

PROJECT MANUAL / SPECIFICATIONS FOR
THE STREAM CENTER
SCHOOL OF THE HOLY CHILD

2225 Westchester Avenue, Rye, NY 10580

VOLUME 1: SECTIONS 000000 - 190000

ARCHITECT:

KG+D ARCHITECTS, PC

285 Main Street
Mount Kisco, NY 10549

**STRUCTURAL
CONSULTANT:**

**THE DISALVO
ENGINEERING GROUP**

Lee Farm Corporate Park
83 Wooster Heights Road
Suite 200
Danbury, NY 06810

**MEP
CONSULTANT:**

**OLA CONSULTING
ENGINEERS, PC**

50 Broadway, Suite 2
Hawthorne, NY 10532

**CIVIL
CONSULTANT:**

**JMC SITE DEVELOPMENT
CONSULTANTS, LLC**

120 Bedford Road
Armonk, NY 10504

**LANDSCAPE
ARCHITECT:**

IQ LANDSCAPE ARCHITECTS, PC

31 Mamaroneck Avenue, 7th Floor
White Plains, NY 10601

ISSUE FOR BID:

12 AUGUST 2021

THE UNDERSIGNED CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION AND BELIEF, THE PLANS AND SPECIFICATIONS ARE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE STATE ENERGY CONSERVATION CONSTRUCTION CODE, AND BUILDING STANDARDS OF THE EDUCATION DEPARTMENT, AND THAT THE PLANS AND SPECIFICATIONS REQUIRE THAT NO ASBESTOS CONTAINING MATERIAL SHALL BE USED.

Erik Kaeyer, AIA

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ALTERNATES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. To allow the Owner to compare total costs where alternate materials and methods might be used, and to enable the Owner's decision prior to awarding the Contract, certain alternates have been established as described in this Section of these Specifications.

1.3 RELATED SECTIONS

- A. Where noted herein, pertinent Sections of these Specifications describe the materials and methods required under the various alternates.

1.4 SUBMITTALS

- A. Alternates described in this Section are required to be submitted on appropriate form as approved by the Owner.
- B. Any additional costs to the Contractor due to the inclusion of alternates shall be included in the amount to be added to the Contract Sum, so that no additional costs shall be borne by the Owner due to the inclusion of the additive alternates.
- C. Any deductive costs to the Contractor due to the inclusion of alternates shall be included in the amount to be deducted from the Contract Sum, so that all deductive costs will accrue to the Owner due to the inclusion of deductive alternates.

1.5 PROCEDURES FOR ALTERNATE BIDS

- A. Each Bidder shall submit on the Proposal Form all Alternate Bids stated herein. Alternate Bids shall state the difference in price as "additions to" or "deductions from" the Base Bid, unless otherwise noted, for the substitution, omission, or addition to the alternate materials, items or construction from that shown and specified.
- B. The Alternate Bids, when accepted, become part of the Contract.
- C. Bidder shall carefully check the Drawings and Specifications to determine the extent of each Alternate Bid required.
- D. Alternate Bids shall include all overhead and profit applicable thereto.

- E. Alternate Bids shall reflect the increase or decrease in cost of all work of every name and nature which may be affected thereby and no subsequent claims for extras by reason of the Contractor's failure to observe this requirement will be considered.
- F. The description herein for each Alternate Bid is recognized to be incomplete and abbreviated but implies that each change must be complete for the scope of the work affected. Refer to the applicable Specification Sections, and to applicable drawings, for the specific requirements of the work, regardless of whether references are so noted in the description of each Alternate. Coordinate related work and modify surrounding work as required to properly integrate with the work of each Alternate. It is recognized that the descriptions of Alternate Bids are primarily scope definitions, and do not necessarily detail the full range of materials and processes needed to complete the work as required. Any change of details, construction, etc., as required to accommodate the Alternate shall be the responsibility of the Contractor and shall be included in his Alternate Bid Price.
- G. Except as otherwise described or approved, materials and workmanship of the Alternate Bids shall conform to the requirements specified under the various Sections of the Specifications for similar items of work.
- H. Where methods of construction, materials, finishes, or details of installation required by the various Alternate Bids differ from the requirements shown on drawings or specified for corresponding items, the Alternate construction, materials, etc., will be subject to approval by the Architect.
- I. The Contractor shall submit shop drawings and samples for the work under each accepted Alternate Bid for approval in conformance with requirements of Section 01 33 00.

PART 2 PRODUCTS

2.1 ALTERNATES

- A. Alternate 1: Fit out entire 2nd floor inclusive of all walls, floors, ceilings, casework, doors, interior display window system, etc. The stairwell will be finished completely along with the
- B. Alternate 2: Entire elevator system inclusive of all elevator equipment, doors, testing, inspections, etc. – electrical and mechanical rough connections are part of base bid.
- C. Alternate 3: Furnish and install all casework and appliances in both 1st floor Prep Rooms – 105a & 106a. This is inclusive of the Sheldon 92244-ADA Air Foil Fume Hood. The electrical and mechanical supplies for this unit are part of base bid.

PART 3 EXECUTION

3.1 ADVANCE COORDINATION

- A. Immediately after award of Contract, and to the maximum extent practicable, thoroughly and clearly advise all necessary personnel and suppliers as to the nature

and extent of Alternates as selected by the Owner; use all means necessary to alert those personnel and suppliers involved as to all changes in the work caused by the Owner's selection of alternates.

3.2 SURFACE CONDITIONS

- A. Prior to installation of the Alternate items, verify that all surfaces have been modified as necessary to accept the installation and the item or items may be installed in complete accordance with their manufacturer's current recommendations; in the event of discrepancy, immediately notify the Architect and proceed as he directs.

3.3 APPROVAL OF ALTERNATE

- A. Approval of the Alternate makes all requirements of scope, performance, submissions, service and guarantee binding as if that material name appeared in the Specifications for the Base Bid. All necessary changes in building design or construction to accommodate the alternate materials shall be the sole responsibility of the Contractor without extra cost to the Owner.

END OF SECTION

SECTION 01 31 13

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the project management and coordination as specified herein, including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Cleaning and protection.

1.3 RELATED SECTIONS

- A. Project Meetings - Section 01 31 19.
- B. Submittal Procedures - Section 01 33 00.
- C. Product Requirements - Section 01 60 00.
- D. Closeout Procedures - Section 01 77 00.

1.4 COORDINATION

- A. Coordinate construction operations included in various sections of these specifications to ensure efficient and orderly installation of each part of the work. Coordinate construction operations included under different sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project closeout activities.
- D. Conservation: Coordinate construction operations to 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 in, the work.

1.5 SUBMITTALS

- A. Coordination Drawings: Prepare coordination drawings where any coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 1. Show the relationship of components shown on separate shop drawings.
 2. Indicate required installation sequences.
 3. Comply with requirements contained in Section 013300, "Submittal Procedures".
- B. Staff Names: Within 15 days of commencement of construction operations, submit a list of the contractor's principal staff assignments, including the superintendent and other personnel in attendance at the project site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.
 1. Post copies of the list in the project meeting room, the temporary field office, and each temporary telephone.

- C. MSDS Information: The submittal of the required MSDS information shall be segregated from the required material/shop drawing/sample submittals in a separate binder and not commingled with the technical submittals, failure to so conform will be cause for rejection of any submittal.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

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

3.2 CLEANING AND PROTECTION

- A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at substantial completion.
- B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.
- C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading.
 - 2. Excessive internal or external pressures.
 - 3. Excessively high or low temperatures.
 - 4. Thermal shock.
 - 5. Excessively high or low humidity.
 - 6. Air contamination or pollution.
 - 7. Water or ice.
 - 8. Solvents.

9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining, and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High-speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. To enable orderly review of progress during construction and to provide for systematic discussions of problems, the Contractor will conduct project meetings throughout the construction period.
- B. In general, project meetings will be held at the job site in accordance with a mutually acceptable schedule.
- C. The purpose of the project meetings is analysis of problems that might arise relative to execution of the work.

1.3 RELATED SECTIONS

- A. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility as described in the General Conditions and are not part of the agenda of project meetings.

1.4 QUALITY ASSURANCE

- A. Persons designated by the Contractor to attend and participate in project meetings shall have all required authority to commit the Contractor to solutions as agreed upon in the project meetings.

1.5 SUBMITTALS

- A. Agenda Items: To the maximum extent possible, advise the Architect at least twenty-four (24) hours in advance of the project meeting regarding all items on the agenda.
- B. Minimum Agenda
 1. Review work progress since last meeting.
 2. Note field observations, problems and decisions.
 3. Identify problems which impede planned progress.
 4. Review off-site fabrication problems.
 5. Develop corrective measures and procedures to regain schedule.

6. Coordinate projected progress with other prime contractors.
 7. Review submittal schedules, expedite as required to maintain schedule.
 8. Review of the following Contractor logs: RFI, Change Order Proposals.
- C. Minutes: The Contractor shall compile minutes of each project meeting and shall distribute copies to the Owner and the Architect. The Contractor shall make and distribute such other copies as he wishes. The Architect and/or Owner may issue amendments to the minutes as necessary. Contractor shall issue same to other interested parties.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 MEETING SCHEDULE

- A. Coordinate with the Architect and Owner as required to establish a mutually acceptable schedule for project meetings.

3.2 MEETING LOCATION

- A. To the maximum extent practicable, project meetings shall be held at the job site. Provide adequate space and facility including table, chairs, and lighting for proper conduct of meeting.

3.3 ATTENDANCE

- A. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout the construction period. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the work are involved.

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes administrative and procedural requirements for documenting the progress of construction during performance of the work, including but not limited to, the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Special reports.
 - 8. Construction photographs.

1.3 RELATED SECTIONS

- A. Project Management and Coordination - Section 01 31 13.
- B. Project Meetings - Section 01 31 19.
- C. Submittal Procedures - Section 01 30 00.
- D. Closeout Procedures - Section 01 77 00.

1.4 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

2. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
 1. Float time belongs to Owner.
 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or a similar significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.5 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 1. Scheduled date for first submittal.
 2. Specification Section number and title.
 3. Submittal category (action or informational).
 4. Name of subcontractor.
 5. Description of the Work covered.

6. Scheduled date for Architect's final release.
 - C. Preliminary Construction Schedule: Submit two printed copies; one a single sheet of reproducible media, and one a print.
 - D. Preliminary Network Diagram: Submit two printed copies; one a single sheet of reproducible media, and one a print; large enough to show entire network for entire construction period.
 - E. Contractor's Construction Schedule: Submit two printed copies of initial schedule, one a reproducible print and one a blue- or black-line print, large enough to show entire schedule for entire construction period.
 1. Submit an electronic copy of schedule, and labeled to comply with requirements for submittals. Include type of schedule Initial or Updated and date on label.
 - F. CPM Reports: Concurrent with CPM schedule, submit three printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.
 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
 - G. Daily Construction Reports: Submit two copies at weekly intervals.
 - H. Material Location Reports: Submit two copies at monthly intervals.
 - I. Field Condition Reports: Submit two copies at time of discovery of differing conditions.
 - J. Special Reports: Submit two copies at time of unusual event.
- 1.6 QUALITY ASSURANCE
- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting.
 - B. Photographer Qualifications: An individual of established reputation who has been regularly engaged as a professional photographer for not less than three years.
 - C. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013113, "Project Management and Coordination." Review

methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

1.7 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
- C. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities including temporary lighting.

PART 2 PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than 10 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date. Delivery dates indicated stipulate the earliest possible delivery date.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 7. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.

- d. Completion of electrical installation.
 - e. Substantial Completion.
- E. Milestones: Include milestones indicated in the schedule.
- F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
- G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Preliminary Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for commencement of the Work.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time.

- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Purchase of materials.
 - c. Delivery.
 - d. Fabrication.
 - e. Installation.
 2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.
- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the Schedule of Values).
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity duration's in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. High and low temperatures and general weather conditions.
 5. Accidents.
 6. Meetings and significant decisions.
 7. Unusual events (refer to special reports).
 8. Stoppages, delays, shortages, and losses.

9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of authorities having jurisdiction.
12. Change Orders received and implemented.
13. Construction Change Directives received.
14. Services connected and disconnected.
15. Equipment or system tests and startups.
16. Partial Completions and occupancies.
17. Substantial Completions authorized.

- B. Material Location Reports: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, duration's, actual starts and finishes, and activity duration's.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified commercial photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the work. Photographs with blurry or out-of-focus areas will not be accepted.
1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
1. Date and Time: Include date and time in the file name for each image.
- D. Preconstruction Photographs: Before starting construction, take four (4) color photographs of Project site and surrounding properties from different vantage points, as directed by Architect. Show existing conditions adjacent to property.
- E. Periodic Construction Photographs: Take four (4) color photographs monthly, coinciding with cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take eight (8) color photographs after date of Substantial Completion for submission as Project Record Documents. Architect may direct photographer for desired vantage points.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete submittal requirements as specified herein, including, but not limited to, the following:
 - 1. Shop drawings and samples.
 - 2. Integrated drawings.

1.3 RELATED SECTIONS

- A. Construction Progress Documentation - Section 01 32 00.

PART 2 PRODUCTS

2.1 SHOP DRAWINGS AND SAMPLES

- A. General
 - 1. Submittals shall be made using Submittal Exchange. The submittal exchange web portal shall be paid for and established by the Owner. Submittals shall be made in PDF format. Physical samples shall be delivered to the Architect with a PDF transmittal and photograph of the sample logged into Submittal Exchange.
 - 2. Submittal transmissions shall be limited to the technical product and drawing requirements only. MSDS data shall not be transmitted as an integral part of the submittal but shall be included as a separate document for the express purpose of assembling the required field manual as specified herein.
 - 3. The Contractor shall be responsible for coordinating the schedule for submittal of shop drawings and samples with his progress schedule and the requirements of the Contract Schedule, and submit a coordinated schedule of submission of all shop drawings and samples to the Architect.
 - 4. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

5. Failure of the Contractor to schedule and submit shop drawings and samples in ample time for checking, correction, and rechecking will not justify any delay in the Contract Schedule. Allow ample time for items to be tested, including time for retesting if the tests or mock-ups fail.
6. Samples, shop drawings, manufacturers' literature, and other required information shall be submitted in sufficient time to permit proper consideration and action on same before any materials and items are delivered on the work. Stagger submissions so that the Architect can review the documents in an orderly and timely manner. All samples of materials requiring laboratory tests shall be submitted to the laboratory for testing not less than 90 days before such materials are required to be used in the work. All other samples, manufacturers' literature, and other sample information shall be submitted for approval not less than 30 days before such materials are required to be used in the work.
7. Shop drawings for each Section of the work shall be numbered consecutively, and the numbering system shall be retained throughout all revisions. Each drawing shall have adequate clear space for the stamps of the Contractor, Architect, and one of the Architect's consultants.
8. All shop drawings shall be thoroughly checked by the Contractor for compliance with the Contract Documents before submitting them to the Architect and shall bear the Contractor's stamp of approval certifying that they have been so checked. Any shop drawings submitted without this stamp of approval and certification, and shop drawings which, in the Architect's sole opinion, are incomplete, contain errors or have not been checked, or only checked superficially, will be returned unchecked by the Architect for re-submission by the Contractor.
9. In checking shop drawings, the Contractor shall verify all dimensions and field conditions and shall check and coordinate the shop drawings of any Section or trade with the requirements of all other Sections or trades whose work is related thereto, as required for proper and complete installation of the work. The Architect will review shop drawings. The Architect's acceptance of shop drawings is for design only and not method of assembly or erection. Acceptance shall in no way be construed as (1) permitting any departure whatsoever from the Contract Documents; (2) relieving the Contractor of full responsibility for any error in details, dimensions, omissions, or otherwise that may exist; (3) relieving the Contractor of full responsibility for adequate field connections, erection techniques, bracing, or deficiencies in strength; (4) relieving the Contractor of full responsibility for satisfactory performance of all work and coordination with the work of all subcontractors and other contractors; or (5) permitting departure from additional details or instructions previously furnished by the Architect. Acceptance of such drawings shall not be construed as a complete check, nor shall it relieve the Contractor from responsibility for proper fitting of the work, nor from the necessity of furnishing any work which may not be indicated on shop drawings when approved. The Contractor shall be solely responsible for any quantities which may be shown on the shop drawings.
10. No work shall be fabricated, manufactured, or installed from shop drawings stamped "Revise and Resubmit" or "Rejected," and such shop drawings shall be

corrected and resubmitted by the Contractor until accepted by the Architect. At least one complete set of shop drawings marked "No Exceptions Taken" or "Make Corrections Noted" shall be kept at the site in the Contractor's field office for reference at all times. "Revise and Resubmit" or "Rejected" shop drawings shall not be permitted at the site.

11. Submittals Marked "No Exceptions Taken": Submittals which require no corrections by the Architect will be marked "No Exceptions Taken."
12. Submittals Marked "Make Corrections Noted": Submittals which require only a minor amount of correcting shall be marked "Make Corrections Noted." This mark shall mean that checking is complete and all corrections are obvious without ambiguity. Fabrication will be allowed on work marked "Make Corrections Noted" provided such action will expedite construction and noted corrections are adhered to. If fabrication is not made strictly in accordance with corrections noted, the item shall be rejected in the field, and the Contractor will be required to replace such work in accordance with corrected submittals.
13. Submittals Marked "Revise and Resubmit" or "Rejected": When submittals are contrary to contract requirements or too many corrections are required, they shall be marked "Revise and Resubmit" or "Rejected." No work shall be fabricated under this mark. The Architect shall list his reasons for rejection on the submittals or in the transmittal letter accompanying their return. The submittals must be corrected and resubmitted for approval.
14. All shop drawings and samples shall be identified as follows:
 - a. Date of submittal.
 - b. Title of project.
 - c. Name of Contractor and date of his approval.
 - d. Name of subcontractor or supplier and date of submittal to Contractor.
 - e. Number of submission.
 - f. Any qualification, departure, or deviation from the requirements of the Contract; shall be EXPLICITLY NOTED.
 - g. Federal Specification or ASTM number where required.
 - h. Such additional information as may be required by the Specifications for the particular material being furnished.
15. If the Contractor wishes to deviate from the materials or details as shown in Specifications or Drawings, he shall submit the proposed deviation with shop drawings and/or samples stating the extent and the materials or details being replaced. The Contractor shall also submit information on the allowed credit or extra cost required for the proposed deviation, if any, and also all information relating to the work of other Sections revised by the proposed deviation.
16. The Architect and Engineer will review and approve shop drawings and samples for approval within 20 calendar days, but only for conformance with the design concept of the work and with information contained in the Contract Documents.

17. Incomplete shop drawings will be returned without checking for proper submission, and this shall not be considered as cause for delay of the work or extra compensation to the Contractor.
18. The Contractor shall submit appropriate transmittal forms with every submittal of shop drawings, manufacturer's literature, and samples. All reproducibles shall be rolled on cardboard tubes for resubmittal. The Contractor shall submit all required shop drawings, manufacturer's literature and samples in accordance with the procedures specified herein.
19. Unless otherwise specifically directed by the Architect, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.
20. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
21. Submit one copy of each standard referred to in the Specifications (ASTM, Fed. Spec., etc.) with the submission of each respective shop drawing, sample, or literature.

B. Submission of Shop Drawings

1. Architectural Work: Submit pdf of each shop drawing to the Architect for approval. If approved, the Architect will return pdf stamped "No Exceptions Taken" or "Make Corrections Noted," and the Contractor shall print the required number of copies. In the event the Architect returns pdf stamped "Revise and Resubmit" or "Rejected," the Contractor shall make indicated changes and resubmit pdf to the Architect.
2. Structural Work and Mechanical Work: Submit pdf of each shop drawing to the Engineer, with pdf to the Architect. If accepted, the Architect shall return pdf stamped "No Exceptions Taken" or "Make Corrections Noted," and the Contractor shall print the required number of copies. In the event the Architect returns pdf stamped "Revise and Resubmit" or "Rejected," the Contractor shall make indicated changes and resubmit pdf to the Engineer and the Architect.
3. Prints: The Contractor shall provide all prints or shop drawings as reasonably required by subcontractors, material suppliers, superintendents, inspectors, and others as required for the work, or as directed by the Architect. The Contractor shall pay all costs in connection with printing and distribution of shop drawings.

C. Submission of Manufacturer's Literature, Including Catalog, Catalog Cuts, Brochures, Charts, Test Data, and Similar Information

1. Manufacturer's literature will receive consideration only when accompanied by the transmittal form properly filled out, as indicated, and listing each item of literature, as well as the Specification Section and paragraph numbers describing such

materials. Any deviations from contract requirements shall be stated on the above form or attached to it.

2. Architectural Work: Submit pdf of manufacturer's literature to the Architect for acceptance. If accepted, the Architect will return pdf stamped "No Exceptions Taken" or "Make Corrections Noted." The Contractor shall resubmit pdf of correct or corrected literature of all submissions stamped by the Architect "Revise and Resubmit" or "Rejected."
3. Structural Work and Mechanical Work: Submit pdf of manufacturer's literature to the Engineer and the Architect. If accepted, the Architect will return pdf stamped "No Exceptions Taken" or "Make Corrections Noted." The Contractor shall resubmit pdf of correct or corrected literature to the Engineer for all submissions stamped "Revise and Resubmit" or "Rejected" by the Engineer.
4. All copies of manufacturer's literature required to be resubmitted hereunder shall be original printed material. Reproductions of printed material will not receive consideration.

D. Submission of Samples

1. All samples shall be submitted in triplicate unless otherwise indicated in the Specifications.
2. Samples will receive consideration only when each is clearly labeled and when accompanied by the transmittal form properly filled out, as indicated, and listing each sample, as well as the listing of any ASTM, Federal or other standard references specified or applicable and such additional information as may be required by the Specifications for the materials being submitted. Any deviation from the contract requirements shall be so stated on the above form or attached to it.
3. The Architect shall have the right to require submission of samples of any materials, whether or not specifically indicated in the various Sections of the Specifications.
4. Unless otherwise specified, samples of sufficient size to indicate general visual effect shall be submitted. Where samples must show a range of color, texture, finish, graining, or other similar property, the Contractor shall submit sets of pairs illustrating the full scope of the range.
5. Two (2) samples of each submission will be returned to the Contractor; and for the supplier and one from the Contractor to store on site for reference by the Architect. Samples stamped "Revise and Resubmit" or "Rejected" by the Architect shall be resubmitted in triplicate by the Contractor.
6. All samples stamped "No Exceptions Taken" or "Make Corrections Noted" shall be kept at the site in the Contractor's field office facilities for reference at all times. "Revise and Resubmit" or "Rejected" samples shall not be kept at the site.

2.2 INTEGRATED DRAWINGS

- A. The HVAC subcontractor shall prepare a Drawing or Drawings showing duct work, heating and sprinkler piping. This Drawing shall include location of grilles, registers, etc., and access doors in hung ceilings. Locations shall be fixed by elevations and dimensions from column center lines and/or walls.
- B. The HVAC subcontractor shall prepare and distribute to the Plumbing and Electrical subcontractors, the General Contractor, and to the Architect a reproducible of the above.
- C. The HVAC subcontractor shall lay out on his reproducible the reflected ceiling plan, beam soffit elevations, ceiling heights, roof openings, etc.
- D. The Plumbing subcontractor shall lay out on his reproducible the piping, valves, clean-outs, etc., indicating locations and elevations and shall indicate the necessary access doors.
- E. The Electrical subcontractor shall indicate on his reproducible the fixtures, large conduit runs, clearances, pull boxes, junction boxes, sound system speakers, etc.
- F. The General Contractor shall indicate on his reproducible any structural framing, ceiling hangers, etc.
- G. The General Contractor shall call as many meetings with the subcontractors as are necessary to resolve any conflicts that become apparent. He will call on the services of the Consultant Engineer or Architect where necessary. The General Contractor is responsible for the coordination of the Drawing or Drawings.
- H. On resolution of the conflicts, each subcontractor shall enter his own work on the HVAC subcontractor's reproducible, which shall become the master or integrated Drawings. The master reproducible shall be signed by each contributing subcontractor to indicate his acceptance of the arrangement of the work.
- I. A reproducible copy of the master integrated Drawing will be prepared by the HVAC subcontractor. The General Contractor will make distribution.
- J. Each subcontractor shall prepare his Shop Drawings in accordance with the integrated Drawings. No work will be permitted without approved Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.

PART 3 EXECUTION

3.1 COORDINATION OF SUBMITTALS

- A. Prior to submittal for Architect's review, use all means necessary to fully coordinate all material, including the following procedures:
 - 1. Determine and verify all field dimensions and conditions, materials, catalog numbers and similar data.

2. Coordinate as required with all trades and with public agencies involved.
 3. Secure all necessary approvals from public agencies and others and signify by stamp, or other means, that they have been secured.
 4. Clearly indicate all deviations from the Contract Documents.
- B. Unless otherwise specifically permitted by the Architect, make all submittals in groups containing all associated items; the Architect may reject partial submittals as not complying with the provisions of the Contract Documents.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.

1.3 RELATED SECTIONS

- A. Project Management and Coordination - Section 01 31 13.
- B. Testing and Inspection - Section 01 45 23.
- C. Divisions 2 through 32 Sections for specific test and inspection requirements.

1.4 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.5 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.

1.6 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Description of test and inspection.
 3. Identification of applicable standards.
 4. Identification of test and inspection methods.
 5. Number of tests and inspections required.
 6. Time schedule or time span for tests and inspections.
 7. Entity responsible for performing tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- D. Reports: Prepare and submit certified written reports that include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.

