: ASTM A 167, Type 304 formed stainless steel sheet, No. 4 satin finish.
- B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Design interlock to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.
 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.
 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.
 1. Aluminum: ASTM B 221 aluminum, mill finish.

2.05 CAR ENCLOSURE

A. Car Enclosure

1. Wall Panels: Reinforced 16 gauge cold-rolled steel with two coats factory applied baked enamel finish, with applied vertical stainless steel sheet panels, No.4 satin finish
2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Two coats factory applied reflective baked enamel.
3. Ceiling: Downlight type, 16 gauge metal pans with LED downlights suspended and dimmer switch 7'-4" above the finished floor. Number of downlights shall be dependent on platform size with a minimum of six.
 - a. Metal pans: Stainless steel, No. 4 satin finish.
4. Cab Columns, Front, and Transom: Stainless steel, No.4 satin finish.
5. 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 shoes sliding in a smooth threshold groove.
 - a. Door Finish: Stainless steel, No.4 satin finish.
 - b. Cab Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness. Aluminum: ASTM B 221 aluminum, mill finish.
6. Handrail: Segmented type metal bar handrail with ends curved to the wall, nominal 1/4" x 2", stainless steel satin finish, lacquered. Provide at rear and side walls.
7. Ventilation: Two speed exhaust fan mounted on the car top.
8. Pad Buttons: Provide pad buttons on cab front(s) and walls.
 - a. Provide one set of vinyl protection pads for the project.
9. Base: Stainless steel satin finish.
10. Protection: Provide one set of wall protection cloth pads
11. Finished Floor: TBD.

2.06 DOOR OPERATION

- ### A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the 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. Direct drive geared operators, AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: 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 the next car up.
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. Limited Door Reversal: If the doors are closing and an infra-red beam is

interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.

- B. Electronic Passenger Sensing Device with Nudging: Provide at each entrance a solid state electronic detector and an electro-mechanical reversal edge as follows:
1. After a stop is made, doors shall remain open for an adjustable time interval. Closing may be initiated instantaneously by registration of a car call, operation of load weighing device or signal from the service demand integrator.
 2. Doors will remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a predetermined time, a buzzer will sound and doors will close at a reduced speed. If the reversal edge contacts a person or object while closing, doors will immediately stop and resume closing after the obstruction has been removed.
 3. Arrange circuitry to inactivate the electronic detector should it fail to operate. However, the electro-mechanical reversing edge will not be deactivated by failure of the electronic detector or its removal from the circuitry by means of a manual switch.
 4. Electronic Passenger Sensing Device (Light Ray Device)
 - a. Provide infra-red light ray device in elevator car entrance. Provide complete, operational system.
 - 1) Light Curtain: Minimum 40 beam, evenly spaced from floor to 6'-0" above floor.
 - 2) Control Module: Top of car mounting.
 - 3) Transmitter: Mounted in housing on left or right door jamb.
 - 4) Receiver: Mounted in housing on door jamb opposite transmitter.
 - 5) Housing: Gage as recommended by manufacturer.
 - 6) Electrical: 110 VAC 6VA.
 5. Ensure that "nudging mode" is either turned off or set to the longest delay setting available.

2.07 CAR OPERATING STATION

- A. Vandal Resistant Car Operating Panel: Flush mounted stainless steel panels, containing call button for each landing served, and containing other buttons, switches and controls required for specified car operation and control. These include, but are not limited to, emergency lighting and alarm bell, key operated stop switch, key operated lights and key operated single-speed fan switch, key operated car top inspection switch, key operated independent service key switch, and all necessary safety functions.
1. Stainless Steel Panel Finish: #4 satin.
 2. Provide operating device symbols as required by code. Mark other buttons and switches with manufacturer's standard identification, including Braille next to buttons, for required use or function.
 3. Mount controls at height complying with ANSI A117.1 requirements for handicapped.
 4. Provide illuminated buttons, which light up when activated and remain

illuminated until call or other function has been fulfilled. Provide non-illuminated buttons with brushed stainless steel finish.