8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Ambient conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New York, and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- H. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.
 1. Contractor responsibilities include the following:
 - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
 - d. When testing is complete, remove assemblies; do not reuse materials on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups, unless otherwise directed by the Architect.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

**SECTION 01 41 00
REGULATORY REQUIREMENTS**

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. If a Geotechnical Report is available and/or a Geotechnical Engineer is retained by the Owner at the Owner's expense, the Contractor must adhere to all requirements contained in the Report and as directed by the Geotechnical Engineer.
- C. The Contractor must adhere to all requirements contained in the Stormwater Pollution Prevention Plan (SWPPP) filed with the New York State Department of Environmental Conservation (NYSDEC), and the Soil Erosion and Sediment Control Plans and Details as mandated by law.
 - 1. New York State Standards and Specifications for Erosion and Sediment Control (Blue Book), effective February 1, 2017 or latest edition.
 - 2. NYSDEC State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity-GP-0-20-001, effective January 29, 2020.
 - 3. Comply with all industry standards and requirements of all Authorities having jurisdiction over soil erosion, sediment and dust control. If the specified requirements conflicts with the requirements of Authorities having jurisdiction, the requirements of the Authority having jurisdiction applies.
- D. As applicable, the Contractor must comply and adhere to all requirements contained in the Logistics Plan and/or Construction Management Plan.

1.02 SUMMARY

- A. The Work of this Section includes, but is not limited to:
 - 1. Stormwater regulations.
 - 2. Permitting.
 - 3. Call before you dig.
 - 4. Hand excavation
- B. Related Sections:
 - 1. Section 31 10 00 "Site Preparation."
 - 2. Section 31 25 00 "Temporary Soil Erosion, Sediment and Dust Control."

1.03 QUALITY ASSURANCE

- A. Provide a detailed installation and termination schedule for all items of work. Notify the Site Engineer prior to the work taking place, so that that the Site Engineer may be present during installation.
- B. Comply with all industry standards and requirements of all Authorities having jurisdiction. If requirements specified conflicts with the requirements of Authorities having jurisdiction, the requirements of the Authority having jurisdiction applies.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PERFORMANCE REQUIREMENTS

- A. Provide an employee, who must be on site at all times when soil disturbance is taking place, who is a NYSDEC certified individual, and whose certification has been obtained within the last three (3) years. This individual will monitor adherence to the soil erosion and dust control requirements of this Contract and have the authority to correct deficiencies within the timeframe required.

1. Should the Contractor fail to correct the deficiencies noted, he shall be subject to a fine issued by the Authorities having jurisdiction as mandated by law.
- B. The Contractor shall obtain all permits and licenses necessary and required for the prosecution of the work, and he shall post all bonds and deposits and pay all fees and charges in connection with obtaining same, unless stated otherwise in the Contract Documents.
- C. Under 16 NYCRR 753 "Protection of Underground Facilities," prior to the start of his work, the Contractor shall be required to notify the One-Call Notification System serving the area of the proposed Work and to contact and notify separately the owners of utilities that do not belong to the One-Call Notification System on file with the Central Registry so that all the various underground utility operators will be able to locate and mark the locations of their own utilities. Refer to Section 31 10 00 "Site Preparation".
- D. Wherever the proposed utilities cross or connect to existing utilities and near Utility Company infrastructure, the Contractor will be required to hand excavate test pits and excavations to determine location and elevation of the existing utilities. This work is to be done prior to any trench excavation. In the event of conflict between the existing utility and the proposed utility, the Contractor shall notify the Owner's Field Representative and Site Engineer immediately for resolution of the conflict.

3.02 CLEANING AND REPAIR

- A. The Contractor will be required to keep the site clean of all debris and maintain the site in accordance with the requirements of the soil erosion and sediment control plans. Silt fencing and other erosion control devices must be inspected after every rainfall and on a continuous basis, promptly repaired and kept free of accumulated sediment. All work of cleaning and repair as specified herein shall be performed at the Contractor's expense and to the complete satisfaction of the Authority having jurisdiction.
- B. As applicable, the Contractor must execute all requirements of the approved Logistics Plan and/or Construction Management Plan, subject to the approval of the Authority having jurisdiction.

3.03 FINAL INSPECTION

- A. Upon completion of the Work and before final acceptance, all soil areas must have permanent stabilization and a full stand of grass as determined by the Authority having jurisdiction. The work shall not be considered complete until all requirements have been met.

END OF SECTION

SECTION 01 45 23

TESTING AND INSPECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the testing and inspection requirements as specified herein.

1.3 RELATED SECTIONS

- A. Requirements for testing and inspection shall be described in various Sections of these Specifications. Where no testing and inspection requirements are described but the Owner chooses to have it performed, the Owner may require additional testing and inspection to be performed at his own expense.
- B. Work Not Included
 - 1. Unless otherwise noted in this Section or other Section of work, the Owner will select a pre-qualified independent testing laboratory and inspection professional.
 - 2. Unless otherwise noted in this Section or other Sections of work, the Owner will pay for all initial services of the testing laboratory and inspection professionals as further described in Article 2.1 of this Section of these Specifications.

1.4 QUALITY ASSURANCE

- A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329-18 "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection."
- B. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.5 PRODUCT HANDLING

- A. Promptly process and distribute to the Architect and Owner all required copies of test reports and related instructions to ensure all necessary retesting and/or replacement of materials with the least possible delay in progress of the work.

PART 2 PRODUCTS

2.1 PAYMENTS FOR TESTING AND INSPECTION SERVICES

- A. Initial Services: The Owner will pay for all initial testing and inspection services.
- B. Retesting: When initial tests and inspections indicate non-compliance with local Codes and the Contract Documents, all subsequent retesting occasioned by the non-compliance shall be performed by the same testing laboratory and inspectors and the costs thereof will be deducted by the Owner from the Contract Sum.

2.2 CODE COMPLIANCE TESTING AND INSPECTION

- A. Inspections and tests required by Codes or Ordinances, or by a plan approval authority, shall be paid for by the Owner unless otherwise noted in this Section or other Sections of work. Retesting or inspection as required shall conform to the requirements of Article 2.1 B of this Section.

2.3 CONTRACTOR'S TESTING

- A. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
- B. Where operating tests are specified, the Contractor shall test his work as it progresses, on his own account, and shall make satisfactory preliminary tests in all cases before applying for official tests.
- C. Tests shall be made in the manner specified, for the different branches of the work. Each test shall be made on the entire system for which such test is required, wherever practical. In case it is necessary to test portions of the work independently, the Contractor shall do so without extra compensation. The Contractor shall furnish all labor, material and apparatus, make corrections and conduct the official test. The test will be conducted in the presence of a representative of the Architect.
- D. All parts of the mechanical and electrical work and associated equipment shall be tested and adjusted to work properly and be left in perfect operating condition. All defects disclosed by these tests shall be corrected to the satisfaction of the Architect and Engineer without any additional cost to the Owner. Tests shall be repeated on this repaired or replaced work if deemed necessary by the Architect. The Architect shall be notified at least forty-eight (48) hours in advance of all tests and shall be represented at tests that he deems necessary. The Contractor shall furnish all necessary instruments, other equipment, and personnel required for such tests.
- E. Required certificates of inspection, testing or approval shall be secured by the Contractor and promptly delivered by him to the Architect.
- F. If the Architect or Engineer is to observe the inspections, tests or approvals required by the Contract Documents, he will endeavor to do so promptly and, where practicable, at the source of supply.

PART 3 EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY AND INSPECTORS

- A. Representatives of the testing laboratory and inspectors shall have access to the work at all times. Provide facilities for such access in order that they may properly perform their functions.

3.2 SCHEDULES

- A. Establishing Schedule: By advance discussions with the inspection service and testing laboratory selected by the Owner, determine the time required to perform inspections and tests and to issue each of its findings. Provide all required time within the construction schedule.
- B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the inspectors and testing laboratory as required.
- C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedule but is prevented from testing or taking specimens due to incompleteness of the work, all extra costs for testing attributable to the delay will be back-charged to the Contractor.

3.3 TAKING SPECIMENS

- A. All specimens and samples for testing, unless otherwise provided in these Contract Documents, will be taken by the testing laboratory; all sampling equipment and personnel will be provided by the testing laboratory; and all deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the temporary facilities and controls as shown on the drawings and specified herein, including, but not limited to, the following:
 - 1. Construction sign.
 - 2. Hoists, stairs, and ladders.
 - 3. Rodent control.
 - 4. Temporary elevator.
 - 5. Construction fence.
 - 6. Field office.
 - 7. Fire protection.
 - 8. Temporary utilities.
 - 9. Temporary toilets.
 - 10. Temporary site access.
 - 11. Security.
 - 12. Water and snow control.
 - 13. Environmental controls.

1.3 RELATED SECTIONS

- A. Product Requirements - Section 01 60 00.
- B. Execution Requirements - Section 01 73 00, for progress cleaning.

PART 2 PRODUCTS

2.1 GENERAL

- A. Arrange for and provide temporary facilities and controls as specified herein and as required for the proper and expeditious prosecution of the work. Pay all costs, except as otherwise specified, until final acceptance of the work unless the Owner makes arrangements for the use of completed portions of the work after substantial completion.
- B. Make all temporary connections to utilities and services in locations acceptable to the local authorities having jurisdiction thereof; furnish all necessary labor and materials, and make all installations in a manner subject to the acceptance of such authorities; maintain such connections; remove the temporary installation and connections when no longer required; restore the services and sources of supply to proper operating condition.
- C. Unless otherwise noted, pay all costs for temporary electrical power, temporary water, and temporary heating; provide metering as necessary.
- D. A Staging Plan shall be submitted by the Contractor for approval by the Owner. The Staging Plan shall locate all temporary facilities and services, including parking for the Contractor's employees, within the limits of the staging areas, and shall allot ground space to Subcontractors for storage of materials, and the erection of sheds and tool houses. Materials and equipment can only be stored in the staging area. No parking for Contractor's or Subcontractors' employees' vehicles will be allowed in undesignated parking areas. The staging area shall be maintained in good repair, free of mud and standing water, and passable at all times. All materials stored within the project site are the responsibility of the Contractor. At the completion of the work, the staging areas shall be restored to their original condition, gravel removed, topsoil replaced and graded and re-seeded.

2.2 PROJECT IDENTIFICATION

- A. No signs or advertisements will be allowed to be displayed on the premises without the approval of the Owner.
- B. One construction sign on the site shall be provided by the Contractor and shall be subject to the review of the Architect and the approval of the Owner.
- C. Erect the construction sign on the site where directed by the Architect. Provide sign approximately 4 ft. x 8 ft. in size, of 3/4 in. plywood with structural supports. Use Douglas Fir Overlaid Plywood, Grade B-B high density, exterior, good two sides, complying with PS-1. The sign shall be primed and given two coats of alkyd white paint. Lettering shall be black of a type, size, and lay-out as directed by the Owner. Sign shall contain the name of the Building, Owner, Architect, Contractor, and such other information as the Architect or Owner may require.

2.3 MATERIAL HOIST

- A. Provide a material hoist as required for use by all trades. Provide all necessary guards, signals, safety devices, and so on, required for safe operations, and suitable runways from the hoists to each floor level and roof. The construction and operation of the material hoist shall comply with all applicable requirements of ANSI A10.5, the ACG Manual of Accident Prevention in Construction and to all applicable state and municipal codes. Prohibit the use of the material hoist for transporting personnel.

2.4 RODENT CONTROL

- A. Institute an effective program of rodent control for the entire site within the construction limits. Cooperate with local authorities and provide the regular services of an experienced exterminator who shall visit the site at least once a month for the entire construction period. Provide marked metal containers for all edible rubbish and enforce their use by all employees. Containers shall be emptied and the contents removed from the site as often as required to maintain an adequate rodent control program. If the program of rodent control used is not effective, take whatever steps are necessary to rid the project of rodents, and such action shall not be the basis of a claim for additional compensation or damages.

2.5 TEMPORARY CONSTRUCTION OPENINGS

- A. Provide openings in slabs, walls, and partitions where required for moving in large pieces of equipment of all types. Close and/or restore all openings and finish them after the equipment is in place. Structural modification, if required, shall be subject to review by the Architect.

2.6 TEMPORARY ELEVATOR

- A. Provide a temporary elevator for necessary service during construction operations after the hoistway enclosures are completed and electrical power is available; use temporary machines, or at the Contractor's option, use permanent machines, if they are available in due time for the required services.
- B. The temporary elevator shall include temporary wood cars with suitable gates, including temporary hoistway doors, all designed in accordance with the local and state safety requirements.
- C. The temporary services shall include qualified operating and maintenance personnel to perform the work in connection with the temporary operations.
- D. Upon completion of temporary use, all work or damaged permanent parts are to be replaced and all equipment placed in first-class condition equal to new.

2.7 TEMPORARY FENCE

- A. Provide and maintain an 8 foot high temporary fence to enclose the area at the job site and to guard and close effectively the designated area. Provide gates at locations where required for access to the enclosed area. Gates shall be cross-braced, hung on heavy strap hinges, and shall have hasps and padlocks. Submit shop drawings of

fence and gates for review of Architect and Owner. Paint the fence with two coats of an approved paint.

- B. Remove the fence upon completion of the work or at such time before final completion as directed by the Owner.

2.8 TEMPORARY FIELD OFFICES

- A. Provide and maintain a field office with a telephone and fax at the job site with not less than 200 square feet of space. The office shall be complete with light, heat, air conditioning, toilet facilities, electric water cooler, plan racks, four-drawer metal file with lock, shelves for samples, tables, chairs, and janitor service. When it becomes possible to establish an office in the building, office accommodation of approximately the same size as those in the field offices, including the services above, shall be provided and maintained until the issuance of a certificate of substantial completion. Temporary offices shall be removed when no longer required. Provide a telephone and fax line with machine and pay all charges for installation and calls, including long distance calls.

- 1. Provide trailer until close of substantial completion.

2.9 FIRE PROTECTION

- A. Provide and maintain adequate fire protection, ready for instant use, distributed around the project.
- B. Make arrangements for periodical inspection by local fire protection authorities and insurance underwriter's inspections. Cooperate with said authorities and promptly carry out their recommendations.
- C. Open fire will not be permitted within the building enclosure or on the project site.

2.10 TEMPORARY HEAT AND VENTILATION

- A. Provide temporary heat as required during construction to protect the work from freezing or frost damage, and as necessary to ensure suitable working conditions for the construction operations of all trades. In areas of the building where work is being conducted, the temperature shall be maintained as specified in the various sections of the Specifications, but not less than 45 degrees Fahrenheit. Under no circumstances shall the temperature be allowed to reach a level that will cause damage to any portion of the work which may be subject to damage by low temperatures.
 - 1. Temporary heating is required in any areas where mechanical work is being done or being turned off.
- B. Until the building, or any major portion thereof, is enclosed, temporary heating shall be by smokeless portable unit heaters of type listed by Underwriter's Laboratories, Factory Mutual, and the Fire Marshall. Pay for fuel, maintenance, and attendants required in connection with the portable unit heaters. Interior or exterior surfaces damaged by the use of these space heaters shall be replaced by new materials or be refinished.

- C. The building shall be considered enclosed when it has reached the stage when exterior walls have been erected, the roof substantially completed, exterior openings closed up either by the permanently glazed windows and doors, or by adequate temporary closing, and the building is ready for interior masonry and plastering operations.
- D. After the building, or any major portion thereof, has been enclosed, the permanent heating system as specified below may be used for temporary heat.
- E. When the permanent heating system, or a suitable portion thereof, is in operating condition, the system may be used for temporary heating, provided that the Contractor assumes full responsibility for the entire heating system, and pays all costs for fuel, operation, maintenance, and restoration of the system.
- F. Provide adequate ventilation as required to keep the temperature of the building within 10 degrees Fahrenheit of the ambient outdoor temperature when such ambient temperature exceeds 70 degrees Fahrenheit, and to prevent accumulation of excess moisture or to prevent excess thermal movement in the building.
- G. When the permanent air circulation system, or a suitable portion thereof, is in operating condition, it may be used without refrigeration or chilling, provided that the Contractor assumes full responsibility for the system which he is using, and pays costs for power, operation, maintenance, and restoration of the system. Provide temporary filters to adequately filter air being distributed through the duct work to the supply outlets; disposable filters shall be placed in front of all exhaust registers to keep construction dirt out of exhaust duct work. The Contractor shall thoroughly clean the interior of the air handling units and duct work prior to acceptance of the work.
- H. Upon conclusion of the temporary heating period, remove all temporary piping, temporary heating units, or other equipment and pay all costs in connection with repairing any damage caused by the installation or removal of temporary heating equipment. Thoroughly clean and recondition those parts of permanent heating and air circulation systems used for temporary service.

2.11 TEMPORARY LIGHT AND POWER

- A. Make all arrangements with the local electric company for temporary electrical service to the construction site; provide all equipment necessary for temporary power and lighting; and pay all charges for this equipment, the installation thereof, and for current used. The electrical service shall be of 120v and 240v for single phase loads up to 30 amps for all construction tools and equipment without overloading the temporary facilities and shall be made available for power, lighting, and construction operations of all trades.
- B. In addition to the electrical service, provide power distribution as required throughout structure. The terminations of power distribution shall be at convenient locations in the building. Terminations shall be provided for each voltage supply complete with circuit breakers, disconnect switches, and other electrical devices as required to protect the power supply system.
 - 1. Provide double duplex outlets at not more than 200' o.c. both directions throughout this building.

- C. A temporary lighting system shall be furnished, installed, and maintained as required to satisfy minimum requirements of safety and security. The temporary lighting system shall afford general illumination in all building areas and shall supply not less than 150 watt lamps on 30' centers both directions of floor area for illumination in the areas of the building where work is being performed.
- D. All temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the governing codes. All temporary wiring shall be maintained in a safe manner and used so as not to constitute a hazard to persons or property.
- E. When the permanent electrical power and lighting systems are in operating condition, they may be used for temporary power and lighting for construction purposes, provided that the Contractor assumes full responsibility for the entire power and lighting system, and pays costs for power, operations, maintenance, and restoration of the system.

2.12 TEMPORARY ACCESS TO SITE

- A. Construct and maintain in good usable condition all required temporary access to site, and, when no longer required, remove all temporary construction and restore the site.
- B. Where streets now in use are within or adjacent to the work, keep the passageways of such streets open to vehicular and pedestrian traffic to building fronting thereon. Maintain constant access for police, fire and ambulance service.
- C. Mud carried off the site and into public roads shall be removed immediately by the Contractor.
- D. Access to the site for delivery of construction material or equipment shall be made only from locations designated by the Architect.
- E. Flagmen: Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on campus drives and public traffic lanes.
 - 1. Flagmen Equipment: As approved by local jurisdiction.

2.13 TEMPORARY STAIRS, LADDERS, RAMPS, SIDEWALK BRIDGING AND RUNWAYS

- A. Provide and maintain all equipment such as temporary stairs, ladders, ramps, runways, and chutes as required for the proper execution of the work.
- B. All such apparatus, equipment, and construction shall meet all requirements of the Labor Law and other state or local laws applicable thereto.
- C. As soon as permanent stairs are erected, provide temporary protective treads, handrails, and shaft protection.
- D. Covered Walkway: Erect a structurally adequate, protective, covered walkway for passage of persons along adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct covered walkways using scaffold or shoring framing.
2. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well drained walkways, and similar provisions for protection and safe passage.
3. Extend back wall beyond the structure to complete enclosure fence.
4. Paint and maintain in a manner approved by Owner and Architect.
5. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8" thick exterior plywood.

2.14 TEMPORARY TOILETS

- A. Provide and maintain in a sanitary condition enclosed weathertight toilets for the use of all construction personnel at a location within the contract limits. Upon completion of the work, toilets shall be removed. Installation shall be in accordance with all applicable codes and regulations of authorities having jurisdiction. The number of toilet rooms required shall be in accordance with the ANSI Standard Safety Code for Building Construction or other local authorities.

2.15 TEMPORARY WATER SERVICE

- A. Provide at a point within 10 feet of the building (or buildings) all water necessary for construction purposes. Make all temporary connections to existing mains; provide temporary meter; and make arrangements to pay for the temporary water service including cost of installation, maintenance thereof, and water used.
- B. Furnish drinking water with suitable containers and cups for use of employees. Drinking water dispensers shall be conveniently located in the building where work is in progress.
- C. When the permanent water supply and distribution system has been installed, it may be used as a source of water for construction purposes, provided that the Contractor assumes full responsibility for the entire water distribution system, and pays costs for operation, maintenance, and restoration of the system including the cost of water used.
- D. At the completion of the construction work or at such time after the Contractor makes use of the permanent water installation, all temporary water service equipment and piping shall be removed, and all worn or damaged parts of the permanent system shall be replaced and equipment placed in first class condition equal to new.

2.16 SECURITY

- A. Provide sufficient watchman service to prevent illegal entry or damage during nights, holidays, or other periods when work is not being executed, and such other control watchmen as required during working hours.
- B. Provide all temporary enclosures required for protecting the project from the exterior, for providing passageways, for the protection of openings both exterior and interior, and any other location where temporary enclosures and protection may be required.

- C. Take adequate precautions against fire; keep flammable material at an absolute minimum; and ensure that such material is properly handled and stored. Except as otherwise provided herein, do not permit fires to be built or open salamanders to be used in any part of the work.

2.17 WATER AND SNOW CONTROL

- A. From the commencement of the construction to the completion of the work, keep all parts of the site and the project free from accumulation of water, and supply, maintain, and operate all necessary pumping and bailing equipment.
- B. Remove snow and ice as necessary for the protection and prosecution of the work and protect the work against weather damage.
- C. The Contractor shall take over responsibility for site drainage upon entering the premises and shall maintain such drainage until completion of the work so as not to adversely affect the adjacent areas.

2.18 ENVIRONMENTAL CONTROLS

- A. The Contractor shall comply with all applicable Federal, State and local laws, regulations, ordinances, codes and standards concerning environment control. Particular attention shall be given, without limitations, to:
 - 1. Minimization of dust, containment of chemical vapors, control of engine exhaust gases, and control of smoke from temporary heaters.
 - 2. Reduction of water pollution by control of sanitary facilities, proper storage of fuels and other potential contaminants, and prevention of siltation from land erosion.
 - 3. Minimization of noise levels.
 - 4. Proper and legal disposal, off site unless otherwise provided, of waste and spoil resulting from construction activities.

PART 3 EXECUTION

3.1 REMOVAL

- A. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the work. Remove all such temporary facilities and controls as rapidly as progress of the work will permit or as directed by the Architect.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete product requirements as specified herein, including, but not limited to, the following:
 - 1. Product delivery, storage and handling.
 - 2. Storage and protection.
 - 3. Identifying markings.
 - 4. Substitution requirements.
 - 5. Temporary use of equipment.
 - 6. General standards.

1.3 RELATED SECTIONS

- A. Execution Requirements - Section 01 73 00.

1.4 TRANSPORTATION AND HANDLING

- A. Materials, products, and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.
- B. More detailed requirements for transportation and handling are specified under the technical Sections.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

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

C. Storage

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

1.6 IDENTIFYING MARKINGS

- A. Name plates and other identifying markings shall not be affixed on exposed surfaces of manufactured items installed in finished spaces.

1.7 PRODUCT APPROVAL STANDARDS

- A. Where the words "or approved equal" or other synonymous terms are used, it is expressly understood that they shall mean that the approval of any such submission is vested in the Architect, whose decision shall be final and binding upon all concerned. All submissions are subject to such approval and shall conform to the requirements of Article 1.8 herein.

1.8 SUBSTITUTIONS

- A. After the contract has been executed, the Architect will consider a formal request for the substitution of products in place of those specified, under the following conditions:

1. The request is accompanied by complete data on the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to Contract time schedule, design and artistic effect where applicable, and its relationship to separate contracts.
 2. The request is accompanied by accurate cost data on the proposed substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.
- B. Requests for substitution based on Para (1) above, when forwarded by the Contractor to the Architect for review are understood to mean that the Contractor:
1. represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 2. will provide the same guarantee for the substitution that he would for that specified;
 3. certifies that the cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate contracts and the Architect's redesign costs, and that he waives all claims for additional costs related to the substitution which subsequently become apparent; and
 4. will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects, at no additional cost to the Owner and at no extension of the contract completion date.
- C. Substitutions will not be considered if:
1. they are indicated or implied on shop drawings submissions without the formal request required in Para (1) above; or
 2. for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.
 3. The Architect will examine, with reasonable promptness, such substitution submittals, and return of submittals to the Contractor shall not relieve the Contractor from responsibility for deviations and alternatives from the contract plans and specifications, nor shall it relieve him from responsibility for errors in the submittals. A failure by the Contractor to identify in his letter of transmittal material deviations from the plans and specifications shall void the submittals and any action taken thereon by the Architect. When specifically requested by the Architect, the Contractor shall resubmit such shop drawings, descriptive data and samples as may be required to evaluate substitutions.
- D. If any mechanical, electrical, structural, or other changes are required for the proper installation and fit of alternative materials, articles, or equipment, or because of deviations from the contract plans and specifications, such changes shall not be made

without the consent of the Architect and shall be made without additional cost to the Owner.

1.9 TEMPORARY USE OF EQUIPMENT

- A. No equipment intended for permanent installation shall be operated for temporary purposes without the written permission of the Architect.
- B. The temporary or trial usage by the Owner of any mechanical device, machinery, apparatus, equipment or any work or materials supplied under this Contract before final completion and written acceptance by the Architect, shall not be construed as evidence of the acceptance of same by the Owner. The Owner shall have the privilege of such temporary and trial usage, for such reasonable length of time as and when the Architect shall deem to be proper for making a complete and thorough test of same and no claim for damage shall be made by the Contractor for the injury to or breaking of parts of such work which may be caused by weakness or inaccuracy of structural parts or by defective material or workmanship. If the Contractor so elects, he may at his own expense, place a competent person or persons to make such trial usage; such trial usage shall be under the supervision of the Contractor.

1.10 GENERAL REQUIREMENTS

- A. In the event that it is necessary for the Contractor to store any materials offsite, he shall first obtain the approval of the Architect. The Contractor shall be responsible for insurance and warehousing charges of any materials stored offsite. The Contractor shall also be responsible for the cost of delivery to the job site of any materials that have been stored offsite.
- B. Materials delivered to the job site shall be carefully stored and protected from damage. Damaged material shall not be used in the work. The Contractor shall provide, where directed temporary storage facilities as may be required for the storage of all materials which might be damaged by weather.
- C. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the representative manufacturers, unless otherwise specified.
- D. Equipment, plant, and appliances, such as hoists, centering, concrete lifts, construction elevators, cranes, rigging, towers, derricks, walks, ramps, chutes, scaffolding, implements, transportation, cartage and other things necessary and required for the adequate execution of the work and as required by law and applicable Union rules shall be provided and shall be maintained in good and safe mechanical working order, be responsible for their safe use, and remove them when no longer required. Applicable requirements of OSHA shall become and form a part of this document.
- E. During handling and installation of work at project site clean and protect work in progress and adjoining work on a basis of perpetual maintenance. Apply suitable protective covering on newly installed work where reasonably required to ensure freedom from damage or deterioration at time of substantial completion; otherwise, clean and perform maintenance on newly installed work as frequently as necessary

through remainder of construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- F. To extent possible through reasonable control and protection methods, supervise performance of work in a manner and by means which will ensure that none of the work whether completed or in progress, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposures during construction period. Such exposures include (where applicable, but not by way of limitation) static loading, dynamic loading, internal pressures, external pressures, high or low temperatures, thermal shock, high or low humidity, air contamination or pollution, water, ice, solvents, chemicals, light, radiation, puncture, abrasion, heavy traffic, soiling, bacteria, insect infestation, combustion, electrical current, high speed operation, improper lubrication, unusual wear, misuse, incompatible interface, destructive testing, misalignment, excessive weathering, unprotected storage, improper shipping/handling, theft and vandalism.
- G. Require installer of each major unit of work to inspect substrate to receive the work, and conditions under which the work will be performed, and to report (in writing to Contractor) unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- H. Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation to whatever extent these are more explicit or more stringent than applicable requirements indicated in the Contract Documents.
- I. Inspect each item of materials or equipment immediately prior to installation and reject damaged and defective items.
- J. Provide attachment and connection devices and methods for securing work properly as it is installed; true to line and level, and within recognized industry tolerance if not otherwise indicated. Allow for expansions and building movements. Provide uniform joint widths in exposed work, organized for best possible visual effect. Refer questionable visual-effect choices to Architect for final decision.
- K. Recheck measurements and dimensions of the work as an integral step of starting each installation.
- L. Install work during conditions of temperature, humidity, exposure, forecasted weather, and status of project completion which will ensure best possible results for each unit of work in coordination with entire work. Isolate each unit of work from non-compatible work, as required to prevent deterioration.
- M. Coordinate enclosure (closing-in) of work with required inspections and tests, so as to avoid necessity of uncovering work for that purpose.
- N. Mounting Heights: Except as otherwise indicated, mount individual units of work at industry-recognized standard mounting heights, for applications indicated. In CMU walls mount units at height closest to manufacturer's recommendation so as to minimize cutting of block coursings. Refer questionable mounting height choices to Architect for final decision.

12 August 2021
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END OF SECTION

SECTION 01 73 00

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

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

1.3 RELATED SECTIONS

- A. Cutting and Patching - Section 01 73 29.
- B. Closeout Procedures - Section 01 77 00.

1.4 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by land surveyor.

- E. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site work.
- D. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg. F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 014000, "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 017329, "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. This Section includes procedural requirements for cutting and patching.

1.3 RELATED SECTIONS

- A. Refer to Divisions 2 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 22, 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.4 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.5 SUBMITTALS

- A. Cutting and Patching: Submit a method describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.

5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.6 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 1. Provide a list of additional elements that are structural elements and that require Architect's or Construction Manager's approval of a cutting and patching proposal.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Conveying systems.
 7. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.

6. Noise- and vibration-control elements and systems.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 WARRANTY

- A. Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void warranties.

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. In-Place Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Warranties.
 - 4. Instruction of Owner's personnel.
 - 5. Final cleaning.

1.3 RELATED SECTIONS

- A. Construction Progress Documentation - Section 01 32 00.
- B. Execution Requirements - Section 01 73 00.
- C. Operating and Maintenance Data - Section 01 78 23.
- D. Divisions 2 through 32 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.4 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued. A sample of the Certificate of Substantial Completion form is attached at the end of this section.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.5 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment.

2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1.7 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

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

3. Note related Change Orders, Record Drawings and Record Specifications, where applicable.

- E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" x 11" paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

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

PART 3 EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 1. Provide instructors experienced in operation and maintenance procedures.

2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 3. Schedule training with Owner with at least seven days' advance notice.
 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. 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. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
1. System design and operational philosophy.
 2. Review of documentation.
 3. Operations.
 4. Adjustments.
 5. Troubleshooting.
 6. Maintenance.
 7. Repair.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid

- disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1). Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the operation and maintenance data as specified herein.

1.3 RELATED SECTIONS

- A. Submittal Procedures - Section 01 33 00.
- B. Closeout Procedures - Section 01 77 00.

1.4 GENERAL

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Subcontractors shall prepare operation and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.

1.5 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Format
 - 1. Size: 8-1/2" x 11".
 - 2. Paper: 20 pound minimum, white for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Drawings
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to the size of the text pages.
 - 5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.

- b. Provide indexed tabs.
- 6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS." List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.
- C. Binders
 - 1. Commercial quality three-ring binders with durable and cleanable plastic covers.
 - 2. Maximum ring size: 1 inch.
 - 3. When multiple binders are used, correlate the data into related consistent groupings.
- 1.6 MANUAL FOR MATERIALS AND FINISHES
 - A. Submit two copies of complete manual in final form.
 - B. Content, for architectural products, applied materials and finishes
 - 1. Manufacturer's data, giving full information on products.
 - a. Catalog number, size, composition.
 - b. Color and texture designations.
 - c. Information required for re-ordering special-manufactured products.
 - 2. Instructions for care and maintenance.
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods which are detrimental to the product.
 - c. Recommended schedule for cleaning and maintenance.
 - C. Content, for moisture-protection and weather-exposed products
 - 1. Manufacturer's data, giving full information on products.
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 - 2. Instructions for inspection, maintenance, and repair.
- 1.7 MANUAL FOR EQUIPMENT AND SYSTEMS
 - A. Submit three copies of complete manual in final form.
 - B. Content, for each unit of equipment and system, as appropriate.

1. Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of all replaceable parts.
 2. Operating procedures
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 3. Maintenance procedures
 - a. Routine operations.
 - b. Guide to "trouble-shooting."
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
 4. Servicing and lubrication schedule.
 - a. List of lubricants required.
 5. Manufacturer's printed operating and maintenance instructions.
 6. Description of sequence of operation by control manufacturer.
 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 8. As-installed control diagrams by controls manufacturer.
 9. Each contractor's coordination drawings.
 - a. As-installed color coded piping diagrams.
 10. Charts of valve tag numbers, with the location and function of each valve.
 11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 12. Other data as required under pertinent sections of specifications.
- C. Content, for each electric and electronic system, as appropriate:
1. Description of system and component parts.
 - a. Function, normal operating characteristics, and limiting condition.

- b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
- 2. Circuit directories of panel boards.
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
- 3. As-installed color coded wiring diagrams.
- 4. Operation procedures
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
- 5. Maintenance procedures
 - a. Routine operations.
 - b. Guide to "trouble-shooting."
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
- 6. Manufacturer's printed operating and maintenance instructions.
- 7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- 8. Other data as required under pertinent sections of specifications.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional Requirements for Operation and Maintenance Data: The respective sections of Specifications.

END OF SECTION

SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. If a Geotechnical Report is available and/or a Geotechnical Engineer is retained by the Owner at the Owner's expense, the Contractor must adhere to all requirements contained in the Report and as directed by the Geotechnical Engineer.

1.2 SUMMARY

- A. This Section includes subsurface investigations which may have been or will be performed at the project site.
- B. Related Sections:
 - 1. Section 01 41 00 "Regulatory Requirements."
 - 2. Section 31 23 00 "Excavation and Fill."
 - 3. Section 31 23 33 "Trenching and Backfilling."
 - 4. Section 31 25 00 "Temporary Soil Erosion, Sediment and Dust Control."

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL

- A. The on-site installation of certain materials may be subject to special construction requirements. Refer to the details, plans, and specification sections, as may be prepared and as applicable, by the Geotechnical Engineer, Structural Engineer, MEP Engineer, and/or Architect.
- B. Existing Subsurface Data - At this time, subsurface investigations have not been made at the site. Should a report become available with the results of subsurface investigations, the location of each exploration and the information obtained will be shown on the boring and/or test pit logs and/or drawings and would be available for the general information and convenience of the Contractor/Bidder and is intended to supplement the Contractor's/Bidder's own investigations. The information obtained from these subsurface investigations would be for general information only and would not be a warranty of existing conditions. They would not be part of the Contract Documents. Variations in subsurface conditions shall not affect the terms of the Contract.
- C. Borings and/or Test Pits by Contractor/Bidder - Permission may be granted upon request to make borings or dig test pits for the purpose of verifying conditions at the site. The locations and size of such exploratory holes will be subject to approval by the Owner. The cost of such explorations shall be borne by the Contractor/Bidder.
- D. Examination of Site and Interpretation of Data - Contractor/Bidder shall examine the site as well as all available information and then decide for themselves the character of materials to be encountered. Attention is directed to the fact that subsurface conditions may include different soils, hard or soft strata, obstructions that may be either natural or man made, or conditions different from those anticipated. No representations or warranties either as to the presence or absence of such different

conditions or as to their nature and extent are made. The Bid/Price should include the influence of such features.

- E. Groundwater Information - Attention is also directed to the fact that groundwater may rise during wet weather or fall during dry weather. Varying groundwater levels and perched groundwater should be expected and may affect construction operations including earthwork.
- F. Subsurface Information not Guaranteed - Neither the Architect, Site Engineer, Geotechnical Engineer nor the Owner guarantees that materials disclosed by any subsurface investigations would actually be encountered at other locations. They further disclaim responsibility for the interpretation of the data. The data would be supplied only for general information and would not be guaranteed. The Contractor and/or Construction Manager is expected to examine the site and the record of the Contractor's investigations, and detail the character of materials that may be encountered.

The information referred to herein would be made available in good faith and is not intended as a substitute for personal investigation, interpretations and judgment by the Contractor/Bidder.

- G. Geotechnical Engineer - The Geotechnical Engineer or designated representative may be on site during ground intrusive activities. If present, the Geotechnical Engineer will report to the Owner's Field Representative and advise on technical subsurface related items. The Geotechnical Engineer will interact with NYSDEC on behalf of the Owner, as applicable.

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION AND ALTERATION WORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the selective demolition and alteration work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Alterations, selective demolition and removals as noted on drawings and as required to accommodate new construction.
 - 2. Removal of debris.
 - 3. Protection of existing building and spaces to remain.
 - 4. Protection of existing curbs and sidewalks.
 - 5. Temporary coverage passageways.
 - 6. Alterations, selective demolition and removals of exterior façade, where noted.
 - 7. Patching and refinishing of existing surfaces damaged as a result of this work.
 - 8. Protection.

1.3 QUALITY ASSURANCE

- A. The Contractor shall comply with the requirements of all applicable Federal, State and local safety and health regulations regarding the demolition of structures including ANSI/NFPD 241-Building Construction and Demolition Operations.
- B. The Contractor shall be responsible for any damage to any adjacent structures or buildings to remain.
- C. Qualifications: Qualifications of Contractor for work of this Section shall not be less than ten (10) years of field experience in work of this nature.
- D. Professional Engineering: The Contractor shall retain the services of a Professional Engineer licensed in the State of New York, who shall design and supervise installation of all underpinning and shoring.

1.4 RELATED SECTIONS

- A. Alteration and removal requirements for mechanical and electrical work - Mechanical and Electrical Sections.

1.5 SUBMITTALS

- A. Schedule of Demolition Operations: Submit demolition procedures and operational sequence for Architect's review prior to start of work. Submit a written request to Architect well in advance of executing any cutting or alteration which affects:
 - 1. The work of tying in or connecting to operational systems of the building, including electrical, mechanical and security systems.
 - 2. The work of the Owner or any separate Contractor.
 - 3. The structural value or integrity of any element of the project or of adjacent structures.
 - 4. The integrity or effectiveness of weather-exposed and moisture-resistant elements or systems.
 - 5. The efficiency, operational life, maintenance, or safety of operational elements or systems.
- B. Notice of Differing Conditions: Submit a written notification if, during the work of demolition and cutting, conditions are discovered which significantly vary from those shown on the drawings. Do not commence work until approval of Architect.
- C. Shop Drawings: Submit the following prior to starting work:
 - 1. Submit for Architect's information shop drawings indicating location and typical construction details of temporary dustproof and weatherproof partitions.
 - 2. Submit drawings of temporary structural shoring, bracing, framing or support, for the information of the Architect. Such drawings will be reviewed by the Structural Engineer for the effects of such temporary members on the structural elements to remain. These drawings shall include the reason for such temporary members, the location, the direction and magnitude of design reaction forces on existing structure, and details showing how these reaction forces will be applied to the existing structure.
 - a. Shop drawings shall be submitted with the Seal of the P.E. engaged by Contractor; P.E. must be licensed in the State of New York.
 - b. The Architect will receive acknowledgment for concepts shown. Such acknowledgments shall be of the concept only and not of actual capacities or structural design and shall not in any way diminish or limit the Contractor's responsibility for the quality and performance of the work and for protecting existing structures and facilities.

1.6 SPECIAL PRECAUTION

- A. Hazardous materials may be encountered during demolition operations including asbestos; comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

1.7 JOB CONDITIONS

A. Condition of Structure

- 1. The Contractor for the work of this Section shall be held to have visited the site, examined the premises, determined for himself the existing conditions, character of equipment and facilities needed for the performance of the work, and all matters which may in any way affect the work before submitting a bid.
 - a. Information regarding existing construction or conditions is based on available record drawings which may or may not truly reflect existing conditions. Such information is included on the assumption that it may be of interest to the Contractor, but the Architect, Owner and their consultants do not assume responsibility for its accuracy or completeness.
 - b. Notify the Architect if, during the course of demolition, conditions are discovered which significantly vary from those shown on the drawings. Do not proceed until authorized by Architect.
- 2. The Contractor shall accept the condition of the site and structures as found. The Architect and Owner assume no responsibility for condition of site or structures nor the continuation of the condition existing at time of bidding or thereafter.

- B. Areas of building to be demolished or altered will be vacated and discontinued in use prior to the start of the work.

C. Partial Removal

- 1. Items of savable value to the Contractor may be removed from the structure as the work progresses. Salvaged items must be transported from the site as they are removed.
- 2. Storage or sale of removed items on the site will not be permitted.

- D. Explosives: The use of explosives will not be permitted.

E. Traffic

- 1. Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.
- 2. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

F. Utilities

1. Refer to Division 22 and 26 of the specifications for special requirements concerning utilities and services.
2. Maintain any existing utilities required to remain; keep in service and protect against damage during demolition operations.
3. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the governing authorities.
4. Disconnect and seal any abandoned utilities before starting demolition operations. Coordinate all work with local utility companies having jurisdiction.

1.8 SCHEDULING

- A. Before commencing any alteration or demolition work, submit for review by the Architect, and approval of the Owner, a schedule showing the commencement, the order, and the completion dates for the various parts of this work.
- B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the structures to remain, notify the Architect and the Owner 7 days in advance and obtain the Owner's approval in writing before proceeding with this phase of the work.

PART 2 PRODUCTS

Refer to Part 3 - Execution, for Product Requirements

PART 3 EXECUTION

3.1 PROTECTION

- A. Take full precautions to protect workmen, passersby or any other persons from falling debris and other hazards of demolition operations.
- B. Execute demolition work to insure protection of existing portions of building to remain against damages which might occur from falling debris or other cause. Do not interfere with use of adjacent occupied buildings and areas. Maintain free, safe passage to and from occupied adjacent buildings.
- C. Materials Placement: Do not load structure with weight that will endanger, overload or cause excessive deflection of the existing structure, or that will damage finished surfaces adjacent to and/or supported by the existing structure, except portions being removed.
- D. Construction Operations: Do not employ any construction operation, equipment or vehicles that will endanger, overload or cause excessive deflection of the existing structure, or that will damage finished surfaces adjacent to and/or supported by the existing structure, except portions being removed.

- E. Take precautions to guard against movement, settlement, damage, or collapse of any part of building, sidewalks, adjacent property or street passages; be liable for any such movement, settlement or collapse. If such damage does accidentally occur, Contractor shall repair promptly at no cost to Owner.
- F. Provide the necessary safeguards to prevent accidents, to avoid all necessary hazards and protect the public, the work and property at all times, including Saturdays, Sundays, and holidays.
- G. Be responsible for any and all damages which may arise or occur to any party whatsoever by reason of the neglect in providing proper lights, guards, barriers, or any other safeguards to prevent damage to property, life and limb.
- H. Make such explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. Give particular attention to shoring and bracing requirements so as to prevent any damage to existing construction.
 - 1. Provide interior and exterior shoring, bracing, or support to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain. The Contractor's Professional Engineer shall advise on bracing, shoring, underpinning, or other structural requirements. The Contractor shall bear all responsibility for prevention of movement or other structural fault.
 - 2. The Contractor shall restore, by repair or otherwise, the portions of structure or their contents altered by the Contractor in furtherance of his underpinning and support operations. Restoration shall be completed to the conditions which existed prior to the start of the work. Any damage caused by inadequate support shall also be restored by the Contractor at no cost to the Owner.
- I. Provide, erect and maintain catch platforms, lights, barriers, weather protection, warning signs, and other items as required for proper protection of the workmen engaged in demolition and alteration operations, occupants of the building, public and adjacent property. Any damage caused by the Contractor's operations shall be promptly repaired by the Contractor at no cost to the Owner.
- J. Provide and maintain temporary protection of the existing structure designated to remain where demolition, removal, and new work are being done, connections made, materials handled, or equipment moved.
- K. Take necessary precautions to prevent dust and dirt from rising. Protect unaltered portions of the existing building affected by the operations under this Section by dustproof partitions and other adequate means.
- L. Provide adequate fire protection in accordance with local Fire Department requirements.
- M. Do not close or obstruct walkways, passageways, or stairways. Do not store or place materials in passageways, stairs, or other means of egress. Conduct operations with minimum traffic interference.

- N. Be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.
- O. Erect temporary covered passageways at street level as required by authorities having jurisdiction.
- P. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to the Owner.
- Q. Provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

3.2 INSPECTION

- A. Verify that areas of demolition work are protected and temporary dustproof partitions have been installed.
- B. Verify that construction to be removed is not load bearing or has been properly braced, framed or supported.
- C. Inspect existing conditions of the project, including elements subject to damage or to movement during demolition and cutting.
- D. After uncovering work, inspect the conditions affecting the installation or performance of the work.
 - 1. Report differing or questionable conditions to the Architect in writing; do not proceed with the work until the Architect has provided further instructions.

3.3 PREPARATION

- A. Provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the work
- B. Provide devices and methods to protect other portions of the project from damage.
- C. Pollution Controls
 - 1. Use water sprinkling, temporary enclosures, and other suitable 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.
 - a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
 - 2. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations. Return adjacent areas to condition existing prior to the start of the work.
 - 3. Provide drainage for temporary water use.

3.4 DEMOLITION AND CUTTING

- A. Selectively demolish existing construction in conformance with the drawings and these specifications.
1. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surface to receive installation of work by others and patching of finish surfaces.
 2. Do all cutting or removal so as to leave neat, true, plumb and square edges, at edges to remain. Use carborundum or diamond saw equipment for cutting masonry, concrete and stone work, where edges or surfaces are to remain.
 3. Do not cut or remove construction which might weaken or impair the structural integrity or strength of the structural framing or support systems which are to remain.
 4. Demolish and remove materials as shown on the drawings without damage to the remaining parts of the structure or mechanical/electrical/utility systems.
 5. Remove materials so as to not impose excessive loads in supporting walls, floors or framing and so as not to damage remaining undemolished portions of the structure.
 6. Where portions of structures are to be removed, remaining portions shall be protected from damage and prepared to fit new construction. Damage to portions of structures to remain shall be repaired.
 7. Reinforcing steel in existing structures shall be left in place, cleaned and aligned to provide tie with new work.
 8. Proceed with demolition in a systematic manner.
 9. Demolish concrete and masonry in small sections.
 10. Remove structural framing members and lower to ground by means of hoists, derricks, or other suitable methods.

3.5 SHORING AND BRACING

- A. General
1. Design, provide, erect and maintain necessary temporary shoring, bracing, framing, or support where load bearing structural or supporting members are removed or weakened by cuts or openings or are subject to damage from demolition operations, and otherwise as required for safety or to protect finish surfaces from damage.
 2. Construction and adequacy of the shoring shall be the entire responsibility of the Contractor. Any damage caused by the inadequacy of the shoring or other support shall be the responsibility of the Contractor to remedy at no additional expense to the Owner.

3. Shoring and bracing shall remain until new structural framing and/or supports are installed. Coordinate operations fully with other trades.
4. Be ready at any time to promptly provide, add to, or strengthen temporary shoring, bracing, or support for existing work, in case existing construction begins to show signs of structural stress.

3.6 WORKMANSHIP STANDARDS FOR ALTERATION AND REMOVAL WORK

- A. Cut, remove, alter, temporarily remove and replace, or relocate existing work as required for performance of the work. Perform such work required with due care, including shoring and bracing.
- B. Coordinate patching involving the various trades whether or not specifically mentioned in the respective specification Sections.
- C. Materials or items demolished and not designated to become the property of the Owner or to be reinstalled shall become the property of the Contractor and shall be removed from the Owner's property.
- D. Execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the adjacent buildings.
- E. In general, demolish masonry in small sections. Where necessary to prevent collapse of any construction, install temporary shores, struts, or bracing.
- F. Materials to be removed by existing elevators shall be put in enclosed containers.
- G. Where existing equipment and/or fixtures are indicated to be reused, repair such equipment and/or fixtures and refinish to put in perfect working order. Refinish as directed.
- H. Cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.
- I. Confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the new work. Cut and fold back existing roofing. Cut and remove insulation and related items. Provide temporary weathertight protection as required until new roofing and flashings are installed. Consult the Owner to ascertain if existing guarantee bonds are in force and execute the work so as not to invalidate such bonds.
- J. Where utilities are removed, relocated or abandoned, cap, valve, plug, or by-pass to make complete and working installation.
- K. Restore existing pipe and duct coverings damaged by work under this Contract to original undamaged condition.
- L. Immediately restore to service and repair any damage caused by Contractor's workmen to existing pipe and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems which are not scheduled for discontinuance or abandonment.

- M. Upon completion of contract, deliver work complete. Damage that may be caused by Contractor or Contractor's workmen to existing structures designated to remain, grounds, and utilities shall be repaired by Contractor and left in as good condition as existed prior to damaging.
- N. Restore finish work of floors, walls, and ceilings remaining in place but damaged or defaced because of demolition or alteration work to condition equal that which existed at beginning of work under this Contract.
- O. Where alteration or removals expose damaged or unfinished surfaces or materials, refinish such surfaces or materials, or remove them and provide new or salvaged materials to make continuous surfaces uniform.
- P. Perform new work and restore and refinish existing work in conformance with applicable requirements of the specifications, except as follows:
 - 1. Materials for use in repair of existing surfaces, but not otherwise specified, shall conform to the highest standards of the trade involved, and be in accordance with approved industry standards, and shall be as required to match existing surfaces.
 - 2. Workmanship for repair of existing materials shall, unless otherwise specified, be equal to similar workmanship existing in or adjacent to the space where the work is being done.
 - 3. Installation of salvaged items where no similar items exist shall be done in accordance with the highest standards of the trade involved and in accordance with approved shop drawings.
- Q. Materials or items designated to become the property of the Owner shall be as shown on the drawings. Remove such items with care and store them in a location at the site to be designated by the Owner.
- R. Materials or items designated to be reinstalled shall be as shown on the drawings. Remove such items with care under the supervision of the trade responsible for reinstallation; protect and store until required. Replace materials or items damaged in their removal with similar new material.
- S. The existing building shall not be used as a work shop. Neither shall the furnishings or equipment in any room be used as work benches. Should any damage occur during the progress of the work to any furniture, fixtures, equipment, or appurtenances therein, such damage shall be repaired, replaced or made good by the Contractor without extra cost to the Owner.
- T. Where removing existing floor finish and base, remove all adhesive and leave floors and walls smooth and flush, ready to receive new finish.
- U. Finish new and adjacent existing surfaces as specified for new work. Clean existing surfaces of dirt, grease and loose paint before refinishing.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General

1. Remove from the site debris, rubbish and other materials resulting from work of this Section.
2. Burning of removed materials from demolished structures will not be permitted on the site.

- B. Removal: Transport materials removed from demolished structures and legally dispose of off site. Pay any and all fees associated with disposal work. Leave the site in an orderly condition to the approval of the Architect.