5. Fire Service Instructions for Phase II are to be permanently engraved in the car operating panel.
6. Provide a GFIC duplex outlet at the bottom of the car operating panel.
7. Position Indicator: An electronic dot matrix position indicator mounted in a module matching the control panel. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing which the elevator is stopped or passing.
8. Emergency Light: An emergency light and capacity plate shall be integrated into a module. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

- B. In-Car Travel Direction Lanterns: Mounted in car entrance jamb visible from corridor. Illuminates to indicate direction of car travel. Provide with chime which sounds once for "UP" direction and twice for "DOWN" direction as doors are opening.

2.08 CAR OPERATION SYSTEM

- A. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
- B. Emergency Power: In the event of a normal power supply failure, the elevator system shall be arranged to lower from an emergency power supply. The elevator contractor shall provide circuitry so after normal power failure and establishment of emergency power, each elevator shall be operable.

2.09 HALL STATIONS

- A. Hall Stations, General: Illuminated buttons indicating a call has been registered at that floor for the indicated direction. Faceplates shall be No. 4 satin finish stainless steel.
 1. Each terminal station shall contain one illuminating pushbutton.
 2. Each intermediate station shall consist of two illuminating pushbuttons, one for the up direction and one for the down position.
 3. Phase 1 firefighters service keyswitch, with instructions, shall be permanently engraved into the hall station at the designated level.
- B. Floor Identification Pads: Provide metal door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

PART 3 EXECUTION

3.01 PREPARATION

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed.

- 1. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install elevators as specified in accordance with all governing codes, manufacturer's written direction and ASME A17.1.
- B. Lubricate all equipment in accordance with manufacturer's written instructions.

3.03 CLEAN-UP

- A. Remove all unused materials and leave cab and all related areas clean.

3.04 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 Owners personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. Basic specification: Perform work of this Section according to ACI 301-16, "Specifications for Structural Concrete", except as specifically modified herein.
- B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas. Provide and install dowels for masonry walls.
- C. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work such as concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details of equipment being supplied, prior to placing concrete. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.

1.03 QUALITY ASSURANCE

- A. Reference standards:
 - 1. ACI 301, Specifications for Structural Concrete
 - 2. ACI 318, Building Code Requirements for Structural Concrete.
 - 3. ACI 117, Specification for Tolerances for Concrete Construction and Materials
 - 4. ACI 347R, Guide to Formwork for Concrete.
 - 5. ACI 302.1R, Guide to Concrete Floor and Slab Construction.
 - 6. "Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.
 - 7. ACI 439.5R, Comprehensive Guide for the Specification, Manufacture and Construction Use of Welded Wire Reinforcement.
 - 8. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 9. ACI 305.1, Specification for Hot Weather Concreting.
 - 10. ACI 306R, Guide to Cold Weather Concreting.

11. ACI Field Reference Manual, SP-15.

1.04 SUBMITTALS

- A. Submit a mix design for each type of concrete mix required in accordance with ACI 301, Section 1.5.
 1. Acceptable methods of determining concrete proportions shall be in accordance with one of the following methods per ACI 301, Section 4:
 - a. Establish based on previous field strength test data with standard deviation calculations.
 - b. Establish based on trial mixtures with tested strength data relative to each mix design.