3.8 CLEANING UP

- A. Remove debris as the work progresses. Maintain existing premises in a neat and clean condition.

END OF SECTION

SECTION 02 82 00

ASBESTOS REMOVAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This asbestos abatement Project will consist of the removal and disposal of asbestos containing materials (ACM) at *School of the Holy Child*. All Asbestos Containing Materials (ACM) impacted by the scheduled work shall require handling and disposal in accordance with all applicable federal, state and local codes, rules and regulations and the Contract Documents. In the event of contradiction between requirements of the Contract Documents and applicable codes, rules and regulations, the stringent shall apply.
- B. The work shall include but not be limited to the removal of the following tabulated materials:

Table 1.01a – 1930's Building

Building & Floor	Description of Material	Approximate Quantity (LF/SF)
1930's Bldg. (Corridor & Boiler Room)	Pipe Insulation	150 LF
1930's Bldg. (Corridor & Boiler Room)	Pipe Elbow	40 LF
1930 Bldg: (Attic)	Pipe Insulation	225 LF
1930 Bldg: (Attic)	Pipe Elbow	75 LF
1930 Bldg. Crawl Space	Pipe Insulation Debris	45 SF
1930 Bldg. Crawl Space	Pipe Insulation (Presumed)	150 LF
1930 Bldg. 1 st Floor Room 126	Linoleum	180 SF
1930 Bldg. 1 st Floor Pantry	9"x9" Green Floor Tile Adhesive (below 12"x12" Brown/Beige FT)	130 SF
1930 Bldg. Throughout	Braided Wire (Presumed)	10,000 LF
1930 Bldg. Upper Attic	Pipe Insulation (Presumed)	250 LF
1930 Bldg. Throughout	Radiator Risers (2 risers per floor) (Presumed)	1,300 LF
1930 Bldg. Throughout	Elbows to Radiator Risers (3 per floor) (Presumed)	56 LF
1930 Bldg. Restrooms	Pipe Insulation (Presumed)	800 LF
1930 Bldg.: Roof	Roof (Presumed)	3,600 SF
Total Quantity		190 LF / 355 SF
Total Quantity (Presumed)		12,556 LF / 1,200 SF

Note: Old Fuse Panels are Presumed asbestos

Table 1.01b – 1950's Building

Building & Floor	Description of Material	Approximate Quantity (LF/SF)
1950's Bldg (1 st Floor)	Light Fixtures Heat Shield	3 SF (3 fixtures @ 1 SF diameter each)
1950's Bldg (2 nd Floor)	Light Fixtures Heat Shield	7 SF (7 fixtures @ 1 SF diameter each)
1950 Bldg: 2 nd Floor Bedroom	Vinyl Flooring & Glue	170 SF
1950's Bldg.	Base Flashing (where 1950's building & 1930 bldg. meet)	100 SF*
1950's Bldg: Chimney	Cricket Tar/Flashing	5 SF*
1950's Bldg	Skylight	10 SF*
1950's Bldg: Roof Fan	Fan Housing	10 SF*
1950's Bldg: Vent Pipe	Vent Stack	10 SF*
1950's Bldg.: North Roof	Tar/Flashing	100 SF*
1950 Bldg. Throughout	Radiator Risers (2 risers per floor) (Presumed)	1,300 LF
1950 Bldg. Throughout	Elbows to Radiator Risers (3 per floor) (Presumed)	56 LF
1950 Bldg. Restrooms	Pipe Insulation (Presumed)	800 LF
Total Quantity		415 SF
Total Quantity (Presumed)		2,156 LF

***Line Item 1: These samples were sent to another lab for QC. If results are negative, the material(s) will be removed from the SOW**

Table 1.01c – 1970's Building

Building & Floor	Description of Material	Approximate Quantity (LF/SF)
1970's Bldg: 1 st Floor Kitchen	Door Insulation	24 SF (3 doors @ 8 SF each door)
1970's Bldg.: Roof	Asphalt Shingles (all layers), Tar Flashing at Chimney and Vent Stack, and Gable Base Flashing	3,600 SF**
1970's Bldg.: South Flat Roof	Rigid Insulation with Tar	100 SF**
1970 Bldg.: 1 st Floor Recreation Room	Vinyl Flooring & Adhesive	1,900 SF
1970 Bldg. 2 nd Floor Bedroom	Vinyl Flooring	170 SF
1970 Bldg. 2 nd Floor	Ceramic Wall Tile in Bathrooms	100 SF
1970 Bldg. Throughout	Radiator Risers (2 risers per floor) (Presumed)	1,300 LF
1970 Bldg. Throughout	Elbows to Radiator Risers (3 per floor) (Presumed)	56 LF
1970 Bldg. Restrooms	Pipe Insulation (Presumed)	800 LF
Total Quantity		5,894 SF
Total Quantity Presumed		2,156 LF

**** Line Item 2: These samples were sent to another lab for QC. If results are negative, the material(s) will be removed from the SOW**

- C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.
- D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

- E. Working hours shall be as required and approved by the Owner. Asbestos abatement activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during ‘off-hours’ (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner’s representative.

1.02 SPECIAL JOB CONDITIONS

- A. Any special job conditions, including variances obtained by the Owner, are described below.
1. The contractor shall field verify the amount of ACM and familiarize himself in all variable field conditions in and around the building before the submission of their bid. Failure to do so shall not relieve the contractor of its obligation to furnish all labor and materials necessary to perform the work.
 2. All asbestos-containing material shall be completely removed down to the clean substrate, free of all residue and debris, and disposed of as ACM.
 3. Abatement activities may be limited to nights and/or weekends depending upon scheduled facility activities.
 4. The abatement contractor is responsible for all filing in connection with this abatement work.
 5. The contractor shall be responsible for defining and coordinating the phases of the abatement with the facility, as well as securing any site specific variances, permits, and any necessary NYS DOL approvals.
 6. The asbestos abatement Contractor shall coordinate locations of decontamination units, routes of egress, temporary water and power connections, and waste container locations with the Owner and the Facility.
 7. The Contractor may need to supply temporary power/water source if they cannot be provided by facility.
 8. Temporary water and power connections to internal sources shall be extended at ceiling level and disconnected when not in use.
 9. If waste is to be transported through the building the contractor shall use canvas carts covered and lined with plastic sheeting. No waste shall be stored in the work area between work shifts. Storage of waste on site shall be approved and coordinated with facility representatives.
 10. The Contractor shall post appropriate signage at the entranceway that redirects building occupants away from the area of the abatement.
 11. The asbestos contractor shall be responsible for all repairs to finish surfaces which are damaged during the course of the abatement work which are not included in the proposed scope of work.
 12. Abatement will take place in the identified work areas separately and sequentially unless approved otherwise by the Authority.
 13. The Owner may elect to have it on-site environmental consultant perform bulk sampling of presumed asbestos containing materials prior to the commencement of asbestos abatement.

1.03 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56 (herein referred to as Code Rule 56), 40 CFR 61, and 29 CFR 1926. Where more stringent requirements are specified, adhere to the more stringent requirements.
- C. The Contractor must maintain current licenses pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials.

- F. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Code Rule 56.
- E. Should the Contractor choose to apply for any variance, approval of the Owner is first required.
- F. It is the sole responsibility of the Contractor to determine what, if any, patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. He shall defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Engineer, Environmental Consultant and Construction Manager harmless from loss, including attorney's fees, on account thereof.
- G. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.04 SUBMITTALS

- A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below:
 - 1. Contractor license issued by New York State Department of Labor.
 - 2. A list of Projects performed within the past two (2) years and include the dollar value of all Projects. Provide Project references to include Owner, consultant, and air monitoring firm's name, contact persons, address, and phone number.
 - 3. Progress Schedule:
 - a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
 - b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.
 - 4. Project Notifications: As required by Federal, State, and local regulatory agencies together with proof of transmittal (i.e. certified mail return receipt).
 - 5. Building Occupant Notification: As required by regulatory agencies.
 - 6. Abatement Work Plan: Provide plans that clearly indicate the following:
 - a. All Work Areas/containments numbered sequentially.
 - b. Locations and types of all decontamination enclosures.
 - c. Entrances and exits to the Work Areas/containments.
 - d. Type of abatement activity/technique for each Work Area/containment.
 - e. Number and location of negative air units and exhaust. Also provide calculations for determining number of negative air pressure units.
 - f. Location of water and electrical connections to building services.
 - g. Waste transport routes through the building to the waste storage container.
 - 7. Disposal Site/Landfill Permit from applicable regulatory agency.
 - 8. NYS Department of Environmental Conservation Waste Transporter Permit
- B. On-Site Submittals: Refer to Part 3.01.D for all submittals, documentation, and postings required to be maintained on-site during abatement activities.
- C. Project Close-out Submittals: Within 30 days of project completion, the Contractor shall submit 4 copies of the documents listed below. One set of the documents shall be transmitted to the Facility
 - 1. **Originals** of all waste disposal manifests and disposal logs.
 - 2. OSHA compliance air monitoring records conducted during the Work.
 - 3. Daily progress log, including the entry/exit log.
 - 4. A list of all Workers used in the performance of the Project, including name, social security number and NYS DOL certification number.
 - 5. Disposal Site/Landfill Permit from applicable regulatory agency.
 - 6. Project notifications, amended notifications, and variances.

1.05 PRE-CONSTRUCTION CONFERENCE

- A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Environmental Consultant.
- B. Agenda for this conference shall include but not necessarily be limited to:
 - 1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
 - 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 - 3. Environmental Consultant's duties, functions, and authority.
 - 4. Contractor's Work procedures including:
 - a. Methods of job site preparation and removal methods.
 - b. Respiratory protection.
 - c. Disposal procedures.
 - d. Cleanup procedures.
 - e. Fire exits and emergency procedures.
 - 5. Contractor's required pre-work and on-site submittals, documentation, and postings.
 - 6. Temporary utilities.
 - 7. Handling of furniture and other moveable objects.
 - 8. Storage of removed asbestos containing materials.
 - 9. Waste disposal requirements and procedures, including use of the Owner supplied waste manifest and container seals.
- C. In conjunction with the conference the Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.06 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
 - 1. 29 CFR 1910.1001, "Asbestos" (OSHA)
 - 2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
 - 3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 - 4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
 - 5. 29 CFR 1926, "Construction Industry" (OSHA)
 - 6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
 - 7. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
 - 8. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 - 9. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 - 10. 49 CFR 171-172, Transportation Standards (DOT)
- C. New York State Regulations:
 - 1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (DOL)
 - 2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 - 3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
- D. Standards and Guidance Documents:
 - 1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
 - 2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
 - 3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
 - 4. EPA 530-SW-85-007, Asbestos Waste Management Guidance
 - 5. ASTM Standard E1368 "Standard Practice for Visual Inspection of Asbestos Abatement Projects."

1.07 NOTICES

- A. The Contractor shall provide notification of intent to commence asbestos abatement activities as indicated below.
1. At least ten (10) Working days prior to beginning abatement activities, send written notification to:

U.S. Environmental Protection Agency
National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Coordinator
26 Federal Plaza
New York, NY 10007
 1. At least ten (10) days prior to beginning abatement activities send written notification to:

New York State Department of Labor
Division of Safety and Health, Asbestos Control Program.
State Office Campus
Building 12 - Room 454
Albany, NY 12240
- B. The Contractor is required to send notifications to regulatory agencies via electronic, mail, or package delivery service that will provide proof of delivery and receipt.
- C. The Contractor shall be responsible for maintaining current project filings with regulatory agencies for the duration of the project.
- D. The Contractor shall post and/or provide Building Occupant Notification at least 10 days prior to beginning abatement activities as required by Code Rule 56.

1.08 PROJECT MONITORING AND AIR SAMPLING

- A. NYPA shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's NYSDOL licensed Project Monitoring Firm to oversee the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement Project period.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the air sampling and Project monitoring functions described in this section. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
- C. The Consultant shall provide the following administrative services:
1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
- D. The Consultant shall staff the Project with a trained and certified person(s) to act on the Owner's behalf at the job site. This individual shall be designated as the Abatement Project Monitor (APM).
1. The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site (except for inspection of barriers and negative air system during non-working days).
 2. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed, or when ambient fiber concentrations outside the removal area exceed .01 f/cc or background level.
 - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
 - b. Standby time and air sample collection and analysis required to resolve the situation shall be at the Contractor's expense.
 3. The APM shall provide the following services:
 - a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.

- b. Provide abatement Project air sampling as required by applicable regulations (NYS, AHERA) and the Owner. Sampling will include, but not be limited to background, work area preparation, asbestos handling, final cleaning, and clearance air sampling.
 - c. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
 - d. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
 - e. Monitor, verify, and document all waste load-out operations.
 - f. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
 - g. The APM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
- 4. The following minimum inspections shall be conducted by the APM. Additional inspections shall be conducted as required by Project conditions and/or the Owner's direction. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
 - a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
 - b. Pre-Commencement Inspection: The purpose of this inspection is to verify the integrity of each containment system prior to disturbance of any asbestos containing material. This inspection shall take place only after the Work Area is fully prepped for removal.
 - c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
 - d. Pre-Encapsulation Inspection: The purpose of this inspection is to ensure the complete removal of Asbestos Containing Material (ACM), from all surfaces in the Work Area prior to encapsulation.
 - e. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible asbestos debris/residue remains; no pools of liquid or condensation remains; and all required cleanings are complete. This inspection shall be conducted before final air clearance testing.
 - f. Post-Clearance Inspection: The purpose of this inspection is to ensure the complete removal of ACM, including debris, from the Work Area after satisfactory final clearance sampling and removal of all isolation and critical barriers and equipment from the Work Area.
 - g. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
- E. The Consultant shall provide abatement Project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include background, work area preparation, asbestos handling, and final cleaning and clearance air sampling.
 - 1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM). Results shall be available within 24 hours of completion of sampling.
 - 2. For large and small Projects, samples shall be collected as required by applicable regulations (New York State and/or AHERA)
 - 3. For tent removals, a minimum of at least one clearance sample shall be collected in each tent, Additional samples shall be collected in accordance with small or large Project requirements if cumulative Project quantities exceed those of a minor Project
 - 4. If the air sampling during abatement reveals airborne fiber levels at or above .01 fibers/cc or the established background level, whichever is greater, outside the regulated Work Area, Work shall stop immediately and corrective measures required by Code Rule 56. The Contractor shall then

- inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the Work Area. The Contractor shall bear the burden of any and all costs incurred by the delay.
4. The Environmental Consultant shall submit copies of all final air clearance results to the NYS DOL at the completion of the Project.

1.09 CONTRACTOR AIR SAMPLING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection is being worn and utilized.
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.
- C. The Contractor's laboratory analysis of air samples shall be conducted by an NYS DOH ELAP approved laboratory.
- D. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Work site within five (5) days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

1.10 PROJECT SUPERVISOR

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
 2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
 3. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Contractor may not remove the Project Supervisor from the Project without the written consent of the Owner and the Environmental Consultant; however the Project Supervisor shall be removed from the Project if so requested by the Owner.
- C. The Project Supervisor shall maintain the Daily Project Log that also includes the entry/exit logs as required by New York State Department of Labor and section 2.03 of the specifications and the Waste Disposal Log (Appendix B) required by section 4.03 of the specifications.
- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.11 MEDICAL REQUIREMENTS

- A. Before exposure to airborne asbestos fibers, provide Workers with a comprehensive medical examination as required by 29 CFR 1910.1001, and 29 CFR 1926.1101.
1. This examination is not required if adequate records show the employee has been examined as required by 29 CFR 1910.1001, and 29 CFR 1926.1101 within the past year.
 2. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos fibers.

1.12 TRAINING

- A. As required by applicable regulations, prior to assignment to asbestos Work instruct each employee with regard to the hazards of asbestos, safety and health precautions, and the use and requirements of protective clothing and equipment.
- B. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.1101. Provide respirator training and fit testing.

1.13 RESPIRATORY PROTECTION

- A. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).
- B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.
- C. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators (PAPR) are the minimum allowable respiratory protection permitted to be utilized during gross removal operations of OSHA Class I or OSHA Class II friable ACM.
- D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.
- E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.1101.
- F. A storage area for respirators shall be provided by the Contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.
- G. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.
- H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day.
- I. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.
- J. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.14 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
 - 1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - 2. Protect materials from unintended contamination and theft.
 - 3. Storage areas shall be kept clean and organized.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.15 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos Work Areas.

- B. Provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
 - 1. Where available, obtain from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - 3. Provide wiring and receptacles as required by the Environmental Consultant for air sampling equipment.
 - 4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.
 - 1. The entire Work Area shall be kept illuminated at all times.
 - 2. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.
- D. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.
- E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 PRODUCTS

2.01 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.
- C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

2.02 SIGNS AND LABELS

- A. Provide warning signs and barrier tapes at all approaches to asbestos Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.
 - 1. Provide danger signs in vertical format conforming to 29 CFR 1926.1101, minimum 20" x 14" displaying the following legend.

DANGER
ASBESTOS CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

2. Provide 3" wide yellow barrier tape printed with black lettered, "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos Work Area. Install tape 3' to 4' AFF.
- B. Provide asbestos danger labels affixed to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.
 1. Provide asbestos danger labels of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
 2. Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport asbestos contaminated material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172: (Note: Include "RQ" for friable asbestos waste only.)

RQ, NA2212, (WASTE) ASBESTOS, 9, PGIII
 3. Generator identification information shall be affixed to each waste container or any packaging used to containerize asbestos waste indicating the following printed in indelible ink:

Generator Name
Facility Name
Facility Address

2.03 DAILY PROJECT LOG

- A. Provide a Daily Project Log. The log shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department and all other New York State Department of Labor requirements.
- B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.
- C. All persons entering and exiting the Work Area shall sign the log and include name, social security number, and time.
- D. The Project Supervisor shall document all Work performed daily and note all inspections required by Code Rule 56, i.e. testing and inspection of barriers and enclosures.

2.04 SCAFFOLDING AND LADDERS

- A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.
- B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SURFACTANT (AMENDED WATER)

- A. Wet all asbestos-containing materials prior to removal with surfactant mixed and applied in accordance with manufacturer's printed instructions.

2.06 ENCAPSULANT

- A. Encapsulant shall be tinted or pigmented so that application when dry is readily discernible.

- B. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

2.07 WASTE DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall also be imprinted with U.S. Department of Transportation required markings.
- B. Provide 30 or 55 gallon capacity fiber, plastic, or metal drums capable of being sealed air and water tight if asbestos waste has the potential to damage or puncture disposal bags. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Containers and bags must be labeled accordance with 40 CFR Part 61 NESHAPS and Code Rule 56. When the bags/containers are moved to the lockable hardtop dumpster from the waste decontamination system washroom, the bags must also be appropriately labeled with the date they are moved on the bag/container in waterproof markings.
- D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.08 HEPA VACUUM EQUIPMENT

- A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

2.09 POWER TOOLS

- A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

2.10 POLYETHYLENE SHEETING

- A. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.
- B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire retardant plastic sheeting. At least 2 layers of 6 mil reinforced fire retardant plastic sheeting shall be used for the flooring.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Should visible emissions or water leaks be observed outside the Work Area, immediately stop Work and institute emergency procedures per Code Rule 56. Should there be elevated fiber levels outside the Work Area, immediately stop Work, institute emergency procedures per Code Rule 56, and notify all employers and occupants in adjacent areas. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. NYS DOL Asbestos Handler certification cards shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.
- C. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:
 - 1. Contractor license issued by New York State Department of Labor.
 - 2. NYS DOL Asbestos Handler certification cards for each person employed in the removal, handling, or disturbance of asbestos.
 - 3. Daily OSHA personal air monitoring results.
 - 4. NYS Department of Health ELAP certification for the laboratory that will be analyzing the OSHA personnel air samples.

5. NYS Department of Environmental Conservation Waste Transporter Permit.
 6. Project documents (specifications and drawings.)
 7. Notifications, Variances, Asbestos Work Permit, Work Place Safety Plan, ACP15, ACP20/21. Ensure that the most up-to-date notifications and Variances are on-site.
 8. Applicable regulations.
 9. Material Safety Data Sheets of supplies/chemicals used on the Project.
 10. Approved Abatement Work Plan.
 11. List of emergency telephone numbers.
 12. Magnahelic manometer semi-annual calibration certification.
 13. Waste Disposal Log.
 14. Daily Project Log.
- D. The Work Area must be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation.
- E. All demolition necessary to access asbestos containing materials for removal must be conducted within negative pressure enclosures by licensed asbestos handlers. Demolition debris may be disposed of as construction and demolition debris provided the Abatement Project Monitor determines that it is not contaminated with asbestos and there has been no disturbance of ACM within the enclosure. If the demolition debris is determined to be contaminated or ACM has been disturbed, it must be disposed of as asbestos waste.

3.02 PERSONNEL DECONTAMINATION ENCLOSURE

- A. Provide personnel decontamination enclosure contiguous to the Work Area or as per Variance. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. Access to the Work Area will be from the clean room through an air-lock to the shower and through an air lock to the equipment room. Each airlock shall be a minimum of three feet from door to door. Additional air locks shall be provided as required by Code Rule 56 for remote decontamination enclosures.
- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil polyethylene sheeting. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
- D. The entrance to the clean room shall have a lockable door. Provide suitable lockers for storage of Worker's street clothes. Storage for respirators along with replacement filters and disposable towels shall also be provided.
- E. Provide a temporary shower with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be one shower for every six Workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.
- F. Shower water shall be drained, collected and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- G. The equipment room shall be used for the storage of tools and equipment. A walk-off pan filled with water shall be located in the Work Area outside the equipment room for Workers to clean foot coverings when leaving the Work Area. A labeled 6 mil plastic ACM waste bag for collection of contaminated clothing shall be located in this room.

- H. The personal decontamination enclosure shall be cleaned and disinfected minimally at the end of each Work shift and as otherwise directed by the Asbestos Project Monitor.

3.03 WASTE DECONTAMINATION ENCLOSURE

- A. Provide a waste decontamination enclosure contiguous to the Work area. The decontamination enclosure shall be attached to the Work Area and not located within it unless isolation barriers are installed. If the decontamination chamber is accessible to the public it shall be fully framed, sheathed, and lockable to prevent unauthorized entry.
- B. The waste decontamination enclosure system shall consist of a holding area, air lock and washroom. The airlock shall be a minimum of three feet from door to door. The entrance to the holding area shall have a lockable door.
- C. The decontamination enclosure ceiling and walls shall be covered with one layer of opaque 6 mil polyethylene sheeting on walls and ceiling. Two layers of reinforced polyethylene sheeting shall be used to cover the floor.
- D. Where there is only one egress from the Work Area, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste wash room.
- E. The waste wash room water shall be drained, collected, and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be discharged in accordance with applicable codes and the contaminated filters disposed of as asbestos waste.
- F. In small asbestos Projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Access to and from the asbestos Work Area is permitted only through the personnel decontamination enclosure unless otherwise stipulated in a Site Specific Variance.
- B. Workers shall sign the entry/exit log upon every entry and exit.
- C. The following procedures shall be followed when entering the Work Area:
 - 1. Before entering the Work Area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
 - 2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area.
- D. The following procedures shall be followed when exiting the Work Area:
 - 1. Before leaving the Work Area, gross asbestos contamination will be removed by brushing, wet cleaning and/or HEPA vacuuming.
 - 2. In the equipment room, Workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room.
 - 3. Workers shall shower thoroughly while wearing respirators, then wash respirator with soap and water prior to removal.
 - 4. Upon exiting the shower, Workers shall enter the clean room and don new disposable clothing if the Work shift is to continue or street clothes to exit area. Under no circumstances shall Workers enter public non-Work Areas in disposable protective clothing.

- E. If remote decontamination enclosures are permitted by Code Rule 56 or a Site Specific Variance, workers shall wear two disposable suits for all phases of Work. Workers exiting the work area shall HEPA vacuum the outer suit, enter the airlock, remove the outer suit and then place it back into the Work Area. A clean second suit shall be donned before exiting the airlock and proceeding to the decontamination enclosure or another work area via the designated pathway required by Code Rule 56.

3.05 WORK AREA PREPARATION

- A. Asbestos danger signs shall be posted at all approaches to the asbestos Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with asbestos caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the asbestos Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.
- B. Shut down and lock out the building heating, ventilating, and air conditioning systems. Electrical systems and circuits shall also be shut down unless permitted to remain active per Code Rule 56 and appropriately protected and labeled. Existing lighting sources shall not be utilized. Provide temporary electric power and lighting as specified herein.
- C. All non-ACM surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited. ACM shall not be disturbed during pre-cleaning.
- D. Movable objects within the Work Area shall be HEPA vacuumed and/or wet-wiped and removed from the Work Area.
- E. All non-movable equipment in the Work Area shall be completely covered with 2 layers of polyethylene sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive.
- F. Provide enclosure of the asbestos Work Area necessary to isolate it from unsealed areas of the building in accordance with the approved asbestos Work plan and as specified herein.
- G. Provide critical barriers by sealing off all openings including but not limited to windows, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations of the Work Area enclosure, using 2 layers of at least 6 mil polyethylene sheeting.
- H. Provide isolation barriers by installing temporary framing and sheathing at openings larger than 32 square feet forming the limits of the asbestos Work Area. Sheathing thickness must be a minimum of 3/8 inch and all sheathing shall be caulked and the Work Area side sealed with two layers of 6 mil polyethylene sheeting.
- I. Isolation barriers shall be installed at all elevator openings in the Work Area. Elevators running through the regulated abatement work area shall be shut down or isolated as per Code Rule 56. Elevator controls shall be modified so that elevators bypass the Work Area
- J. Provide two layers of 6 mil polyethylene sheeting over all floor, wall, and ceiling surfaces. Isolation barriers shall also be covered with two layers (for a total of four layers). Sheeting shall be secured with spray adhesive and then sealed with duct tape. All joints in polyethylene sheeting shall overlap 12" minimum. Carpeting left in place shall be covered with 3/8 inch plywood sheathing prior to plasticizing.
- K. Unless otherwise specified for removal, the Contractor shall either protect all fiberglass insulation on piping, ductwork, tanks, etc. in the Work Area using two layers of six mil polyethylene or remove the insulation as asbestos containing waste. If the Contractor elects to remove the fiberglass insulation, he shall be responsible for reinsulation if reinsulation of removed ACM is part of the Contract or Project.