In either case, provide accurate test data within allowable time periods indicated in ACI 301. Incorrect or missing data will cause for rejection of submittals.
- B. Submit Placing Drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.
- C. Submit shop drawings for all formwork and shoring. Formwork design shall follow the guidelines of ACI 347 and ACI 347.2R. Shop drawings shall indicate sequence of form removal and reshoring for each type of construction. Include minimum concrete strengths for each reshored level at time of form stripping and concrete placement. Provide calculations sealed by a professional engineer registered in the applicable state of project location.
- D. Submit test data for aggregates proposed for use, indicating source and compliance with specification requirements.
 1. Submit blended aggregate mix gradation data for review in all mixes which utilize blended aggregates.
- E. Submit aggregate sample for exposed aggregate floors and sidewalks, and proposed procedure for exposing the aggregate.
- F. Submit product literature for admixtures and curing compounds proposed for use.
- G. Submit product literature on all proprietary materials including joint systems, waterstops, hooked anchorage systems, sealers, and patching compounds.
- H. For formed slabs and slabs on metal deck, provide a proposed layout of construction joints and placement methods to verify construction live load used in the design of supporting framing members will not require additional shoring or re-design by the Engineer of Record.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: Portland Cement, ASTM C150, Type I or Type II or ASTM C1157, Type LH or GU. All cement to be from the same mill.
- B. Supplementary Cementitious Materials
 - 1. Fly Ash: ASTM C618, Type C or F
 - 2. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989, Grade 100 or 120
 - 3. Silica Fume, Microsilica: ASTM C1240
- C. Water: Potable.
- D. Aggregates:
 - 1. Normal weight aggregates: conform to ASTM C33, (4.2.1.2).
 - 2. Light weight aggregates, fine and coarse: conform to ASTM C330, (7.2.1).
 - 3. Coarse aggregate:
 - a. Topping slabs on precast concrete deck and fill on stair pans: Gradation #8.
 - b. All other classes: Gradation #57.
 - c. A blended aggregate mix may be used at the Contractor/Suppliers' discretion.
 - 4. For architecturally exposed concrete, use a single source of uniform quality throughout the work.
- E. Admixtures, where required or permitted per ACI 301, Section 4:
 - 1. Water-Reducing: ASTM C494, Type A or D.
 - 2. Mid-Range Water-Reducing admixture: ASTM C494, Type A.
 - 3. Air-entraining: ASTM C260 (4.2.1.4).
 - 4. High-Range Water-Reducing admixture (Superplasticizer): ASTM C494, Type F or G.
 - 5. Non-Chloride, Non-Corrosive accelerator: ASTM C494, Type C or E.
 - 6. Fly Ash: ASTM C618, Type C or F.
 - 7. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989.
 - 8. Calcium Chloride and admixtures containing more than 0.06% chloride ions are NOT permitted.
 - 9. Use of admixtures other than those listed will be permitted only when approved prior to bid.
- F. Reinforcing:
 - 1. Deformed bars - Uncoated: ASTM A615 or A706. Minimum yield strength to be 60 ksi.

2. Deformed bars – Epoxy Coated. ASTM A615, A616, A617, or A706. Minimum yield strength to be 60 ksi. Epoxy coated in accordance with the requirements of ASTM A775 or A934.
 3. Welded Wire Fabric:
 - a. Plain welded wire reinforcement: ASTM A1064. Provide in sheet form for all uses other than slabs-on-grade. Minimum yield strength is to be 65 ksi.
 - b. Deformed welded wire reinforcement: ASTM A1064. Minimum yield strength is to be 70 ksi.
 - c. Lap sheets a minimum distance of cross wire spacing plus two inches.
 4. Deformed joint dowel bars: ASTM A615, Grade 60, plain steel bars, cut true to length with square ends.
 5. Smooth joint dowel bars: ASTM A36, plain steel bars, cut true to length with square ends.
 6. Reinforcing support accessories:
 - a. Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties, and similar items as required for spacing, assembling, and supporting reinforcement in place. Conform with CRSI RB4.1 and Manual of Standard Practice and the following requirements:
 - b. For footings, grade beams, and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
 - c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finish surfaces, provide supports with legs which are galvanized, plastic-protected, or stainless steel.
 - d. For galvanized reinforcement, provide all galvanized accessories
 - e. For epoxy-coated reinforcement, provide accessories which are nylon-, epoxy, or plastic coated
 7. Shear stud rails: ASTM A1044
 - a. Studs: Minimum yield strength to be 51 ksi. Minimum ultimate strength to be 65 ksi.
 - b. Rails, when used as stud anchorage: Minimum yield strength to be 44 ksi. Minimum ultimate strength to be 65 ksi.
 8. Structural synthetic fiber reinforcement: Structural fibers shall be a coarse monofilament or self-fibrillation, polypropylene / polyethylene blend in accordance with ASTM C1116, Paragraph 4.1.3, Type III. Structural fibers shall have a minimum tensile strength of 73 to 80 ksi, have a minimum length of 1-1/2 inches, thickness of 0.015 inches, and a width of 0.045 inches.
- G. Mechanical Reinforcing Splices: All mechanical splices must develop $1.25f_y$ of the reinforcing being spliced.
1. Welded Lap Splice: Welding of all non-prestressed bars shall conform to the requirements of AWS D1.4. Provide mill test reports of reinforcing bars to demonstrate compliance.