- L. Frame out emergency exits. Provide double layer 6 mil polyethylene sheeting and tape seal opening. Post as emergency exits only. Within the Work Area, mark the locations and directions of emergency exits throughout the Work Area using exit signs and/or duct tape.
- M. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to their removal from the Work Area and before the start of asbestos removal operations.
- N. Suspended ceiling tiles shall only be removed after Work Area preparation is complete. If possible, non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work Area before asbestos removals begin. Contaminated ceiling tiles shall be disposed of as asbestos waste.

3.06 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 in. of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hour in the Work Area during abatement and 6 air changes for non-friable flooring and/or mastic removal .
- B. Such filtration systems must be made operational after critical and isolation barriers are installed but before wall, floor, and ceilings are plasticized and shall be operated 24 hours per day during the entire Project until the final cleanup is completed and satisfactory results of the final air samples are received from the laboratory.
- C. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours of operation.
- D. A minimum of one additional filtration unit of at least the same capacity as the primary unit(s) shall be installed and fully functional to be used during primary unit (s) filter changing and in case of primary failure.
- E. At no time will the unit exhaust indoors, within 15 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the building. Exhaust ducting shall not exceed 25' in length. Provide construction fencing at ground level exhaust termination locations per Code Rule 56.
- F. Upon electric power failure or shut-down of any filtration unit, all abatement activities shall stop immediately and only resume after power is restored and all filtration units are fully operating. For shut-downs longer than one hour, all openings into the Work Area, including the decontamination enclosures, shall be sealed.
- G. The Contractor shall provide a manometer to verify negative air pressure. Manometers shall be read twice daily and recorded within the Daily Project Log.
- H. There shall be at least a 4 hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers.
- I. Once installed and operational, the Contractor's Supervisor shall conduct daily inspections of the Work Area to insure the airtight integrity of the enclosure and operation of the negative air system. Findings shall be recorded within the Daily Project Log. Inspections shall also be conducted on days when no abatement activities are in progress per Code Rule 56 (i.e. weekends).

3.07 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Asbestos-containing materials shall be removed in accordance with the Contract Documents and the approved Asbestos Work Plan. Only one type of ACM shall be abated at a time within a Work Area.

Where there are multiple types of ACM requiring abatement, Code Rule 56 procedures for sequential abatement shall be followed.

- B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.
- C. One Worker shall continuously apply amended water while ACM is being removed.
- D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.
- E. Upon removal of ACM from the substrate, the newly exposed surfaces shall be HEPA vacuumed and/or wet cleaned. Surfaces must be thoroughly cleaned using necessary methods and any required solvents to completely remove any adhesive, mastic, etc.
- F. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Cleanup of accumulations of loose debris or waste shall be performed whenever there is enough accumulation to fill a single bag or container and minimally at the end of each workshift.
- G. Large components shall be wrapped in two layers of 6 mil polyethylene sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.
- H. Power or pressure washers are not permitted for asbestos removal or clean-up procedures unless approved in a Site Specific Variance.
- I. All open ends of pipe and duct insulation not scheduled for removal shall be encapsulated using lag cloth.
- J. All construction and demolition debris determined by the Environmental Consultant to be contaminated with asbestos shall be handled and disposed of as asbestos waste.
- K. The use of metal shovels, metal dust pans, etc. are not permitted inside the work area.

3.08 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

- A. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the Work Area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. The persons in the Work Area shall not enter the airlock. No gross removal operations are permitted when waste transfer is in progress.
- B. The containers and equipment shall be removed from the airlock by persons stationed in the washroom during waste removal operations. The external surfaces of containers and equipment shall be cleaned a second time by wet cleaning.
- C. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated 6 mil plastic bags or sheeting, as the item's physical characteristics demand, and sealed airtight.
- D. The clean recontainerized items shall be moved into the airlock that leads to the holding area. Workers in the washroom shall not enter this airlock.
- E. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from the holding area.

- F. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- G. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- H. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

3.09 WORK AREA DECONTAMINATION, CLEANING, AND CLEARANCE PROCEDURES

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed unless modified by a Site Specific Variance.
- B. First Cleaning:
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and may either be decontaminated prior to removal from the Work Area or disposed of as asbestos waste.
 - 3. The Abatement Project Monitor (APM) shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
 - 4. The Contractor shall then apply a thin coat of encapsulant to all surfaces in the Work Area that were not the subject of removal. In no event shall encapsulant be applied to any surface that was the subject of removal prior to obtaining satisfactory air monitoring results. Encapsulants shall be pigmented or tinted to provide an indication for completeness of coverage. The APM shall determine adequacy of coverage.
 - 5. After the encapsulant has been applied and the required waiting/settling/drying time has elapsed, the first layer of polyethylene sheeting shall then be removed and bagged as asbestos waste.
- C. Second Cleaning
 - 1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned.
 - 2. The APM shall conduct a second visual inspection of the Work Area for cleanliness.
 - 3. After the required waiting/settling/drying time has elapsed, the second layer of polyethylene sheeting shall be removed and bagged as asbestos waste.
- D. Third Cleaning
 - 1. All surfaces in the Work Area shall be HEPA vacuumed and then wet cleaned.
 - 2. The APM shall conduct a third visual inspection of the Work Area for cleanliness.
 - 3. After the required waiting/settling/drying time has elapsed, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant provided no visible asbestos debris/residue; pools of liquid, or condensation remains. NOTE: TEM samples should be used vs. PCM if demolition or other dust-generating evolutions are taking place in adjacent areas, as evident from excessive loading.
 - 4. Upon receipt of satisfactory final clearance air sampling results, the negative air pressure equipment can then be shut down and the isolation and critical barriers removed and bagged as asbestos waste. Following this, the decontamination enclosures shall be removed.
- E. After isolation and critical barriers are removed, the APM and Contractor's Supervisor shall inspect the Work Area for cleanliness. If necessary, additional cleaning shall be performed by the Contractor as directed by the APM.
- F. As a result of any visual inspection by the APM or should air sampling results indicate high fiber levels, the Contractor will reclean the affected areas at no additional expense to the Owner.

3.10 TENT ENCLOSURES

- A. Tent enclosures may only be used where specifically permitted by Code Rule 56 or a Site Specific Variance issued by the NYS Department of Labor.
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as required by Project size. For tent enclosures with gross abatement of friable materials, a contiguous decontamination system shall be constructed, maintained and utilized, except for minor size tent enclosure work areas where a remote decontamination enclosure is permitted by Code Rule 56.
- D. The Work Area shall be precleaned. All objects and equipment that will remain in the restricted area during abatement shall be sealed with two layers of six mil polyethylene and tape.
- E. The tent shall be a single use barrier constructed with a rigid frame and at least two layers of six mil polyethylene unless one layer of six mil polyethylene is otherwise permitted by Code Rule 56. Tents with twenty (20) square feet or less of floor space or no gross removal of friable ACM shall be constructed of one (1) layer of six mil polyethylene and shall include walls, ceilings and a floor (except portions of walls, floors and ceilings that are the removal surface) with double folded seams. All seams shall be sealed airtight using duct tape and/or spray adhesive.
- F. The tent shall be constructed with at least one airlock for worker/waste egress.
- G. A monometer shall be used for all OSHA Class I abatement.
- H. Negative air shall be maintained at four (4) air changes per hour for non-friable and glovebag abatement tent enclosure work areas. Eight (8) air changes shall be maintained for friable gross removal tent enclosure work areas. In a Minor size abatement tent enclosure work area a HEPA vacuum may be used to maintain the required air changes.
- I. OSHA compliance air monitoring is required per section 1.09.
- J. ACM removal shall follow procedures defined in section 3.07.
- K. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed and shall then be placed in a second bag/container before being transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts. These carts shall be held in the holding area until transfer to the waste container. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
- L. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
 - 1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
 - 2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
 - 3. The Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
 - 4. After the waiting/settling and drying time requirements have elapsed, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
 - 5. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable disposal bags, and transported to the waste decontamination enclosure. Isolation and critical barriers shall then be removed and bagged as asbestos waste.

3.11 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes damaged by asbestos abatement activities including, but not limited to, plaster/paint damage due to duct tape, staples, and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored prior to final payment.
 - 1. Finishes unable to be restored shall be replaced under this Contract at the Contractor's expense.
 - 2. All foam and expandable foam products and materials used to seal Work Area openings shall be completely removed upon completion of abatement activities.
- C. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction shall be firestopped using materials and systems tested in accordance with ASTM E814 on Projects where reinsulation is part of the required work.

PART 4 DISPOSAL OF ASBESTOS WASTE

- A. All asbestos waste shall be stored, transported and disposed of in accordance with the following regulations as a minimum:
 - 1. 12 NYCRR Part 56-10
 - 2. US EPA NESHAPS 40 CFR 61
 - 3. US EPA Asbestos Waste Management Guidance EPA/530-SW85

4.01 TRANSPORTATION AND DISPOSAL SITE

- A. The Contractor's Hauler and Disposal Site shall be approved by the Owner.
- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.
- C. All waste generated as part of the asbestos project shall be removed from the site within ten (10) calendar days after successful completion of all asbestos abatement work.
- D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Asbestos Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.
- E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Asbestos Waste Manifests.
- F. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfer of the waste or allow the waste to be transported or combined with any other off-site waste material. The Hauler must travel directly to the disposal site as identified on the notifications with no unauthorized stops.

4.02 WASTE STORAGE CONTAINERS

- A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.). No open containers will be permitted on-site (i.e. open dumpster with canvas cover, etc.) unless specifically permitted by applicable regulation or a Site Specific Variance

- B. The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.
- C. The container shall be plasticized and sealed with two (2) layers of 6 mil polyethylene. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.
- D. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
- E. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of the container.
- F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.

4.03 OWNER'S AND HAULER'S ASBESTOS WASTE MANIFESTS

- A. Asbestos waste shipment records shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.
- B. The Manifests shall have the appropriate signatures of the Environmental Consultant, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
- D. Copies of the completed Manifest shall be retained by the Environmental Consultant and the Contractor and shall remain on site for inspection.
- E. Upon arrival at the Disposal Site, the Manifest shall be signed by the Disposal Facility operator to certify receipt of ACM covered by the manifest.
- F. The Disposal Facility operator shall return the original Manifest to the Owner.
- G. The Contractor shall forward fully executed copies of the Manifest to the Environmental Consultant within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.
- H. The Contractor shall create and utilize a Waste Disposal Log to track the disposal of all project generated waste. This log shall be maintained by the Project Supervisor and shall be kept on site at all times.
- I. All waste disposal manifests and disposal logs shall be submitted by the Contractor to the Environmental Consultant with the final close-out documentation.

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, anchor rod and anchorage device

installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Vapor retarders.
 - 8. Semirigid joint filler.
 - 9. Repair materials.
- B. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.

- F. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

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

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C 330/C 330M, 3/4-inch nominal maximum aggregate size.

E. Air-Entraining Admixture: ASTM C 260/C 260M.

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

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

G. Water: ASTM C 94/C 94M and potable.

2.5 WATERSTOPS

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

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Barrier-Bac; Inteplast Group, Ltd.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Sika Greenstreak.

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Barrier-Bac; Inteplast Group, Ltd.
 - b. Raven Industries, Inc.
 - c. Reef Industries, Inc.

2.7 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Anti-Hydro International, Inc.
 - b. BASF Corp. - Construction Chemicals.
 - c. Euclid Chemical Company (The); an RPM company.
 - d. W.R. Meadows, Inc.

2.8 RELATED MATERIALS

- A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
- B. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- C. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Slag Cement: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 - 5. Silica Fume: 10 percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
 2. Slump Limit: 4 inches (100 mm) plus or minus 1 inch (25 mm).
 3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
- B. Foundation Walls: Normal-weight concrete.
1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
 2. Maximum W/C Ratio: 0.50.
 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
- C. Slabs-on-Grade: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 2. Maximum W/C Ratio: 0.45.
 3. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
 4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

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

2.13 CONCRETE MIXING

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

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.

- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

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

3.4 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least Insert depth of concrete thickness as follows:
 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.7 WATERSTOP INSTALLATION

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where exposed to view:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching

adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 4000 psi at 28 days.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

- b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

3.13 JOINT FILLING

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

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching

- mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.16 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
1. Elevation: 1/4 inch (6 mm).
 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 3. Surface: Gap below 10-foot- (3-m-) long, unlevel straightedge not to exceed 1/4 inch (6 mm).

4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge:
Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

END OF SECTION 033000

SECTION 03 54 13

GYPSUM CEMENT UNDERLAYMENT

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the cement leveling compound as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Gypsum cement underlayment, as indicated on drawings.
 - 2. Acoustical mat and reinforcement.

1.3 RELATED SECTIONS

- A. Cast-in-Place Concrete - Section 03 30 00.
- B. Tile - Section 09 30 13.
- C. Resilient Tile Flooring - Section 09 65 19.
- D. Carpet Tile - Section 09 68 13.

1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in performing the work of this Section with a minimum of 3 years' experience and approved by the manufacturer of the product used.

1.5 SUBMITTALS

- A. Submit catalog information and product data for material to be used.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.7 MOCK-UP

- A. Construct a mock-up of topping material, 8 feet long by 8 feet wide.
- B. Locate where directed by the Architect.
- C. Approved mock-up may remain as part of the Work.

1.8 JOB REQUIREMENTS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F. 24 hours before, during, and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture and until underlayment is dry, allow a minimum of seven (7) daysdays.

PART 2 PRODUCTS

2.1 PRODUCTS

- A. Basis of Design: "Gyp-Crete 2000" by Maxxon Corporation (800-356-7887); or approved equal.
- B. Sound Deadening Mat: "Acousti-Mat 1/4" as manufactured by the Maxxon Corporation.
- C. Reinforcement: Maxxon Crack Suppression Mat (CSM).

2.2 MATERIALS

- A. Gypsum Cement: Gypsum cement product as manufactured by listed manufacturers.
- B. Sand Aggregate: Sand shall be 1/8" or less, washed masonry or plaster sand as recommended by underlayment manufacturer.
- C. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- D. Water: Potable and at a temperature of not more than 70 degrees F.
- E. Floor Primer and Sealer: Products of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

2.3 MIXES

- A. Mix proportions and methods shall be in strict accordance with product manufacturer's recommendations.
- B. Compressive strength of 2500 psi. Do not over-water.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of underlayment including substrate moisture content. Begin underlayment application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions for substrate indicated. Provide clean, dry, neutral-pH substrate and location within the building for underlayment application.
 - 1. Subfloor shall be structurally sound, clean, and free of mud, oil, grease, or other contaminants.
- B. Leak Prevention: Fill cracks and voids with a quick setting patching or caulking material where leakage of gypsum cement underlayment could occur.
- C. Priming Subfloor: Prime the subfloor using manufacturer's recommended floor primer. Priming instructions may vary according to the type of substrate; multiple coats may be necessary.
- D. Expansion Joints: Allow joints to continue through the underlayment at the same width.

3.3 APPLICATION OF ACOUSTICAL MAT

- A. Install sound attenuation mat and perimeter isolation strip as recommended by the manufacturer.
- B. Installation of Reinforcement: Install crack suppression mat, reinforcement, or metal lath as recommended by the manufacturer.

3.4 APPLICATION OF GYPSUM CEMENT FLOORING

- A. Scheduling: Application of gypsum cement underlayment shall not begin until the building is enclosed, including roof, windows, doors and other fenestration. Install after drywall installation, unless tenant finish requirements identify partitioning after the pour.
- B. Application: Apply in accordance with manufacturer's instructions. Place underlayment at 1" minimum over subfloor. Spread and screed to a smooth surface. Except at authorized joints, place underlayment as continuously as possible until application is complete so that no gypsum cement slurry is placed against underlayment product that has obtained its initial set.
- C. Curing: General Contractor shall provide continuous ventilation and adequate heat to rapidly remove moisture from the area until the underlayment is dry. Contractor shall provide mechanical ventilation if necessary. This Contractor shall test for dryness in the presence of the Owner's Representative utilizing the procedure as recommended by the underlayment manufacturer.

- D. Preparation for Installation of Glue Down Floor Goods: Seal all areas that receive glue according to the underlayment manufacturer's specifications. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering to be used. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.

3.5 FIELD QUALITY CONTROL

- A. Slump Test: Gypsum cement mix shall be tested for slump as it's being pumped using a 2" x 4" cylinder for compliance with manufacturer's written recommendations.
- B. Field Samples: At least one set of 3 molded cube samples shall be taken from each day's pour during the application. Cubes shall be tested as recommended by the underlayment manufacturer in accordance with ASTM C 472 using split brass molds. Test results shall be available to Owner's Representative and Contractor from applicator upon request.

3.6 PROTECTION

- A. During construction, contractor shall place temporary wood planking over underlayment wherever it will be subjected to heavy wheeled or concentrated loads.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the unit masonry work as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Concrete unit masonry construction.
 - 2. Metal joint reinforcing, anchors, and related accessories for masonry.

1.3 RELATED SECTIONS

- A. Firestops and Smoke seals - Section 07 84 13.
- B. Joint Sealers - Section 07 92 00.

1.4 SUBMITTALS

- A. Shop Drawings: Submit drawings showing anchoring details.
- B. Samples (Submit the following):
 - 1. Joint reinforcing, each type, width and proposed location (labeled).
 - 2. Anchors, each type, width and proposed location (labeled).
 - 3. Joint filler, each type.
- C. Manufacturer's Literature: Submit technical and installation information for:
 - 1. Mortar materials, each material and mortar type.
 - 2. Certification of mortar mix.
 - 3. Concrete block, joint reinforcing, anchors and joint filler; submit manufacturer's technical and descriptive literature.
 - 4. Block manufacturer shall submit certifications of compliance with ASTM C 90, C 331 and UL 618 prior to any job site delivery. Field sample of concrete block may

be tested by an Independent Testing Laboratory retained by the Owner according to the requirements of ASTM C 140.

1.5 QUALITY ASSURANCE

- A. Work of this Section shall conform to the requirements of the following:
 - 1. 2016 "Building Code Requirements for Masonry Structures," (TMS 402/602-16).
 - 2. 2016 "Specification for Masonry Structures," (TMS 602-16).
- B. Work of this Section shall conform to all applicable requirements of the New York State Building Code.

1.6 PRODUCT HANDLING

- A. General: Deliver, store, handle and protect all materials from damage, moisture, dirt and intrusion of foreign matter. Store all masonry units and mortar materials on raised platforms and under ventilated and waterproof cover. Store packaged materials in manufacturer's unopened containers, marked with manufacturer's name and product brand name. Immediately reseal containers after partial use. Remove and replace damaged materials.
- B. Masonry Units: Pack, deliver and store to prevent breakage, cracking, chipping, spalling or other damage. Store, protect and ventilate units at project site.
- C. Aggregate: Store with provisions for good drainage.
- D. Reinforcement and Anchors: Store and protect so that when placed, joint reinforcement and anchors will be free of soil, dirt, ice, loose rust, scale, or other coatings which would destroy or reduce bond with mortar and will not be disfigured or bent out of shape.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Standard Concrete Block
 - 1. Portland cement, ASTM C 150, Type 1, low alkali (less than 0.6%), single source for entire project.
 - 2. Aggregates, ASTM C 331, lightweight expanded shale, clay or slate aggregates, manufactured by the rotary kiln process equal to "Solite," "Norlite," or "Haydite."
 - 3. Concrete Masonry Units: Load-bearing lightweight aggregate concrete masonry units conforming to the requirements of ASTM C 90, Type 1.
 - a. Block for rated walls shall be 75% solid units.
 - 4. The producer of the concrete masonry units shall furnish certification from an independent testing laboratory confirming that all 8" or larger masonry units meet

all of the UL 618 requirements for two (2) hours or better (as required), referencing full scale fire test reports (ASTM E 119).

5. Sizes and Shapes: Nominal face size 8" x 16" by thickness as indicated on drawings, with stretcher units, jamb units, header units, lintel units and other special shapes and sizes required to complete the work.
6. Surfaces shall be free from deleterious materials that would corrode metal.
7. Curing: All concrete block shall be steam cured, and air dried for not less than thirty (30) days before delivery.
8. Density of concrete block shall not exceed 105 lbs. per cubic foot.
9. Shrinkage: Shrinkage of concrete blocks shall not exceed 0.065% when tested in accordance with ASTM C 426, "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units."
10. Water Content
 - a. At the time of delivery to the job site, concrete masonry units shall have a value, in weight of contained water, of not more than thirty (30) percent of the fully saturated content for the unit tested.
 - b. Ship all units from the factory, and store at the job site, with all necessary protection to prevent increase of water content from rain and other sources.

B. Joint Reinforcing for Masonry Walls

1. For block walls forming part of exterior wall construction, provide super heavy duty reinforcing fabricated of 3/16" dia. side and cross rods, truss or ladder design, ties, spaced every block course. Provide prefabricated pieces at corners and intersections of walls or partitions.
 - a. Reinforcing assembly shall be hot dip galvanized steel finish conforming to ASTM A 153 with zinc coating of 1.5 oz. of zinc per sq. ft., after fabrication.
2. Masonry Joint Reinforcement for Interior Single-Wythe Masonry: Provide standard reinforcing fabricated of 9 ga. side and cross rods, truss or ladder design, no ties, spaced every other block course. Provide prefabricated pieces at corners and intersections of walls or partitions. Reinforcing shall be mill galvanized conforming to ASTM A 641, Class B-1, applied after fabrication. Wire shall be cold drawn steel wire conforming to ASTM A 82.
3. Approved Joint Reinforcing Manufacturers
 - a. Hohmann & Barnard
 - b. Heckmann Building Products
 - c. National Wire Products Industries, Inc.

C. Anchors

1. Wire Mesh: Galvanized sixteen (16) gauge steel wire, 1/4" square mesh, width 1/2" less than wall thickness, by length to suit condition.
2. For anchoring CMU interior partitions to underside of steel beams, provide hot dip galvanized steel tube anchors equal to No. 419 and No. 421 made by Heckmann Building Products, No. PTA-420 made by Hohmann & Barnard, or approved equal.
3. For anchoring CMU interior partitions to underside of structural deck, provide 4" x 4" x 1/4" galvanized steel angles (ASTM A 36), 3'-0" long spaced 3'-0" o.c. alternately on each side of partition. Anchor partition securely to structural deck.

D. Reinforcing Bars and Rods: ASTM A 615, Grade 60. See Drawings for size.

E. Neoprene Joint Filler: Provide closed cell neoprene, Type NN-1, conforming to ASTM D 1056, Grade 1, high performance, as manufactured by Williams Products Inc., or equal made by D. S. Brown, Norton, or approved equal.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type 1, standard color, one source.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate for Mortar: Clean, washed, buff colored sand, graded per ASTM C 144.

D. Aggregate for Grout: ASTM C 404.

E. Water: Clean, fresh and suitable for drinking.

2.3 MORTAR MIX

A. Reinforced Concrete Block: Provide Portland cement/lime mortar conforming to ASTM C 270, Type S.

B. Mortar for Cement Cants: One (1) part Portland cement and four (4) parts sand, by volume.

C. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of unit masonry. Use grout of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Grout shall have a minimum compressive strength of 3000 psi when tested in accordance with ASTM C 1019.

D. Mixing

1. General: Add cement just before mixing and mix dry. Use sufficient amount of water as necessary to produce workable mix. Mix in small batches to make plastic mass.
2. Mixing: Machine mix all mortars in approved type mixer with device to accurately and uniformly control water. Add hydrated lime dry. Mix dry materials not less than two (2) minutes. Add water, then mix not less than three (3) minutes, not to

exceed five (5) minutes. Mix only amount of mortar that can be used before initial set. Do not use mortar which has reached its initial set or two (2) hours after initial mixing, whichever comes earlier. Mortar may not be re-tempered. Clean mixer for each batch, whenever mortar type is changed, and at end of each day's work.

3. Acceleration or other admixtures not permitted.
4. Mortar shall have a flow after suction of not less than seventy-five (75) percent of that immediately after mixing as determined by ASTM C 91.

E. Admixtures

1. No air-entraining admixtures or cementitious materials containing air-entraining admixtures shall be used in the mortar.
2. No antifreeze compounds or other substances shall be used in the mortar to lower the freezing point.
3. Calcium chloride or admixtures containing calcium chloride shall not be used in mortar.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that masonry may be completed in accordance with all pertinent codes and regulations, the referenced standards, and the original design.

- B. Discrepancies: In the event of discrepancy, immediately notify the Architect in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved. Starting of work by the Contractor means acceptance by the Contractor of the substrate.

3.2 COORDINATION

- A. Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.3 INSTALLATION

A. General

1. Do not wet concrete block units.
2. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown.

3. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths. Avoid the use of less than half size units at corners, jambs and wherever possible.
 4. Lay up walls plumb and true with courses level, accurately spaced and coordinated with other work.
- B. Pattern Bond: Lay concealed concrete block with all units in a wythe bonded by lapping not less than two (2) inches. Bond and interlock each course of each wythe at corners. Do not use units of less than four (4) inches horizontal face dimensions at corners or jambs.
- C. Mortar Bedding and Jointing
1. Lay concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on exterior walls and in all courses of piers, columns and pilasters, where solid CMU is used and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.
 2. Lay masonry walls with 3/8" joints unless otherwise shown on drawings.
 3. Concealed joints shall be struck flush.
 4. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- D. Built-In Work
1. As the work progresses, build in items specified under this and other Sections of these specifications. Fill in solidly with masonry around built-in items.
 2. Mortar in door frames, access doors, louvers and other metal items embedded or built into masonry work solidly with mortar as the masonry units are laid up.
 3. Grout under lintels, bearing plates, and steel bearing on masonry with solid bed grout.
 4. Sleeves, pipes, ducts and all other items which pass through masonry walls shall be caulked with interior grade sealant meeting requirements of Section 07 92 00, so as to be air tight and prevent air leakage. Refer to Section 07 84 13 for packing of voids in rated masonry walls.
 5. Fill vertical cells of masonry units solid with grout which have anchoring, reinforcing rods, supporting or hanging devices embedded in the cell, including stone anchors and window or curtain wall anchors.
 6. Fill vertical cells of masonry units solid with mortar on each side of door frames to sixteen (16) inches beyond.

7. Unless otherwise noted, fill vertical cells of masonry units solid with grout which are below steel bearing plates, steel beams, and ends of lintels, to eight (8) inches beyond bearing and from floor to bearing.
8. Place wire mesh in horizontal joint below masonry unit cells to be filled with mortar, to prevent mortar from dropping into unfilled cells below.
9. Masonry indicated as being reinforced shall have all voids filled solid with grout. Grout shall be consolidated in place by vibration or other methods which insure complete filling of cells. When the least clear dimension of the grouted cell is less than two (2) inches, the maximum height of grout pour shall not exceed twelve (12) inches. When the least clear dimension is two (2) inches or more, maximum height of grout pour shall not exceed forty-eight (48) inches. When grouting is stopped for one (1) hour or longer, the grout pour shall be stopped 1-1/2" below the top of a masonry unit. Vertical bar reinforcing shall be accurately placed and held in position while being grouted, and shall be in place before grouting starts. All such reinforcing shall have a minimum clear cover of 5/8". Lap all bars a minimum of forty (40) bar diameters and provide steel spacer ties (not to exceed 192 bar diameter) to secure and position all vertical steel and prevent displacement during grouting. Provide continuous horizontal reinforcement embedded in mortar joints every second course.

E. Cutting and Patching

1. All exposed masonry which requires cutting or fitting shall be cut accurately to size with motorized carborundum or diamond saw, producing cut edges.
2. All masonry which requires patching in exposed work, if approved by Architect, shall be patched neatly with mortar to match appearance of masonry as closely as possible and to the Architect's satisfaction. Rake back joints and use pointing mortar to match as required.

F. Solid Wall Construction

1. Fill the vertical longitudinal joint between wythes solidly with mortar by parging the in-place wythe and shoving units into the parging.
2. Tie wythes with continuous horizontal reinforcement embedded in mortar joints sixteen (16) inches o.c. vertically.

G. Interior Block Partitions

1. At fire rated partitions, fill void with fire stop material meeting the requirements of Section 07 84 13. Fasten to structure at top of partition using steel angles as specified herein.
2. Provide continuous horizontal joint reinforcing every other block course, except as otherwise noted. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8". Lap reinforcement a minimum of six (6) inches at ends of units.

3. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
4. Corners
 - a. Provide interlocking masonry unit bond in each course at corners.
 - b. Provide continuity at corners with prefabricated "L" reinforcement units, in addition to masonry bonding.
- H. Cants: Provide specified mortar for cement cants at beams and other projections in elevator shafts, where adjoining wall is of masonry construction. Cants shall slope twenty (20) degrees from the horizontal.
- I. Ties and Anchors for Masonry Construction
 1. Provide horizontal reinforcing at every course.
 2. Anchoring Masonry to Structure: Provide an open space not less than 1/2" in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.
- J. Lintels: For concrete block walls, use specially formed U-shaped concrete block lintel units with reinforcing bars in accordance with the following table, filled with grout.

Number and Size of Reinforcing Bars Required at Concrete Block Lintels		
Maximum Clearance Span	Wall Width	Rebar No. - Size
2'-0" to 6'-0" 6'-0" to 8'-0"	6"	2 - #3 2 - #4
2'-0" to 6'-0" 6'-0" to 8'-0"	8"	2 - #3 2 - #4
2'-0" to 6'-0" 6'-0" to 8'-0"	12"	3 - #3 3 - #4

1. U-shaped concrete block lintels shall extend a minimum of 8" at each side of opening.
- K. Pointing: Point any defective joint with mortar identical with that specified for that joint.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other steel items not defined as structural steel.
 - 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for surface-preparation and priming requirements.

1.3 COORDINATION

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment Drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs).
- D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shop primers.
 5. Nonshrink grout.
- E. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
- B. Moment Connections: Type FR, fully restrained.

2.2 STRUCTURAL-STEEL MATERIALS

- A. All Shapes: As indicated on drawings.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. All bolts and anchors: As indicated on drawings.

2.4 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Fabricate beams with rolling camber up.
 - 2. Mark and match-mark materials for field assembly.
 - 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted as indicated on drawing notes.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened, use Slip Critical bolts at bolted moment connections.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 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 construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards indicated on drawing notes.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels shelf angles and all other steel exposed to weather.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, provide Slip critical bolts at bolted moment connections.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 05 40 00

COLD FORMED METAL FRAMING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the cold formed metal framing as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. "C" shaped steel studs for exterior non-load bearing wall frame construction.
 - 2. "C" shaped steel joists.
 - 3. Anchors and accessories.
 - 4. Gypsum sheathing.
 - 5. Field inspection.

1.3 RELATED SECTIONS

- A. Structural Steel - Section 05 12 00.
- B. Thermal Insulation - Section 07 21 00.
- C. Vapor permeable air barrier - Section 07 27 00.
- D. Fiber-Cement Siding - Section 07 46 46.
- E. Interior steel stud construction - Section 09 29 00.

1.4 QUALITY ASSURANCE

- A. Component Design: Compute structural properties of studs in accordance with AISI "North American Specification for the Design of Cold Formed Steel Structural Members."
- B. Fire-Rated Assemblies: Where framing units are indicated to be components of fire-resistance rated assemblies, provide cold formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction. Products used in the assembly shall carry a classification label from an approved testing and inspection agency.

C. Qualifications

1. Manufacturer's Qualifications: Minimum five years' experience in producing products of the type specified.
2. Installer's Qualifications: Minimum three years' experience in installation of the type of product specified.
3. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M "Structural Welding Code - Steel" and AWS DL3 "Structural Welding Code – Sheet Steel."

D. Pre-Installation Meeting

1. Convene meeting at project site within one week of scheduled start of installation with representatives of the following in attendance: Owner, Architect, General Contractor, and metal framing subcontractor.
2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
3. Keep minutes of meeting, including responsibilities of various parties and deviations from specifications and installation instructions. Distribute minutes to attendees within 72 hours.

E. Comply with the following standards:

1. American Iron and Steel Institute (AISI):
 - a. "North American Specification for the Design of Cold-Formed Steel Structural Members," latest edition.
 - b. "Standard for Cold-Formed Steel Framing General Provisions."
2. American Welding Society (AWS):
 - a. Structural Welding Code (D1.1).
 - b. Specifications for Welding Sheet Steel in Structures (E1.3).
3. ASTM:
 - a. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - c. ASTM A 924 - Standard Requirements for Sheet Steel, Metallic-Coated by the Hot-Dipped Process.
 - d. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

- e. ASTM A 1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Non-Metallic-Coated for Cold-Formed Framing Members.
 - f. ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
 - g. ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- F. Vertical and Lateral Fire Propagation Test Characteristics: The exterior wall assembly is required to comply with NFPA 285 "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components." The base wall, stud cavity insulation, wall sheathing, air barrier, continuous wall rigid insulation and exterior cladding are components that are required to be to be evaluated as part of this specific assembly test. The basis of design product listed herein is a component of the design test assembly selected by the Architect.

1.5 SUBMITTALS

- A. Product Data: For information only, submit copies of manufacturer's product information and installation instructions for each item of cold-formed framing and accessories.
- B. Shop Drawings
 - 1. Submit shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data. Include placing drawings for framing members showing size and gauge designations, number, type, location and spacing. Indicate supplemental bracing, splices, window and door headers accessories and details as may be required for proper installation.
 - 2. If the Contractor elects to prefabricate framing members into panels for erection, he shall submit shop drawings of such panels at suitable scale showing all dimensions, components, and methods of fastening and support.
- C. For fasteners, submit product data sheet and samples.
- D. Engineering Data
 - 1. Submit Engineering Data drawings to the Architect for review. The Contractor is responsible for the structural design and supports for the cold-formed metal frame and must show his proposed system and how the Performance Criteria noted below is accommodated on these drawings.
 - 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.
- E. Quality Assurance Submittals: Submit the following:
 - 1. Qualifications: Proof of manufacturer, installer, and welder qualifications.

2. Structural design calculations.
3. Certificates
 - a. Submit mill certificates signed by framing member/accessory manufacturer certifying compliance with material requirements.
 - b. Welder certificates.
4. Manufacturer's installation instructions for framing members and framing accessories.

1.6 PERFORMANCE CRITERIA

- A. Cold-formed metal framing system shall be designed, fabricated, and installed to withstand a 30 psf suction and pressure load (or greater if required by Code) with a maximum deflection of $L/720$ with stone masonry veneer.
- B. Design system to accommodate vertical deflection of structural building frame, live loading, seasonal and day/night temperature ranges and construction tolerances.
- C. Comply with New York State Building Code requirements for seismic connections and loads.

1.7 PRODUCT DELIVERY AND STORAGE

- A. Protect metal framing units from rusting and damage. Deliver to one project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off the ground in a dry ventilated space or protect with suitable waterproof coverings. Conform to storage and handling requirements of AISI "Code of Standard Practice."

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Provide cold-formed steel framing manufactured by Marino/Ware, Dale/Incor, Superior Steel Studs, ClarkDietrich Building Systems, Super Stud Building Products, or approved equal.

2.2 METAL FRAMING, GENERAL

- A. System Components: With each type of metal framing required, provide manufacturer's standard steel runners, (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners and accessories, as recommended by manufacturer for the applications indicated, as needed to provide a complete metal framing system.

2.3 MATERIALS

- A. Steel Sheet for Studs and Tracks: ASTM A 1003 Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 1. Grade: As required by structural performance.

2. Coating: G90 galvanized coating.

B. Steel Sheet for Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.

2. Coating G90 galvanized coating.

2.4 FRAMING MEMBERS

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges; thickness and grade as required by structural performance.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths compatible with studs, un-punched, with un-stiffened flanges; thickness and grade as required by structural performance.

2.5 FRAMING ACCESSORIES

A. Stamp manufacturer's name on each accessory item.

B. Provide screws with accessories designated for screw attachment.

C. Connector Devices

1. Vertical Deflection Clips: "VertiClip," including step bushings, as manufactured by The Steel Network Inc. (919) 845-1025 or approved equal. Rigid attachments to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement. 68 mils minimum thickness, size as required by structural design calculations.

2. Rigid Clip Angles: "StiffClip" as manufactured by The Steel Network Inc., or approved equal, size as required by structural design calculations. Rigid attachment to structure and stud web.

D. Bridging

1. Cold Rolled Channel: 1-1/2" by 1/2" by 56 mil thick.

a. Bridging Clip: "BridgeClip" as manufactured by The Steel Network Inc. or approved equal. Provide attachment through stud punch-out clamping onto stud web and wrapping around bridging channel. Provide holes for screw attachment to stud web and channel.

2. Flat Strap: Width and thickness as required by structural design calculations. Rigid attachment to stud flange.

3. Solid Bridging: Channel shaped bridging with lipped flanges and integral formed clips. Screw attachment to stud. 33 mils minimum thickness, size as required by structural design calculations.

4. Bridging and accessories shall be hot dip zinc coated per ASTM A 153.

- E. Header for Window and Door Openings: Provide "ProX Header" system made by Brady Innovations LLC or approved equal complete with all accessories including clips and accessories; finish and gauge to match studs.

2.6 FASTENERS

- A. Screws: Corrosion resistant coated, self-drilling, pan or hex washer head. Provide screw type and size as required by structural design calculations.
- B. Anchor Bolts and Studs: ASTM A 307, Grade A, carbon steel, with hex-head carbon steel nuts and flat steel washers. Hot-dip zinc coated in accordance with ASTM A 153. Provide bolt or stud type and size as required by structural design calculations.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

2.7 GALVANIZING TOUCH-UP

- A. For touching up damaged galvanized surfaces after erection, provide "Silver Galv" made by Z.R.C. Worldwide. Apply to a dry film thickness of 1.5 to 3.0 mils.

2.8 SHEATHING AND RELATED ACCESSORIES

- A. Gypsum Sheathing: 5/8" thick "Dens-Glass Fireguard," Type X, made by Georgia Pacific, "Securock Glass-Mat Sheathing" made by U.S. Gypsum Co., "Gold Bond EXP Extended Exposure Sheathing" made by National Gypsum Co., "Weather Defense" made by Lafarge/Continental, or approved equal, meeting ASTM C 1177, Type X.
1. Fasteners: 1-1/4" Type S-12 screws "Climaseal" finish.
 2. Joint Treatment: Provide a one-part high performance sealant conforming to ASTM C 920, Type S, Grade NS, Class 25 meeting with the approval of the air/vapor barrier manufacturer for compatibility; see Section 07 27 00 for description. Apply a 3/8" bead of sealant to the joint and trowel flat. Apply enough of the same material to each fastener to cover completely when trowelled flat.

2.9 FABRICATION

- A. Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion in any members in the assembly.

- B. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting or screw fasteners, as standard with manufacturer.
- C. Wire tying of framing components is not permitted.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where cold-formed metal framing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION, GENERAL

- A. Methods of construction shall be piece by piece.
- B. Connections shall be accomplished with self-drilling screws or welding so that the connection meets or exceeds the design loads required at that connection.
- C. Studs shall be installed seated squarely (within 1/16") against the web portion of the top and bottom tracks. Tracks shall rest on a continuous, uniform bearing surface.
- D. Cutting of steel framing members may be accomplished with a saw or shear. Torch cutting of loaded members is not permitted. Cutting of loaded members is not permitted unless under supervision of the project architect or engineer.
- E. Temporary bracing shall be provided and left in place until work is permanently stabilized.
- F. Bridging shall be of size and type shown on the approved shop drawings and as called for in the engineering calculations.
- G. Install headers in all openings that are larger than the stud spacing in that wall. Form headers as shown on the drawings.
- H. Insulation meeting the requirements of Section 07 21 00 shall be placed in all jamb and header type conditions that will be inaccessible after their installation into the wall.
- I. Provide jack studs to support each end of headers. These studs shall be securely connected to the header and must seat squarely in the lower track of the wall and be properly attached to it.
- J. If, by design, a header is low in the wall, the less than full-height studs (cripples) that occur over the header shall be designed to carry all imposed loads.
- K. Wall track shall not be used support any load unless specifically designed for that purpose.

- L. All axially loaded members shall be aligned vertically, to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections or alternate provisions for load transfer may be made.
- M. Holes that are field cut into steel framing members shall be within the limitation of the product and its design. Provide reinforcement where holes are cut through load bearing members in accordance with manufacturer's recommendations and as approved by the Architect or Engineer.
- N. Touch up all steel bared by welding using touch-up coating specified herein.
- O. Studs shall be spaced to suit the design requirements and limitations of collateral facing materials.
- P. Care should be taken to allow for additional studs at intersections, corners, doors, windows, control joints, etc., and as called for in the shop drawings or design calculations.
- Q. 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 or loading resulting from item supported.
- R. Provide for structure movement, expansion shall be allowed where indicated and necessary by design or code requirements.
- S. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.
- T. Install horizontal bridging in stud system, spaced (vertical distance) at not more than 48 inches on center. Fasten at each intersection.
- U. Splicing of axially loaded members or floor joists shall not be permitted.
- V. Wire tying of members is not permitted.

3.3 INSTALLATION OF GYPSUM SHEATHING

- A. Fasten sheathing to exterior of each stud with specified fasteners spaced 3/8" from ends and edges and approx. 8" o.c. at each stud. Install fasteners in accordance with manufacturer's recommendations using 2500-RPM maximum screw gun. Sheathing board shall be installed horizontally. Apply sealant between joints and trowel flush; and apply sealant around sheathing perimeter and at interface with other materials. Cover fastener heads with sealant and trowel flush.
- B. Refer to Section 07 27 00 for vapor permeable air barrier description.

END OF SECTION

SECTION 05 50 00

MISCELLANEOUS METALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the miscellaneous metal work as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Rough hardware.
 - 2. Vertical steel ladders.
 - 3. Ladder safety cages.
 - 4. Steel pipe handrails and railings not part of steel pan stair assemblies.
 - 5. Light steel framing and supports not included as part of work of other trades.
 - 6. Steel gratings and frames.
 - 7. Structural steel support for operable partitions.
 - 8. Cast thresholds.
 - 9. Elevator divider beams, guide rail beams and elevator pit hold down beams.
 - 10. Steel dunnage beams.
 - 11. Furnishing stair nosings for interior concrete stairs.
 - 12. Miscellaneous steel trim and channels.
 - 13. Countertop supports.
 - 14. Masonry support steel.
 - 15. Sleeves in concrete walls and slabs.
 - 16. Steel framing, bracing, supports, anchors, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this Section.

17. Prime painting, touch-up painting, galvanizing and separation of dissimilar metals for work of this Section.
18. Cutting, fitting, drilling and tapping work of this Section to accommodate work of other Sections and of concrete, masonry or other materials as required for attaching and installing work of this Section.

1.3 RELATED SECTIONS

- A. Steel Pan Stairs - Section 05 51 13.
- B. Painting and Finishing- Section 09 90 00.

1.4 QUALITY ASSURANCE

- 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.
- B. Shop Assembly: Pre-assemble 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 re-assembly and coordinated installation.
- C. Reference Standards: The work is subject to requirements of applicable portions of the following standards:
 1. "Manual of Steel Construction," American Institute of Steel Construction.
 2. AWS D1-1 "Structural Welding Code," American Welding Society.
 3. SSPC SP-3 "Surface Preparation Specification No. 3, Power Tool Cleaning," Steel Structures Painting Council.
 4. SSPC PA-1 "Painting Application Specification," Steel Structures Painting Council.
 5. "Handbook on Bolt, Nut and Rivet Standards," Industrial Fasteners Institute.
- D. Steel Materials: For steel to be hot dip-galvanized, provide steel chemically suitable for metal coatings complying with the following requirements: carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
- E. Engage the services of a galvanizer who has demonstrated a minimum of five (5) years' experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coatings within the same facility as outlined herein. The Architect has the right to inspect and approve or reject the galvanizer/galvanizing facility.
- F. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation. The

galvanizer/galvanizing facility must have an on-premise testing facility capable of measuring the chemical and metallurgical composition of the galvanizing bath and pickling tanks.

- G. Inspection and testing of hot-dip galvanized coating shall be done under the guidelines provided in the American Hot-Dip Galvanizers Association (AGA) publication "Inspection of Products Hot-Dip Galvanized After Fabrication."

1.5 PERFORMANCE STANDARDS

- A. Railings shall be designed to resist loads per the 2010 New York State Building Code.

1.6 SUBMITTALS

- A. Manufacturer's Literature: Submit manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.
- B. Shop Drawings: Shop drawings for the fabrication and erection of all assemblies of miscellaneous iron work which are not completely shown by manufacturer's data sheets. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items.
- C. Engineering Data
 - 1. Before any ladders or railings are fabricated, submit engineering data drawings to the Architect for review indicating how performance standards specified here shall be met. The Contractor is responsible for the structural design and supports for these systems and must show his proposed systems on these drawings.
 - 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.
- D. Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous). Auxiliary views shall be shown to clarify all welding. Notes such as 1/4" weld, weld and tack weld are not acceptable.
- E. Certification: For items to be hot-dip galvanized, identify each item galvanized and to show compliance of application. The Certificate shall be signed by the galvanizer and shall contain a detailed description of the material processed and the ASTM standard used for the coating and, the weight of the coating. In addition, and as attachment to Certification, submit reports of testing and inspections indicating compliance with the provisions of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metals

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
2. Steel Plates, Shapes and Bars: ASTM A 36.
3. Steel Bar Grating: ASTM A 1011 or ASTM A 36.
4. Steel Tubing: Cold formed, ASTM A 500; or hot rolled, ASTM A 501.
5. Structural Steel Sheet: Hot rolled, ASTM A 570; or cold rolled, ASTM A 611, Class 1; of grade required for design loading.
6. Galvanized Structural Steel Sheet: ASTM A 924, of grade required for design loading. Coating designation G90.
7. Steel Pipe: ASTM A 53, type and grade as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.
8. Gray Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
9. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.
10. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
11. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

- B. Grout: Non-shrink, non-metallic grout conforming to the requirements of Section 03 30 00.

C. Fasteners

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
3. Anchor Bolts: ASTM F 1554, Grade 36.
4. Lag Bolts: ASME B18.2.1.

5. Machine Screws: ASME B18.6.3.
6. Plain Washers: Round, carbon steel, ASME B18.22.1.
7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
8. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
9. Lock Washers: Helical spring type carbon steel, ASME B18.21.1.
- D. Shop Paint: Shop prime all non-galvanized miscellaneous metal items using Series 88 Azeron Primer made by Tnemec, ICI Devoe "Rust Guard" quick dry alkyd shop coat No. 41403, or "Interlac 393" by International Protection Coatings.
 1. If steel is to receive high performance coating as noted in Section 09 90 00, shop prime using primer noted in Section 09 90 00.
- E. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D 1187.
- F. Galvanizing Repair Coating: For touching up galvanized surfaces after erection, provide repair coating that is V.O.C. compliant, equal to "Silver Galv" made by Z.R.C. Worldwide or approved equal. Apply to a dry film thickness of 1.5 to 3.0 mils.

2.2 PRIME PAINTING

- A. Scope: All ferrous metal (except galvanized steel) shall be cleaned and shop painted with one coat of specified ferrous metal primer. No shop prime paint required on galvanized steel or aluminum work.
- B. Cleaning: Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning" for cleaning of ferrous metals which are to receive shop prime coat.
 1. Steel to get high performance coating as noted in Section 09 90 00 shall be cleaned as per SSPC SP.6 "Commercial Blast Cleaning."
- C. Application
 1. Apply shop prime coat immediately after cleaning metal. Apply paint in dry weather or under cover. Metal surfaces shall be free from frost or moisture when painted. Paint all metal surfaces including edges, joints, holes, corners, etc.
 2. Paint surfaces which will be concealed after shop assembly prior to such assembly. Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.
 3. Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness. No work shall be shipped until the shop prime coat thereon has dried.

- D. Touch-Up: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.
- E. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 GALVANIZING

- A. Scope: All ferrous metal exposed to the weather, and all ferrous metals indicated on drawings or in specifications to be galvanized, shall be cleaned and then hot-dipped galvanized after fabrication as provided by Duncan Galvanizing or approved equal.
- B. Avoid fabrication techniques that could cause distortion or embrittlement of steel items to be hot-dip galvanized. Fabricator shall consult with hot-dip galvanizer regarding potential warpage problems or handling problems during the galvanizing process that may require adjustment of fabrication techniques or design before finalizing shop drawings and beginning of fabrication.
- C. Cleaning: Thoroughly clean metal surfaces of all mill scale, rust, dirt, grease, oil, moisture and other contaminants prior to galvanizing.
- D. Application: Hot-dip galvanizing shall conform to the following:
 - 1. ASTM A 143: Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel.
 - 2. ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A 153: Galvanized Coating on Iron and Steel Hardware - Table 1.
 - 4. ASTM A 384: Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
 - 5. ASTM A 385: Practice for Providing High Quality Zinc Coatings.
 - 6. ASTM A 924: Galvanized Coating on Steel Sheets.
 - 7. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.
- E. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
- F. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the weight of the coating, and the appropriate ASTM number.
- G. To minimize surface imperfection (eg: flux inclusions), material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride (pre-flux) immediately prior to

galvanizing. The type of galvanizing process utilizing a flux blanket overlaying the molten zinc will not be permitted.

- H. After galvanizing all materials not exposed to view must be chromated by dipping material in a 0.2% chromic acid solution.
- I. Galvanized surfaces, where exposed to view, must have a smooth, level surface finish. Where this does not occur, piece shall be rejected and replaced to the acceptance of the Architect.

2.4 PROTECTIVE COATINGS

- A. Whenever dissimilar metals will be in contact, separate contact surfaces by coating each contact surface prior to assembly or installation with one coat of specified bituminous paint, which shall be in addition to the specified shop prime paint. Mask off those surfaces not required to receive protective coating.

2.5 WORKMANSHIP

A. General

- 1. Miscellaneous metal work shall be fabricated by an experienced fabricator or manufacturer and installed by an experienced tradesman.
- 2. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
- 3. All work shall be accurately and neatly fabricated, assembled and erected.

- B. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the miscellaneous metal subcontractor to assure himself that the shop-fabricated miscellaneous metal items will properly fit the field condition. In the event that shop-fabricated miscellaneous metal items do not fit the field condition, the item shall be returned to the shop for correction.

- C. Cutting: Cut metal by sawing, shearing, or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp and free of burrs, without deforming adjacent surfaces or metals.