2. Proprietary coupling devices. Provide proprietary testing reports demonstrating compliance to strength requirements.
- H. Premolded expansion joint filler: ASTM D1751.
- I. Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.40 kg/m² when applied at 300 ft²/gal. Manufacturers' certification is required. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile resilient flooring, vinylbacked carpet, wood, terrazzo, epoxy or urethane overlays or adhesives, or other coating or finishing products. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows
- J. Curing Compound (Strippable): The compound shall conform to ASTM C309 and is to be used on slabs that are to receive subsequent applied finishes and where noted on the drawings. Install in strict accordance with the manufacturer's recommendations and supervision. Verify compound is compatible with the applied finish prior to placement. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows
- K. Curing compound for the parking area slabs on grade: ASTM C1315, Type 1, Class A, and AASHTO M148. Compound must contain a fugitive dye. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. W.R. Meadows.
- L. Penetrating Sealer for Elevated Parking Decks: Meets or exceeds performance requirements of NCHRP 244 and have minimum 40% silane content. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Kaufman Company.
 3. Sika Corporation.
- M. Grout for masonry core fill: ASTM C476, coarse type.
- N. Grout under steel base plates and bearing plates: Non-shrinking, non-metallic, with minimum 28-day strength of 5,000 psi, when mixed to a fluid consistency. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
 2. Euclid Chemical Company.
 3. Kaufman Company.
- O. Vapor Retarder:
1. Conform to ASTM E1745 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs", Class A.
 2. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity-controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity-controlled areas.
 3. Vapor retarder shall be installed in accordance with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs. The vapor retarder/barrier shall be a minimum of 10 mils thick and placed directly on the granular fill, below the concrete floor slab. Lap joints a minimum of 6 inches and seal with manufacturer's recommended tape or adhesive.
- P. Granular fill below slabs on grade: Provide as recommended in project specific soils report. If soils report is not provided for project, use 4" deep of compacted ODOT 304 or approved equivalent AASHTO dense graded base course. Provide ASTM D448 size #57 stone under slabs-on-grade where radon evacuation is anticipated.
- Q. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide either premolded polyvinylchloride or swellable type.
1. Premolded, flexible, polyvinylchloride, with center bulb. CRD C572
 2. Rubber and Swellable Clay CRD C513
- R. Structural Bonding Compound: Epoxy adhesive, 100% solids, two-component material suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Kaufman Company.
 3. Sika Corporation.
- S. Patching Compound, Epoxy Type: 100% solids, suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
 2. Sika Corporation.
 3. W.R. Meadows
- T. Patching Compound, Cementitious Type: Subject to project requirements, provide one from the following manufacturers:

1. Euclid Chemical Company.
 2. Sika Corporation.
 3. W.R. Meadows
- U. Curing sheets for wet curing – the following materials are approved:
1. Sisalcraft Sk-10 (C171).
 2. Burlap
 3. Filter Fabric (8-ounce minimum)
 4. Visqueen plastic, 8 mils minimum.
 5. Bur-lene curing blankets.
- V. Concrete Inserts:
1. Dovetail Inserts
 - a. Heckman #100 Inserts; hot-dip galvanized.
 2. Brick Ledge Inserts:
 - a. Hohmann & Barnard LW-340 Inserts; hot-dip galvanized.
- W. Frictionless Bearing Pads:
1. Frictionless bearing pads shall be a nominal 3/32" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. Provide one sliding pad tack welded to the lower supporting surface and one tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings. The lower frictionless bearing pads shall be a nominal 1/16" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. The upper frictionless bearing pad shall be a 20-gauge stainless steel sheet (RMS<20) resistance welded to a 10-gauge A36 steel backing plate. The lower sliding pad shall be tack welded to the lower supporting surface and the upper pad tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings.
 2. Design: The pad size and design shall conform to 1998 AASHTO "LRFD Bridge Design Specifications," Section 14. Design bearing pressure under total service load shall not exceed the manufacturer's recommendation. If Neoprene is used the compressive load shall be limited to 800 psi.
 3. Corrosion Resistance: Frictionless bearing pads for exterior or exposed usage shall be manufactured for use in an exposed climate of heat, cold, moisture, and ultraviolet rays. All backing steel in an exposed or open environment shall be shop painted with a zinc rich paint or field painted with "ZRC Cold Galvanizing Compound".

X. Neoprene bearing pads:

1. 100% virgin chloroprene meeting AASHTO Specifications. Shore A hardness of 60, unless noted otherwise.

2.02 MIXES

A. The following mixes of concrete are required:

Mix Usage	f'_c at 28 days	Exposure Class	Maximum Water Cementitious Ratio	Air Content
Lean Concrete, & Mud Slabs	1,500 PSI	F0	---	---
Footings & Interior Column Piers	3,500 PSI	F1	0.55	optional
Interior Slabs on Grade	3,500 PSI	F0	0.50	optional
Interior Slabs on Grade Which Receive Moisture-Sensitive Floor Coverings	4,000 PSI	F0	0.45	optional
Interior Slabs on Metal Deck	3,500 PSI	F0	0.45	optional
Exterior Foundation Stem Walls, Foundation Walls, & Exterior Column Piers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior, Unreinforced Slabs on Grade and Exterior Concrete Not Subjected to Deicers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior Reinforced Site Concrete subjected to Deicers, Parking Structures	5,000 PSI	F3, C2	0.40	5%-7%

Concrete Mix Notes:

- 1) Exposure class requirements are achieved through the F'_c , w/cm, and air content requirements provided to ensure adequate durability conforms to Freeze/Thaw exposures (F) or Corrosive exposures (C).
- 2) For all slab mixes, provide a minimum cementitious content of 520 lbs.
- 3) Use No. 8 coarse aggregate for concrete topping on precast concrete deck and metal stair pan fill.
- 4) Provide 3 pounds per cubic yard of collated fibrillated polypropylene fibers for topping on precast concrete plank.
- 5) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
- 6) Fly ash is permitted in all mixes but shall not exceed 25% of cement weight indicated above and can be included in the water-to-cementitious ratio.
- 7) Ground granulated blast-furnace slag is permitted in all mixes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
- 8) Silica fume (microsilica) is permitted in all mixes but shall not exceed 10% of the cement weight indicated above and can be included in the water-to-cementitious ratio.

- 9) Total supplemental cementitious material shall not exceed 35% of the total cement weight.
- 10) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
- 11) Concrete for slabs on grade must include a mid-range or high-range plasticizer.
- 12) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Engineer of Record and verification that the water-to-cement ratio has not been exceeded.
- 13) Maximum water-soluble chloride ion content in Non-Prestressed concrete shall not be more than the ACI limits set forth for defined corrosion classes. For all other concrete, the maximum water-soluble chloride ion content shall not be more than 0.06 percent (by weight) of the weight of cement as determined by ASTM C1218.
- 14) Lightweight concrete shall have an equilibrium density, as determined by ASTM C567, between 90 and 115 pounds per cubic foot.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete.
- B. Determine field conditions by actual measurement.
- C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Construction Manager is present, unless this requirement is specifically waived.

3.02 FORMWORK AND REINFORCING

- A. All formwork shall follow the guidelines of ACI 347R resulting in final formed surfaces within the tolerances of ACI 117.
- B. Footings may be cast against earth cuts when soil conditions permit.
- C. Removal of forms and shoring:
 1. Remove no forms within 24 hours after placement.
 2. Shoring is to remain in place until concrete reaches its design strength. Windsor Penetrometer is to be used to verify in-place strength if forms are removed prior to 28 days after casting concrete.
- D. Reinforcing:
 1. Welding of reinforcing is prohibited, except where shown.
 2. Use plastic-tipped or stainless-steel bar supports for surfaces exposed to view in finished structure.

3.03 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install all embeds shown on contract documents, including but not limited to: headed stud embeds, anchor bolts, brick ledge inserts, and dovetail anchor slots.
 - 2. Install sleeves for mechanical, electrical, and plumbing penetrations.
 - 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.
- B. Aluminum conduit shall not be installed in concrete.

3.04 DELIVERY AND PLACEMENT

- A. Preparation before placement:
 - 1. Remove all debris from forms and deck. Clean steel deck of grease, oil, and other substances that would reduce bond to concrete.
 - 2. Standing water shall be removed from place of deposit before concrete is placed.
 - 3. Do not use additives or salts to remove ice. Non-chloride deicers may be used.
 - 4. In cold weather, comply with ACI 306R; maintain temperature of forms and reinforcing within a range of 55 - 90 degrees F.
 - 5. In hot weather, comply with ACI 305.1.
 - 6. Prior to placing topping slabs on Precast Concrete Hollow Core Planks, thoroughly dampen the precast surface but do not leave standing water. Immediately before placing topping, re-dampen the surface and broom on a coat of thin neat cement grout. Apply grout only to small enough areas so that it will not begin to set or dry before placement of the topping slab.
 - a. In lieu of neat cement grout, a manufactured bonding agent may be used. The bonding agent must be integrally colored to show the extent of application. Apply by brush or spray, at recommended rates, in accordance with the manufacturer's directions.
- B. Delivery is to conform to ASTM C94.
 - 1. Delivery tickets to contain the following, in addition to the information required by C94:
 - 2. Reading of revolution counter at first addition of water.
 - 3. Type and brand of cement and supplementary cementitious materials.
 - 4. Cementitious content.
 - 5. Total water content by producer.
 - 6. Maximum size of aggregate.
 - 7. Secure Architect's written approval if non-agitating type equipment is to be used for transportation.

8. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to the aggregates. Architect may require an earlier discharge during hot weather, or when high-early strength cement is being used.
- C. Water addition at the site will not be permitted, except when the approved mix design has been formulated to allow for on-site addition of water. Water may only be added by personnel authorized by the Architect/Engineer and Concrete Producer.
- D. Conveying: Keep delivery carts and buggies on runways; do not allow them to bear on reinforcing or uncured concrete.
- E. Placement.
 1. Place within 6 feet of final position. Spreading with vibrators is prohibited.
 2. In walls and columns, deposit concrete in uniform horizontal layers, with a maximum depth of 4 feet (18 inches for architectural concrete).
 3. Maximum free fall without chutes or elephant trunks to be 5 feet (3 feet for architectural concrete).
 4. Place concrete continuously to a designed joint such that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of cold joints or planes of weakness.
 5. Concrete shall be consolidated per guidelines in ACI 309.2R.
- F. Records: Keep a complete log of pours, including date, location, quantity, weather, and identification of test cylinders for each pour.

3.05 JOINTING

- A. Interior slabs on grade:
 1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, and inside corners. The maximum spacing of contraction (control) joints, for reinforced and unreinforced slabs, is to be 6 times the square root of the slab thickness (i.e. for a 4-inch slab the maximum spacing is 12 feet). Cut joints $\frac{1}{4}$ times the slab thickness. The Soff-Cut Saw shall be used immediately after final finishing. A conventional saw shall be used as soon as possible without dislodging aggregate. Schedule slab pours and saw-cutting operations such that sawing is completed prior to onset of shrinkage cracking.
 2. Provide isolation joints at columns ($\frac{1}{2}$ inch thick) and at walls ($\frac{1}{8}$ inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.
- B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):

1. Expansion joints: Full depth, with ½ inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
 2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.
- C. Above-grade, Below-grade and foundation walls: Locate contraction joints at maximum spacings of 60'-0" on center, except as approved otherwise. Provide horizontal reinforcing separation, doweling of adjacent placements, and v-grooves each face per details on Structural Drawings. Construction joints in walls shall be submitted to EOR for review and approval.
- D. Construction Joints in supported slabs and slabs on metal deck: Locate per Contract Document requirements, and in accordance with ACI 301 section 2.2.2.5. Submit proposed construction joint locations for review prior to proceeding with construction.

3.06 FINISHES

- A. Schedule of finishes on flatwork per ACI 301, section 5 is as follows:
1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish.
 2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish.
 3. Exterior slabs - broom finish.
 4. Areas indicated on Drawings:
 - a. Exposed aggregate.
 - b. Non-slip.
 - c. Liquid sealer/densifier – per manufacturer's instructions, under direction of manufacturer's representative. Use on all interior trowel finished slabs subject to small-wheeled vehicular traffic.
 - d. Hardener - per manufacturer's instructions, under direction of manufacturer's representative.
- B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117:
1. Minimum flatness of F(f) 30, and a minimum levelness of F(l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F(f) 25 and F(l) 17 shall be obtained.
 2. Minimum flatness of F(f) 25 is required for elevated slabs. Preceding value is an average value to be obtained over a given area. Minimum local value (one-half bay) of F(f) 20 shall be obtained.
- C. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E115. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.

- D. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner.
- E. "F Numbers" shall be submitted to the Owner and Architect immediately after they are determined by the testing laboratory.

3.07 CURING AND PROTECTION

A. Curing:

1. Interior slab areas that will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, or a liquid sealer/densifier, are to be moist-cured for a minimum of 7 days, without the use of a curing compound.
2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 7 days. Edges and joints are to be sealed. Rewetting of the slab at any time during construction should be avoided.
3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound, except that when concrete above grade is placed in the open, and the air temperature exceeds 60 °F, the concrete is to be moist-cured for the first 24 hours.
4. Whichever curing method is used, it is to commence immediately after placement. Do not allow curing to be delayed overnight.
5. Prevent excessive moisture loss from formed surfaces. If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

B. Protection:

1. When air temperature during placement is less than 40 °F, or will be within 24 hours, temperature of concrete as placed is to be between 50 °F and 90 °F (55 °F and 90 °F for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days.
2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

3.08 CLEANING AND REPAIR

- A. Repair any slabs that do not meet the finish requirements. The Architect will determine whether grinding, filling of cracks, or patching and leveling procedures are required.
- B. For slabs that are dusting, or showing other signs of improper curing, any corrective measures attempted will be subject to prior approval of the Architect

and will be performed at Contractor's expense. These may include additional applications of sealer/densifier, or grinding, or covering with specified repair topping.

- C. Immediately prior to final acceptance, remove from all interior and exterior surfaces that are exposed to view, any stain-producing elements, such as pyrites, nail, wire, reinforcing steel, and form ties.
- D. Remove all stains completely. Use of weak acids or patented cleaners is acceptable, but surface is to be completely neutralized after use.
- E. All repairs shall conform to ACI 301, Section 5.3.7 except that the specified bonding compounds, cementitious, or epoxy repair materials must be used. Repair procedures must be submitted and reviewed by the Engineer of Record.
- F. As-cast formed finishes shall be comply with the following:
 - 1. Concrete surfaces not exposed to view (Surface Tolerance Class D per ACI 117)
 - a. Patch voids larger than 1-1/2" wide or 1/2" deep.
 - b. Remove projections larger than 1".
 - 2. Concrete surfaces exposed to view (Surface Tolerance Class C per ACI 117)
 - a. Patch voids larger than 3/4" wide or 1/2" deep.
 - b. Remove projections larger than 1/2".
 - c. Patch tie holes.
- G. Failure of concrete topping to bond to substrate (as evidence by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

3.09 ACCEPTANCE

- A. Concrete work with serious honeycombing, form misalignment, or other deviation from Contract requirements is subject to rejection per ACI 301, Section 1.
- B. When observations or tests indicate that the Contract requirements have not been met, the Contractor is to bear the costs of any additional testing and analysis to determine acceptability and also the cost of removal and replacement, if such is required per ACI 301, Section 1.

3.10 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the jurisdiction.
- B. All tests and inspection shall be per ACI 301, Section 1.6

END OF SECTION 03 30 00