- D. Holes: Drill or cleanly punch holes; do not burn.

- E. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to weather. Locate joints where least conspicuous. Unless indicated otherwise, weld or bolt shop connections; bolt or screw field connections. Provide expansion and contraction joints to allow for thermal movement of metal at locations and by methods approved by Architect.

1. Welding
 - a. Shall be in accordance with AWS D1.1 Structural Welding Code of the American Welding Society, and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.
 - b. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
 - c. All welds on or behind surfaces which will be exposed to view shall be done so as to prevent distortion of finished surface. Remove weld spatter and welding oxides from all welded surfaces.
2. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.
- F. Operating Mechanism: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
- G. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this Section of the Specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
- H. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- I. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
- J. Exposed Work
 1. In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs, and other defects which mar appearance of finished work.
 2. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.
 3. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.

- K. Preparation for Hot-Dip Galvanizing: Fabricator shall correctly prepare assemblies for galvanizing in consultation with galvanizer and in accordance with applicable Reference Standards and applicable AGA publications for the "Design of Products to be Hot-Dip galvanized After Fabrication." Preparation shall include but not be limited to the following:

1. Remove welding flux.
2. Drill appropriate vent holes and provide for drainage in inconspicuous locations of hollow sections and semi-enclosed elements. After galvanizing, plug vent holes with shaped lead and grind smooth.

2.6 MISCELLANEOUS METALS ITEMS

A. Rough Hardware

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

- B. Ladders: Vertical steel ladders shall be eighteen (18) inches wide with 3/4" diameter non-slip steel rungs spaced twelve (12) inches o.c. Stringers shall be 3/8" thick by 2-1/2" wide steel bars; rungs welded to bars. Attach ladders to walls six (6) inches from top and bottom and maximum thirty-six (36) inches o.c. from these points. At the roof, gooseneck the rails back to the structure to provide secure ladder access.

1. Ladders shall be fabricated to support a live load of one hundred (100) lbs. per square foot and a concentrated load of three hundred (300) lbs. per rung; loads not to act simultaneously.

- C. Ladder Safety Cages: Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners. Provide cage above 3'-0" to underside of slab.

1. Provide primary hoops at tops and bottoms of cages and spaced not more than 20'-0" o.c. Provide secondary intermediate hoops spaced not more than 48" o.c. between primary hoops.
2. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless-steel fasteners, unless otherwise indicated.
3. Primary Hoops: 1/4" by 4" flat bar hoops.
4. Secondary Intermediate Hoops: 1/4" by 2" flat bar hoops.
5. Vertical Bars: 3/16" by 1-1/2" flat bars secured to each hoop.

6. Galvanize exterior ladder cages and interior ladder cages, where indicated, including fasteners.
- D. Steel Pipe Handrails: Provide Schedule 40 steel pipe of size shown on Drawings. Fittings shall be flush type, malleable or cast iron. Brackets shall be malleable iron, design as selected by the Architect.
1. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded and ground smooth and flush, except where field connections and expansion joints are required. Field connections may be welded, internal sleeve and plug weld, or internal sleeve and set screw.
 2. Secure handrails to walls with wall brackets. Provide brackets of malleable iron castings, with not more than three (3) inches clearance from inside face of handrail to wall surface. Neatly drill wall plate portion of the bracket into concrete or masonry to receive bolts for concealed anchorage. For installation at drywall, Drywall trades shall provide plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.
 3. Provide wall return fittings of cast iron, flush type, with the same projection as that specified for wall brackets.
 4. Longitudinal members shall be parallel with each other and with floor surface or shape of stair to a tolerance of 1/8" in 10'-0" linear feet. Center line of members within each run of railing shall be in the plane.
 5. For steel pipe posts where indicated, anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized steel pipe, not less than six (6) inches long and having an inside diameter not less than 1/2" greater than outside diameter of the inserted pipe. Provide steel plate closure secure to bottom of sleeve and of width and length not less than one (1) inch greater than outside diameter of sleeve. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-ferrous grout. Cover anchorage joint with a round steel flange welded to post. Posts shall be set plumb within 1/8" vertical tolerance.
 6. Steel pipe handrails shall be capable of resisting a two hundred (200) lb. force applied to rail from any direction and a uniformly distributed load of fifty (50) lbs. per linear foot applied downward or horizontally, loads not to act simultaneously.
- E. Miscellaneous Light Steel Framing
1. Light steel framing, bracing, supports, framing, clip angles, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings and details or as required to suit the condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and all other connecting and adjoining work.

2. All light steel framing steel shall be furnished and erected in accordance with the applicable requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction and as specified herein.
- F. Steel Gratings and Frames: Provide hot dipped galvanized steel gratings complying with FS RR-G-661 with rectangular cross bars welded to bearing bars. Bars to have plain wearing surface.
1. Manufacturer: Provide gratings manufactured by Reliance, Borden, Irving Subway Grating, or approved equal.
 2. Hinged Section: Provide hinged sections in areaway gratings where required by the drawings. Each hinged section up to 4'-0" wide shall be provided with two (2) five knuckle, fast pin, regular weight, plain bearing, wrought bronze butt hinges. Each hinged section over 4'-0" wide shall be provided with three (3) butt hinges. Hinged sections shall have provisions for padlocking on the underside.
 3. Furnish grating frames, with corners mitered, welded and ground smooth, and with welded-on straps for secure anchorage into concrete. Frames and anchors to be galvanized.
 4. Structural Performance: Provide gratings capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections:
 - a. Floors: Capable of withstanding a uniform load of 250 lbf/sq. ft. or a concentrated load of 3000 lbf, whichever produces the greater stress.
 - b. Walkways and Elevated Platforms Other Than Exits: Capable of withstanding a uniform load of 60 lbf/sq. ft. Limit deflection to L/360 or 1/4", whichever is less.
 - c. Walkways and Elevated Platforms Used as Exits: Capable of withstanding a uniform of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress. Limit deflection to L/360 or 1/4", whichever is less.
 - d. Sidewalks and Vehicular Driveways: Capable of withstanding a uniform load of 250 lbf/sq. ft. or a concentrated load of 8000 lbf, whichever produces the greater stress.
- G. Structural Steel Door Frames
1. Fabricate steel door frames of structural shapes and bars, fully welded, uniform, square and true. Plug weld built-up members, continuously weld exposed joints; grind exposed welds smooth. Provide 5/8" x 1-1/2" steel bar stops. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than ten (10) inches o.c.
 2. Provide necessary reinforcements and drill and tap as required for finish hardware.
 3. Provide steel strap anchors for securing door frames into adjoining concrete or masonry, using 1/8" x 2" straps of the length required for a minimum eight (8) inch

embedment. Weld anchors to frame jambs no more than twelve (12) inches from both bottom and head of frame and space anchors not more than thirty (30) inches apart.

4. Extend bottom of frames to floor elevation and secure to concrete with steel angle clips welded to frames, anchored with expansion shields and bolts.

H. Cast Thresholds

1. Fabricate of sizes and configurations as shown. Provide cast iron units with integral abrasive finish. Furnish in lengths as required to accurately fit each opening or condition.
 - a. Cast units with an integral abrasive grit consisting of aluminum oxide, silicone carbide, or a combination of both.
2. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
 - a. Provide two (2) rows of holes for units over five (5) inches wide, with two (2) holes aligned at ends and staggered intermediate holes.
3. Apply black asphaltic coating to concealed bottoms, sides and edges of cast iron units set into concrete.
4. Provide a diamond surface texture.

I. Safety Nosings for Concrete Stairs

1. Provide three (3) inch wide, Style A cast iron safety nosing with hatched abrasive surface extending to end of stringers, manufactured by American Abrasive Metals Co., or equal made by Wooster Products Inc., American Mason Safety Tread Co., or approved equal.
2. Provide anchors spaced not more than four (4) inches from each end and not more than twelve (12) inches o.c. Furnish nosings to concrete trades for installation.
3. Apply asphaltic coating to surfaces in contact with concrete.

J. Miscellaneous Steel Trim: Provide shapes and sizes for profiles shown. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

K. Countertop Supports: Steel framing as indicated or required to support countertops. Conceal framing under countertops and within wall behind countertops. Provide supports to withstand a concentrated load of not less than three hundred (300) lbs. applied at any point with a deflection not to exceed L/240 for the length of the countertop.

L. Masonry Support Steel

1. Provide galvanized steel, relieving angles, plates, accessories and other steel shapes for masonry support steel; for lintels refer to Structural Drawings.
2. Fabricate masonry support steel to allow final adjustment with the closest tolerances possible. Relieving angles which require cutting to fit masonry flashing shall be straightened without deflections.
3. Coordinate masonry support system with concrete work for locations of wedge inserts.
4. Install to meet requirements of building masonry work, face brick coursing and stone placement. Coordinate final adjustments with masonry work as work progresses.

M. Sleeves in Concrete Walls and Slabs

1. Sleeves through concrete walls shall be of Schedule 40 steel pipe with i.d. two (2) inches larger than o.d. of pipe or conduit (including insulation, if any) to be accommodated. Sleeves shall project one-half (1/2) inch on each side of finished wall. Provide rectangular one-quarter (1/4) inch steel plate collar at center, continuously welded to the perimeter of the sleeve, and six (6) inches wider than the o.d.
2. Slots in slabs shall be 12 gauge steel sheet, galvanized, of dimensions indicated, with strap anchors welded in place not more than twelve (12) inches on centers.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where miscellaneous metal is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 ERECTION

- A. 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.
- B. 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 levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.

- C. Fitting Connections: 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.
- D. 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.
- E. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- F. Field Touch-Up of Galvanized Surfaces: Touch-up shop applied galvanized coatings damaged during handling and installation. Use galvanizing repair coating specified herein for galvanized surfaces.

END OF SECTION

SECTION 05 51 13

STEEL PAN STAIRS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the steel pan stairs as indicated on the drawings and specified herein, including, but not limited to, the following:
 - 1. Steel pan stairs, including all clips, hangers, inserts, braces and other supports.
 - 2. Steel pickets and wood guard and handrails for steel stairs, including supports, brackets, and anchors.

1.3 RELATED SECTIONS

- A. Miscellaneous Metals - Section 05 50 00.
- B. Installation of inserts in drywall furnished by this Section - Section 09 29 00.
- C. Resilient Base and Accessories - Section 09 65 13, for resilient stair treads.
- D. Finish painting - Section 09 90 00.

1.4 QUALITY ASSURANCE

- A. Qualification of Welders: Use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Protect adjacent surfaces when field welding to prevent damage or stain. Welders and welding operators must be qualified by tests as provided by AWS.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with:
 - 1. "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 - 2. "Code for Welding in Building Construction" of the American Welding Society.
 - 3. "Metal Stairs Manual" of the National Association of Architectural Metal Manufacturers.

- C. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards of these specifications, the provisions of the more stringent shall govern.
- D. Field Measurements: If construction process permits, take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress. Allow for trimming and fitting wherever taking field measurements before fabrication might delay work.
- E. Tolerances: Allow for construction tolerances as required.
- F. Coordination: Coordinate this work with the work of all other trades interfacing with metal pan stairs, such as structural openings, sprinklers and standpipes, and other trades as required.

1.5 DRAWING SUBMISSION

- A. General: It is the intent of the Working Drawings to display the layouts and general design parameters upon which the Shop Drawings shall be developed. Detail development and all connections shall be part of Shop Drawing Development.
- B. Shop Drawings
 - 1. Before any steel stairs are fabricated, submit shop drawings to the Architect for approval.
 - 2. Show all locations, markings, quantities, materials, sizes and shapes, and indicate all methods of connecting, anchoring, fastening, bracing, for the stair construction, support and attachment to the work of other trades.
- C. Engineering Data
 - 1. Before any metal pan stairs are fabricated, submit engineering data drawings to the Architect for review. The Contractor is responsible for the structural design and supports for the stair system and must show his proposed system on these drawings.
 - 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of stair members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.

1.6 SAMPLES SUBMISSION

- A. Submit the following listed samples and other samples as may be requested by the Architect, to show the quality standards:
 - 1. Railing bracket.
 - 2. Exposed weld.
 - 3. Exposed bolted connection.

4. Bent pipe railing.

- B. Samples shall be submitted cleaned and shop primed and shall represent standards to which all respective materials used in the Project shall meet.

1.7 PERFORMANCE STANDARDS

- A. Stairs and railings shall be constructed to conform to the following performance standards, unless greater required by Code:
1. Stairs and platforms shall support a live load of one-hundred (100) psf and a concentrated live load of three-hundred (300) lbs. and shall have a live load deflection limited to 1/360 of the span. Loads shall not apply simultaneously.
 2. Railings shall withstand a two-hundred (200) lb. force applied to rail from any direction, and a uniformly distributed load of 50 lbs./lin. ft. applied downward or horizontally, loads not to act simultaneously.

1.8 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect steel pan stair before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel: ASTM A 36.
- B. Steel Sheets: ASTM A 245, Grade C, minimum ten (10) gauge for platforms, twelve (12) gauge minimum for treads and risers.
- C. Steel Pipe: ASTM A 53, Type E., Grade A, and ASTM A 501. Use standard malleable iron fittings for steel pipe.
- D. Malleable Iron Castings: ASTM A 47, Grade 35018.
- E. Bolts and Nuts: ASTM A 307, Grade A bolts.
- F. Machine Screws: ASME B 18.6.3.
- G. Expansion Bolts: "Cinch" type, galvanized, of approved manufacture.
- H. Threaded End Hanger Rods: Minimum 3/4" diameter, ASTM A 36.
- I. Shop Paint: Shop prime all stairs and railings using Series 88 Azaron Primer made by Tnemec, ICI Devoe "Rust Guard" quick dry alkyd shop coat No. 41403, or "Interlac 393" by International Protection Coatings.

J. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187.

K. Wood Guard and Handrails: See Section 062023.

L. Concrete Fill and Reinforcing Materials

1. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi.

a. Where resilient stair treads and indicated, concrete shall have a trowel finish.

2. Welded Wire Fabric: ASTM A 185, 6 by 6 inches – W1.4 by W1.4, unless otherwise indicated.

2.2 FABRICATION

A. General

1. Steel pan stair work shall be fabricated by an experienced manufacturer in accordance with approved shop drawings and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand strains and stresses to which material will be subjected.

2. Fabricate shop assemblies in largest practical sizes to minimize field work. All exposed surfaces shall be clean and free from all dirt, stains, grease marks, scratches, waves, dents, buckles, tool marks, rattles, and other objectionable defects which mar appearance or use of finished work.

3. Cutting: Cut materials by sawing, shearing, or blanking. Flame cutting will be permitted when ground back to clean edges. Cuts shall be made accurately, clean, sharp and free of burrs, without deforming adjacent metals.

4. Connections: Make connections with tight joints, capable of developing full strength of the members, flush. Locate joints where least conspicuous. Use concealed fasteners where possible. Weld or rivet shop connections; bolt, screw or weld field connections.

a. Welding: Welds shall be continuous, except where spot welding is specifically permitted. Welding shall conform to the Standard Code of the American Welding Society. Exposed welds are required to be ground flush.

b. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts, or upset thread ends. Exposed bolts and screw head shall be flat and countersunk, unless otherwise indicated on drawings. Remove projecting ends of bolts and screws. Punch or drill holes; do not burn.

B. Stairs and Platforms

1. Provide stringers, risers, sub-treads and platforms matching profiles as shown. Form tread pan and riser in a continuous piece to receive the finished tread; tread

shall be a minimum of twelve (12) gauge. Weld risers and treads to carrier angles which shall be welded to the structural steel stringers. Fasten countersunk bolts or stud welded clips through mesh for cement fill. Provide welded-on clips for the support of gypsum drywall soffits.

2. On intermediate platforms, provide metal bases formed of stringers. Miter and weld and grind smooth internal and external corners of metal bases. Form platform runs of minimum ten (10) gauge steel.
3. Countersink bolt heads and screws on finished surfaces or cut off flush with such surfaces.
4. Properly fit and securely fasten together all parts making exposed joints close fitting. Cut, drill, punch and tap as required for installation.
5. Make joints as strong and rigid as adjoining sections. Weld continuously along entire line of contact except where spot welding is indicated.
6. Separate dissimilar metals in or adjacent to work of this Section with a coat of bituminous paint on each surface prior to installation.
7. Closure and Filler Plates: Where indicated on drawings or as required, at least twelve (12) gauge sheet steel, securely fastened to top and bottom of stringer and adjacent wall, by welding or screws.
8. Struts, Hangers, Platform Headers and Subframing
 - a. Provide supports as detailed and required, including all struts, clip angles, angles or hangers which are required and necessary for support of stair construction.
 - b. Supports shall be of size suitable for the support load, as required. Struts, angles and hangers shall be supported by and directly connected to the structural framing. Struts and hangers, with their connections, shall be concealed.
 - c. Provide other inserts, anchors and/or other subframing as may be required to complete the stair construction and properly support it on the structural framing.

C. Handrails, Railings, Posts and Brackets

1. Provide steel pipe of size shown on drawings, Schedule 40. Use heavier weight pipes and/or reinforce pipes internally as required to meet performance standards given in paragraph 1.7 herein. Fittings shall be flush type, malleable or cast iron. Wall brackets shall be steel design as detailed.
2. Handrail, post and railing spacing shall meet Code requirements.
3. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded, except where expansion joints are required. Field connections shall be welded for continuity. All exposed welds shall be ground smooth and flush.

- a. If elbows are not available for angles shown, bends shall maintain full diameter of pipe, use mandrel, no kinks, ripples, flats are acceptable.
4. Fabricate newel or steel tubing with wall thickness of 0.120" and provide gray iron casting newel caps.
5. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.
6. Secure handrails to walls with wall brackets. Provide brackets as shown on drawings. For installation in drywall, furnish Drywall Section steel plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.
7. Anchor rail ends into adjacent walls with steel flanges welded to rail ends and anchored into the wall construction as described above.

2.3 SHOP PAINTING

- A. Scope: All ferrous metal shall be cleaned and shop painted with one coat of specified ferrous metal primer.
- B. Cleaning: Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning" for cleaning of ferrous metals which are to receive shop prime coat.
- C. Application
 1. Apply shop prime coat immediately after cleaning metal. Apply paint in dry weather or under cover. Metal surfaces shall be free from frost or moisture when painted. Paint all metal surfaces including edges, joints, holes, corners, etc.
 2. Paint surfaces which will be concealed after shop assembly prior to such assembly. Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.
 3. Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness. No work shall be shipped until the shop prime coat thereon has dried.
- D. Touch-Up: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.
- E. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where steel pan stairs are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Work in the field shall comply with the same requirements as specified for shop work above.
- B. Except where otherwise shown or specified for a particular item of work or for built-in work, fasten metal work to solid masonry with expansion bolts. Fastenings to wood plugs in masonry will not be accepted. Drill holes to the exact diameter of the bolts using a rotary drill for concrete and a percussion drill for other masonry. Thread screws full length to the head of the screw.
- C. Provide connecting members needed for properly securing the work to masonry, drywall and structural framing, including bolts, machine screws, rods, hangers, inserts, sleeves, plates, anchors, expansion bolts, washers and other items as required. Furnish built-in items to drywall trades as required for proper anchorage.
- D. Leave work exposed to view, including stair soffits, clean, smooth and neatly finished. All exposed welds shall be dressed smooth.
- E. Include supplementary parts necessary to complete each item even though such work is not definitively shown or specified.
- F. Coordinate and schedule the work of this Section with the work of other trades. Furnish anchors, sockets, fastenings and other miscellaneous items to be embedded in concrete or masonry or required for securing metal work to other construction so as not to delay job progress.
- G. Attach wall railings to the wall construction, using appropriate bolts and anchors to meet performance standards.
- H. Install work plumb and true to the exact lines and levels, in the correct location and in proper relation to adjoining work.
- I. Touch up marred and abraded shop paint of exposed surfaces after erection in the field.
- J. Posts shall be set plumb within 1/8" vertical tolerance. Longitudinal members shall be parallel with each other and with floor surface or slope of stair to a tolerance of 1/8" in ten (10) linear feet. Center lines of members within each run of railing shall lie in the same vertical plane. Field joints of connecting sections shall be hairline.

3.3 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop coat, and paint exposed areas with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

SECTION 05 70 00

ORNAMENTAL METALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the ornamental metals, including heavy gauge stainless steel and non-ferrous metal products which are used in building construction for functional, architectural, and decorative effects, and which are not a part of other metal systems specified in other Sections. The extent of these items is indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Stainless steel ornamental railings and handrails.
 - 2. Stainless steel shelving, custom shelving unit in display case.

1.3 RELATED SECTIONS

- A. Miscellaneous Metals - Section 05 50 00.
- B. Elevator entrances - Division 14.

1.4 QUALITY ASSURANCE

- A. General: Work of this Section shall be fabricated and installed by an experienced fabricator or manufacturer who has been engaged in work of equivalent scope and fabrication standards for at least five (5) years. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings, specifications, and approved shop drawings, and be of highest quality practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected. All work shall be accurately and neatly fabricated, assembled, and erected.
- B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay the work.
- C. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Work that cannot be permanently shop assembled, shall be completely assembled, marked and disassembled in shop before shipment to insure proper

assembly in field. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the Contractor for this work to ensure that the shop fabricated items will properly fit the field condition. In the event that shop fabricated items do not fit the field condition, the item shall be returned to the shop for correction.

1.5 SUBMITTALS

- A. Shop Drawings: Submit for all items of work of this Section, as enumerated under paragraph 1.2, showing locations, layouts, materials, thicknesses, finishes, dimensions, construction, relation to adjoining construction, erection details, profiles, jointing and all other details to fully illustrate the work of this Section.
- B. Samples: Submit fabricated samples (of sufficient size to fully show construction, materials and finishes) of all items of work as enumerated under paragraph 1.2 herein.
- C. Product Data: Submit manufacturer's, fabricator's and finisher's specifications and installation instructions for products used in ornamental metal work, including finishing materials and methods.
- D. Samples for Verification: For each type of exposed finish required, prepared on 12" x 12" samples of metal of same thickness and material indicated for the Work.
- E. Contractor Licensed Engineer Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments and necessary clearances.

1.6 COORDINATION

- A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors, that are to be embedded in concrete to masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim and joint sealants, are protected against damage from the effects of weather, age, corrosion and other causes.

1.7 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.8 PERFORMANCE STANDARDS FOR RAILINGS (UNLESS GREATER REQUIRED BY CODE)

- A. Railing assemblies shall be designed and installed to resist the simultaneous application of a lateral force of 50 PLF and a vertical load of 100 PLF, both applied to the top of the railing. Railings shall resist a total lateral force and total vertical load of at least 200 lbs. each.
- B. Submit calculations and drawings signed and sealed by a Professional Engineer licensed in the State of New York indicating that railing system can meet these performance criteria.

PART 2 PRODUCTS

2.1 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. Surfaces exposed to view that exhibit pitting, seam marks, roller marks, oil-canning, stains, discolorations, or other imperfections on the finished units will not be acceptable.
- B. Stainless Steel: Comply with the following standards for the forms and types of stainless steel for the required items of work.
 - 1. Tubing: ASTM A 554, Grade MT 304.
 - 2. Pipe: ASTM A 312, Grade TP 304.
 - 3. Castings: ASTM A 743, Grade CF 8 or CF 20.
 - 4. Sheet, Strip, Flat Bar and Plate: ASTM A 666, Type 304.
 - 5. Bars and Shapes: ASTM A 276, Type 304.
- C. Steel (Carbon) for Concealed Supports Only
 - 1. Structural Shapes: ASTM A 36.
 - 2. Plates (for forming or bending cold): ASTM A 283, Grade C.
 - 3. Steel Sheets: ASTM A 366, Grade 1.
 - 4. Shop prime with rust inhibitive primer equal to Series 88 Azerox made by Tnemec or approved equal made by Benjamin Moore or Sherwin Williams.
- D. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
- E. Fasteners: Furnish basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Provide Phillips flat-head screws for exposed fasteners, unless otherwise indicated.

- F. Anchors and Inserts: Either furnish inserts to be set in concrete or masonry work, or provide other anchoring devices as required for the installation of ornamental metal items. Provide toothed steel or lead shield expansion bolt devices for drilled-in-place anchors. Provide galvanized or cadmium-coated anchors and inserts for exterior installations.
 - 1. Provide units with exposed surfaces matching the texture and finish of the metal item anchored.
- G. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).
- H. Cast-in-Place and Preinstalled Anchors: Anchors fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete.
- I. Sealants, Interior: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.
 - 1. Sealants shall have a VOC content of not more than 250 g/l when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- J. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items
 - 1. Use filler metals that will match the color of metal being joined and will not cause discoloration.

2.2 FABRICATION

- A. Cutting: Cut metal by sawing, shearing or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp, square and free of burrs, without deforming adjacent surfaces or metals.
- B. Holes: Drill or cleanly punch holes (do not burn), so that holes will be accurate, clean, neat and sharp without deforming adjacent surfaces or metals.
- C. Connections
 - 1. Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to water. Locate joints where indicated on drawings. Provide connections to allow for thermal movement of metal at locations and by methods approved by Architect. For work exposed to view, use concealed fasteners (unless welded or other connections indicated) with joints accurately fitted, flush and rigidly secured with hairline contacts. All edges within public reach shall be eased.
 - 2. Welding: Welding shall be in accordance with recommendations of the American Welding Society and shall be done with electrodes and/or methods recommended by the manufacturers of the metals being welded. Welds shall be continuous,

except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces so that joint will not be visible; undercut metal edges where welds are required to be ground flush and dressed smooth. All welds on or behind surfaces which will be exposed to view shall be done so that finished surface will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld splatter and welding oxides from all welded surfaces.

3. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads, where shown to be exposed to view, shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts of adjacent metal.
- D. Operating Mechanism: Operating devices, mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
- E. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items for architectural metal work to be built into concrete, masonry, or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
- F. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- G. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
- H. Exposed Work: In addition to requirements specified herein or shown on drawings, all surfaces exposed to view shall be clean, and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs and other defects which mar appearance of finished work. Ornamental metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.
- I. Materials used shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.
- J. Bending: Bend sheet metal to the required shape. Bent items shall be free of grain separation, oil canning or other distortion.
 1. Square Bends: Back-cut sheets to attach maximum square bend possible, with maximum radius of 1/16 in.

2. Knife Edge Bends: Back-cut and back bevel sheets to attain sharpest bend possible, with maximum radius of 1/32 in.

2.3 SHOP FINISHING

A. General

1. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated.
2. Provide colors or color matches as indicated on selected samples.
3. Protect mechanical finishes on exposed surfaces from damage by application of strippable temporary protective covering prior to shipment.
4. Corrosion Protection: Coat concealed surfaces which will be in contact with concrete, masonry, wood or dissimilar metals, in exterior work and work to be built into exterior and below grade walls and decks, with a heavy coat of bituminous paint. Do not extend coating onto exposed surfaces.

B. Stainless Steel

1. Remove or blend tool and die marks and stretch lines into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 - a. Bright, Directional Polish: No. 4 finish.
3. When polishing is complete, passivate and rinse surfaces. Remove foreign matter and leave surface chemically dry.

2.4 PROTECTION

- A. Provide necessary protection to all exposed surfaces of architectural metal work, so as to prevent damage, staining, discoloration, abrasion, etc., to these surfaces from time of shipment from factory to acceptance of work of this project. Protection shall be provided by wrappings, strippable coatings, or other means. After installation, remove protective paper or strippable coating and clean exposed surfaces, and then provide additional temporary protection to protect architectural metal work from damage during subsequent construction activities. Surfaces which are damaged, stained, discolored, abraded etc., shall be rejected and replaced with new materials, at no cost to the Owner.

2.5 STEEL FRAMING, BRACING, SUPPORTS AND REINFORCEMENTS

- A. Steel framing, plate reinforcing, supplementary steel framing or reinforcing, bracket assemblies, and the like required for the support, framing, reinforcing, bracing, etc., of work of this Section shall be of such sizes and shapes as indicated on the drawings, or as required to suit the conditions, and shall be provided with all necessary supports and accessory items such as inserts, hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly and rigidly fasten, anchor or attach work

of this Section in place and to the concrete, masonry and other connecting and adjoining work.

2.6 ORNAMENTAL HANDRAILS AND RAILINGS

- A. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
 5. Form changes in direction of railing members by radius bends.
 6. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces of handrail and railing components.
 7. Provide wall returns at ends of wall-mounted handrails, close ends of returns.
 8. Close exposed ends of handrail and railing members with prefabricated end fittings.
 9. Brackets, Flanges, Fittings, and Anchors: Provide brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
 - a. Furnish inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
 - b. For railing posts set in concrete, provide preset sleeves of steel, not less than 6 inches long and inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ornamental metal work is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do

not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. General: Install work of this Section square, plumb, straight, true to line or radius, accurately fitted and located, with flush, tight hairline joints (except as otherwise indicated or to allow for thermal movement), with provisions for other trades, with provisions to allow for thermal movement, with provisions to exclude water where exposed to weather, and with attachment devices as required for secure and rigid installation. It is the responsibility of the Contractor to ensure that shop fabricated architectural metal items will properly fit the field condition. In cases where the shop fabricated architectural metal items do not fit the field condition, the item shall be returned to the shop for correction.
- B. Attachments
 - 1. Unless otherwise indicated, work to be built into concrete or masonry shall be anchored with shop welded on galvanized steel strap anchors; work to be attached to concrete or masonry shall be anchored by bolts into embedded inserts or expansion shields; work attached to structural steel shall be anchored by welds or bolts; work attached to metals other than structural steel shall be anchored by bolts or screws. Power actuated fasteners not permitted unless approved by Architect. Provide all supplementary parts necessary to complete each item of work of this Section.
 - 2. All attachment devices shall be of type, size and spacing to suit condition and as approved by Architect. Provide shims, slotted holes, or other means necessary for leveling, plumbing and other required adjustments. Attachment devices for work exposed to view shall be concealed, unless indicated otherwise. Where bolts or screws are permitted in work exposed to view, they shall be oval head and counter sunk, unless otherwise noted, with projecting end cut off flush with nuts or adjacent material and shall match adjacent surfaces.
 - 3. Do all necessary drilling, tapping, cutting or other preparations of surrounding construction in the field accurately, neatly and as necessary for the attachment and support of work of this Section, but obtain Architect's approval prior to such preparation to work of others.
- C. Tolerances: All work of this Section shall be plumb, square, level, true to radius and correctly aligned within the following limitations:
 - 1. Offset from true horizontal, vertical and design location shall not exceed 1/16" per ten (10) feet of length for any component, not cumulative.
 - 2. Maximum offset from true alignment between abutting components shall not exceed 1/32".
- D. All railings shall be installed to withstand loads as required by the 2020 New York State Building Code.

- E. Do not cut or abrade finishes which cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units at Contractor's option.
- F. Install concealed gaskets and joint fillers as the work progresses, so as to make the work soundproof or lightproof as required.
- G. Restore protective coverings which have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
- H. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.
- I. Field Welding: Comply with AWS Code for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.

3.3 CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.4 PROTECTION

- A. Protect finishes of ornamental metal from damage during construction period with temporary protective coverings approved by ornamental metal fabricator. Remove protective covering at the time of Substantial Completion.
- B. Restore finishes damaged during construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 05 73 00
EXTERIOR METAL HANDRAILS AND RAILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Work of this Section includes, but is not limited to:

1. Stainless steel handrails at rear steps.
2. Stainless steel cable guardrail with top rail.
3. Galvanized handrails at site steps.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:

- | | |
|--|------------------|
| 1. Cement and Concrete for Exterior Improvements | Section 32 05 23 |
|--|------------------|

1.4 REFERENCES

- A. Comply with applicable requirements of following standards. Where these standards conflict with other specified requirements, most restrictive requirement shall govern.

1. American Institute of Steel Construction (AISC):

Code	Code of Standard Practice for Steel Buildings and Bridges
Specification	Specification for the Design, Fabrication and Erection of Structural Steel for Buildings

2. American Society for Testing and Materials (ASTM):

A 167	Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet,
-------	--

and Strip

A 312 Seamless and Welded Austenitic
 Stainless Steel Pipe

A 554 Welded Stainless Steel Mechanical Tubing

A 743 Castings, Iron-Chromium, Iron-Chromium
 Nickel, and Nickel-Base Corrosion-
 Resistant for General Application

3. American Welding Society (AWS):

D1.1 Structural Welding Code - Steel

D1.6 Structural Welding Code – Stainless Steel

4. State of New York Building Code:

Code State Building Code

5. Corps of Engineers (CE):

CRD-C-621 Specification for Nonshrink Grout

1.5 QUALITY ASSURANCE

A. Conform to governing laws, building code, and following standards, as applicable:

1. AISC Code and AISC Specification.
2. National Association of Architectural Metal Manufacturers (NAAMM),
 applicable publications.

B. Installer: A firm with at least three years experience in Work of type required by
 this Section.

C. Source: For each type of material required for Work of this Section, provide
 primary materials that are products of one manufacturer. Provide secondary
 materials that are acceptable to manufacturers of primary materials.

D. Mock-ups: Before beginning primary Work of this Section, provide mock-ups at
 locations acceptable to Engineer and obtain Engineer's acceptance of visual
 qualities for each type of handrail and rail. Protect and maintain acceptable
 mock-ups throughout Work of this Section to serve as criteria for acceptance of
 this Work.

E. Engineering: Provide services of a Professional Engineer, registered in the State
 of New York, to design and certify that Work of this Section meets or exceeds
 performance requirements specified.

- F. Shop Assembly: Preassemble handrails and railings and guardrails to greatest extent possible to minimize field splicing. Disassemble units as required for shipping and handling. Clearly mark units for reassembling in field.
- G. Wood Toprail:
- Materials and workmanship shall conform to governing laws and building code.
 - Lumber shall bear the grade-trademark of the association under the rules or standards of which they were produced. Grade trademarks shall conform to the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - o Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.
 - o Lumber shall bear the grade mark of an American Lumber Standards Committee, Board of Review-approved agency. Lumber shall conform to USDC PS 20.
 - o Lumber shall bear a mark of mill identification.
 - Ipe wood shall be Forest-Safe TM, indicating that the supplier buys only from those mills who's forestry practices have been independently certified to conform with the most rigorous standards as set by the Forest Stewardship Council (FSC).
 - o Furnish evidence indicating that source of Ipe wood used for bench construction is plantation farm or other designated source practicing sustain yield concept in forestry, and regulated by governing authorities regarding the growing, harvesting, and replanting of tropical hardwood trees.
 - o All lumber shall come stamped with the mills Forest Stewardship Council (FSC) chain-of-custody certification number, which allows it to be traced back to the originating well-managed forest.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of parts of Work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for Work installed by others.
- C. Field Measurements: Take accurate field measurements before preparation of shop drawings and fabrication. Do not delay job progress. Allow for field cutting and fitting where taking field measurements before fabrication is not possible.
- D. Calculations: Provide professionally prepared calculations and certification of

performance of this Work. Show how design load requirements and other performance criteria have been satisfied.

- E. Samples: Submit representative samples of each material that is to be exposed in finished Work, showing full range of color and finish variations expected. Provide minimum 12 in. long samples of handrails, top rails, wire rope and posts. Provide samples of exposed fittings and brackets.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver railings, cables and posts wrapped in manufacturer's standard protective coverings. Deliver brackets, fittings, sleeves, fasteners and other miscellaneous materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from possible damage.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.8 PROJECT CONDITIONS

- A. Weather: Perform exterior Work only when existing and forecasted weather conditions are within limits established by manufacturers of materials and products used.
- B. Proceed with Work only when substrate construction is complete.

1.9 SEQUENCING AND SCHEDULING

- A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this Work with related and adjacent Work.

1.10 GENERAL REQUIREMENTS

- A. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.11 WORKMANSHIP

- A. Handrail and railing work shall be well formed to shape and size, with sharp lines

and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.12 PERFORMANCE REQUIREMENTS

- A. Structural Performances: Provide installed handrail and railing assemblies complying with following structural performances, unless otherwise indicated:
 - 1. Live Loads shall not be less than the minimum required by applicable building codes.
 - 2. Design shall incorporate safety factors as required by the applicable building codes.
 - 3. Design and construction shall be as such to assure that under the required design live loads there shall be no failure of any member, deflection of not more than $L/240$ of length of any member, and without permanent deformation of any member or fastener.
- B. Handrails and Guards: Handrails and guards shall be designed to resist a lateral load of 50 pounds per linear foot (plf) applied in any direction at the top and to transfer this load through the supports to the structure.
 - 1. Concentrated Load: Handrails and guards shall be able to resist a single concentrated load 200 pounds, applied in any direction at any point along the top, and to transfer this load through the supports to the structure. This load need not be assumed to act concurrently with the uniform load specified above.
 - 2. Components: Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot, including openings and space between rails. Reactions due to this loading are not required to be superimposed with those of the previous sections.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Stainless Steel Handrails and Rail: Provide stainless products of one of the following manufacturers that meet or exceed requirements specified:

1. Blum, Julius & Co., Inc.
 2. CraneVeyor Corp.
 3. KDI Paragon Inc.
 4. Architectural Metal Works.
 5. Blumcraft of Pittsburgh.
 6. Pisor Industries, Inc.
 7. Wylie Systems.
- B. Stainless steel cable: Provide stainless cable system as manufactured by Seco South Railing & Cable Assemblies, which is located at: 2111 34th Way; Largo, FL 33771; Tel: 727-536-1924; or approved equal.
- C. Wood Toprail:
1. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19% , by weight. Wood members shall be selected for best possible appearance from the grade of stock specified.
 - "IPE", Species: Tabebuia spp. Lapacho Group; Family: Bignoniaceae, supplied by Timber Holdings Ltd., "Iron Woods", a Division of Cecco Trading, Inc., Milwaukee, WI 53209, or approved equal, supplied FEQ-Clear All Heart, S4S-E4E (surfaced four sides-eased four edges), with smooth surface profile. Edges shall be eased to a radius of 1/8 in. All lumber shall be supplied 2 in. over the specified length to allow for final trim and proper fit in the field. Lumber shall be supplied with the end sealed with Mobil CER-M, or approved equal aqueous wax log end sealer.
 - Moisture Content: Partially air-dried to a moisture content of 15%-19%.
 - Lumber Grade: Lumber shall be graded as per "Iron Woods Premium-CAH (Premium Clear All Heart) Grading Rules", defined as follows:
 - o Lumber shall be graded both faces and both edges.
 - o Lumber shall be straight grained and parallel cut without heart center.
 - o Lumber shall be all heartwood, no sapwood allowed.
 - o Lumber shall be in sound condition, free from worm holes or knots.
 - o Allowable imperfections defined as Small drying cracks, small end splits (less than 5/32 in. in width), that do not impair strength of the material or fastening. Discoloration caused by weathering or chemical reaction. Bow or twist which can be removed using normal installation methods and tools.

2.2 STAINLESS STEEL

- A. Stainless Steel: Comply with following standards and requirements for stainless steel components:
1. Tubing: ASTM A 554, Type 316 stainless steel, as standard with manufacturer.

2. Pipe: ASTM A 312, Type 316 stainless steel.
3. Castings: ASTM A 743, Grade CF 8 or CF 20.
4. Plate: ASTM A 167, Type 316 stainless steel.

B. Steel:

1. Steel pipe shall be seamless steel pipe conforming to ASTM A 53, Schedule 40. Galvanized steel pipe shall be used at exterior uses.
2. Steel tubing shall be structural steel square tubing conforming to ASTM A 501.
3. Solid steel pickets shall conform to ASTM A 36.
4. All other steel shall conform to ASTM A 36.

2.3 FABRICATION

- A. General: Fabricate handrails and railings to design, dimensions and details shown. Provide members in sizes and profiles indicated, with posts and brackets of size and spacings shown, but not less than required to support indicated design loads.
- B. Fabricate Work to be truly straight, plumb, level and square.
- C. Brackets, Flanges, Fittings and Anchors: Provide brackets, flanges, fittings and anchors for interconnection of handrail and railing components to other Work.
- D. Welded Connections: Perform welding to comply with AWS for recommended practices, using method appropriate for metal and finish indicated. Grind exposed welds flush and smooth to blend with adjoining finish metal surfaces.
- E. Bends: Form bends by use of prefabricated elbow fittings and radius bends, as applicable.
- F. Curves: Form simple and compound curves by bending members in jigs designed to produce uniform curvature with uniform profile of member throughout entire bend without buckling, twisting or deforming in any way.
- G. Provide weep holes or other means of draining entrapped water in hollow Sections of railing members.

2.4 FINISH – STAINLESS STEEL

A. Stainless Steel:

1. After fabrication, clean and de-scale stainless steel components in accordance with ASTM A 380.
2. Finish components with AISI No. 4 brushed finish in accordance with ASTM B 912

B. Galvanized Steel:

1. Finish components for galvanized steel in accordance with ASTM A123.

2.5 ANCHORING SYSTEMS

A. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as metal being fastened, unless otherwise indicated.

1. Concealed Fasteners: Provide concealed fasteners for interconnection of handrail and railing components, and for other connections, except where exposed fasteners are unavoidable.
2. Exposed Fasteners: Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

B. Anchors and Inserts: Furnish inserts and anchors to be set in concrete or masonry, of proper type, size and material for loading conditions indicated. Use toothed steel or lead expansion bolt assemblies for drilled-in-place construction.

1. All mechanical fasteners used in the assembly of stainless steel railings shall be manufactured from stainless steel.
- 2.

2.6 MISCELLANEOUS

A. Provide neoprene pad between aluminum and concrete surfaces to prevent direct contact between the two materials.

B. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended for color match, strength and compatibility with fabricated items.

C. Non-Shrink, Non-Metallic Grout: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C-621.

D. Bituminous Paint: SSPC-Paint (Cold-applied asphaltic mastic).

2.7 ELECTROLYTIC SEPARATION/CORROSION RESISTANCE

A. Coating for electrolytic separation between steel and concrete and grout shall be a high-build coal tar epoxy providing one coat protection for steel and concrete in a variety of chemical, immersion and underground conditions, manufactured by Tnemec Company, Inc., 6800 Corporate drive, Kansas City, MO 64120-1372; Tel. 816-483-3400; Kop-Coat Inc, 436 Seventh Avenue, Pittsburgh, PA 15219-1818; 1/412/227-2700, parent company RPM, International 2628 Pearl Road - P.O. Box 777 - Medina, Ohio 44258; Phone: 330.273.5090 - Fax: 330.225.8743; Carboline Company, 2150 Schuetz Road, St. Louis, MO 63146; Phone: 800-848-4645 or 314-644-1000; FAX: 314-644-4617, or approved equal.

2.8 EPOXY GROUT

- A. Epoxy Grout: Provide non-shrink, non-metallic, non-corrosive epoxy grout conforming to the following requirements:
 - 1. Grout shall be manufactured specifically for use in supporting heavy loads.
 - 2. Shrinkage at 28 days: None (0.00 shrinkage when tested in accordance with ASTM C827 modified procedure) with a minimum effective bearing area (EBA) of 95 percent coverage of the tested base plate.
 - 3. Compressive strength, minimum: 10,000 psi at seven days, when tested in accordance with ASTM C579.
 - 4. Initial setting time: Approximately one hour at 70 degrees F.
 - 5. Provide flowable consistency as necessary for the particular application.
 - 6. Epoxy grouts which are volatile and which give off noxious fumes are not acceptable.

PART 3 EXECUTION

3.1 INSPECTION

- A. The Installer/Erector shall examine substrates, supports, and conditions under which this Work is to be performed and notify Contractor, in writing, of conditions detrimental to proper completion of Work. Do not proceed with Work until unsatisfactory conditions are corrected. Beginning Work means Installer accepts substrates and conditions.

3.2 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads].
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

- G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Form changes in direction as follows:
1. By bending or by inserting prefabricated elbow fittings.
- I. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- J. Close exposed ends of hollow railing members with prefabricated end fittings.
- K. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
- M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- O. For railing posts set in concrete, provide steel sleeves as indicated on the Drawings, but not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, with steel plate forming bottom closure.
- P. Cable System:
1. Before beginning installation, verify that conditions installed under other sections are acceptable for installation of cable systems in accordance with manufacturer's installation instructions.
 2. Supply items required to be cast into concrete or embedded in masonry with

setting templates to appropriate Sections.

3. Verify supporting system for stainless steel cable rail is prepared for attachment of anchors, fittings, wire rope, and wire netting and transfer of calculated loads.

3.3 PREPARATION, INSTALLATION/ERECTION

- P. Verify alignment, support dimensions, and tolerances are correct.
- Q. Inventory components to ensure all required items are available for installation. Inspect components for damage. Remove damaged components from site and replace.
- R. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.
- S. Installation, General: Provide anchorage devices and fasteners necessary for fastening handrail and guardrail systems to in-place construction using manufacturer's standard connections. Coordinate and furnish anchorages, templates, setting drawings, instructions and recommendations for installation of items embedded in concrete or masonry construction.
 - 1. Use manufacturer's supplied hardware.
- T. Corrosion Protection: Provide neoprene pad, or coat concealed surfaces of metal with heavy coat of bituminous paint when metal surfaces will be in contact with grout, concrete, masonry, wood or dissimilar metals, as indicated on the Drawings.
- U. Set posts in core drilled concrete wall, steps or sub slab and epoxy in place as indicated on the Drawings.
- V. Adjust handrails and rails prior to anchoring to ensure matching alignments at abutting joints. Space posts at intervals indicated, or as required by design loading.
- W. Expansion Joints: For exterior Work, provide manufacturer's standard slip joint type expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 ft.

3.4 TOLERANCES

- P. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by Contract Document and shall not be added to allowable tolerances indicated for other Work.
 - 1. Allowable Variation from True Plumb: $\pm 1/8$ in. in 20 ft.-0 in.
 - 2. Allowable Variation from True Level: $\pm 1/8$ in. in 20 ft.-0 in.

3. Allowable Variation from True Line: $\pm 1/8$ in. in 20 ft.-0 in.

3.5 REPAIR OF DEFECTIVE WORK

- P. Remove stained or otherwise defective work and replace with material that meets specification requirements.
- Q. Repair damaged finish in accordance with manufacturer's printed instructions.
- R. Touch-up damaged coatings and finishes to eliminate evidence of repair.
- S. Remove and replace Work that cannot be successfully cleaned or repaired.

3.6 CLEANING

- P. As installation is completed, wash thoroughly using clean water and soap; rinse with clean water.
- Q. Do not use acid solution, steel wool or other harsh abrasives.
- R. If stain remains after washing, remove finish and restore in accordance with NAAMM/NOMMA Metal Finishes Manual.

3.7 PROTECTION

- P. Provide temporary protection to ensure Work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 06 15 00

COMPOSITE WOOD DECKING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the composite wood decking as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Composite wood decking.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. C 177 -Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 2. D 143 - Standard Test Methods for Small Clear Specimens of Timber.
 - 3. D 198 - Standard Test Methods of Static Tests of Lumber in Structural Sizes.
 - 4. D 1037 -Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 5. D 1413 -Standard Test Method for Wood Preservatives by Laboratory Soil-Block Cultures.
 - 6. D 1761 -Standard Test Methods for Mechanical Fasteners in Wood.
 - 7. D 1929 -Standard Test Method for Determining Ignition Temperature of Plastics.
 - 8. D 2047 -Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
 - 9. D 2394 - Standard Methods for Simulated Service Testing of Wood and Wood-Base Finish Flooring.

10. D 2395 -Standard Test Methods for Specific Gravity of Wood and Wood-Based Materials.
11. D 4761 -Standard Test Methods for Mechanical Properties of Lumber and Wood-Base Structural Material.
12. E 84 -Standard Test Method for Surface Burning Characteristics of Building Materials.
13. F 1679 -Standard Test Method for Using a Variable Incidence Tribometer (VIT).

- B. American Wood Preservers Association (AWPA) E1-06 -Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

1.5 QUALITY ASSURANCE

- A. 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.

1.6 SUBMITTALS

- A. Product Data: Indicate sizes, profiles, surface finishes, and performance characteristics.
- B. Samples: 12" long decking and tread samples illustrating size, profile, color, and surface finish.
- C. Maintenance Data: Manufacturer's instructions on care and cleaning of composite wood products.

1.7 PRODUCT HANDLING

- A. Deliver, store, and handle composite wood materials in accordance with manufacturer's instructions.
- B. Store composite wood level and flat, off ground or floor, with supports at each end and maximum 24" on center.
- C. Do not stack composite wood over 12 feet high.
- D. Cover composite wood with waterproof covering, vented to prevent moisture buildup.

1.8 WARRANTY

- A. Furnish manufacturer's 25 year warranty providing coverage against checking, splitting, splintering, rotting, structural damage from termites, and fungal decay of composite wood.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Project design is based on products by Trex Company, Inc., Select Line. Equal products of other manufacturers, as determined by the Architect, may submit their products for approval.

2.2 MATERIALS

- A. Composite Wood:
 - 1. Composition: Reclaimed wood and plastic with integral coloring; free from toxic chemicals and preservatives.
 - 2. Profiles:
 - a. Decking: Nominally 2 x 6 inches x maximum practical length.
 - b. Fascia and Trim: Sizes and profiles as shown on drawings or as required by project conditions; furnish in maximum practical length.
 - 3. Surface Texture: Accents; reversible wood grain and smooth surfaces.
 - 4. Colors: As selected by the Architect.
 - 5. Characteristics:
 - a. Abrasion Resistance: 0.01 inch wear per 1000 revolutions, tested to ASTM D 2394.
 - b. Hardness: 1124 pounds, tested to ASTM D 143.
 - c. Self ignition Temperature: 743 degrees F, tested to ASTM D 1929.
 - d. Flash Ignition Temperature: 698 degrees F, tested to ASTM D 1929.
 - e. Flame Spread Rating: 80, tested to ASTM E 84.
 - f. Water Absorption, 24 hour immersion, tested to ASTM D 1037:
 - 1). Sanded surface: 4.3 percent.
 - 2). Unsanded surface: 1.7 percent.
 - g. Thermal expansion coefficient, 36 inch long samples:
 - 1). Width: 35.2×10^{-6} to 42.7×10^{-6} .
 - 2). Length: 16.1×10^{-6} to 19.2×10^{-6} .
 - h. Fastener withdrawal, tested to ASTM D 1761:
 - 1). Nail: 163 pounds per inch.
 - 2). Screw: 558 pounds per inch.
 - i. Static coefficient of friction:
 - 1). Dry: 0.53 to 0.55, tested to ASTM D 2047.
 - 2). Dry: 0.59 to 0.70, tested to ASTM F 1679.
 - 3). Wet: 0.70 to 0.75, tested to ASTM F 1679.
 - j. Fungus resistance, white and brown rot: No decay, tested to ASTM D 1413.
 - k. Termite resistance: 9.6 rating, tested to AWPA E-1.
 - l. Specific gravity: 0.91 to 0.95, tested to ASTM D 2395.
 - m. Compression:
 - 1). Parallel: 1806 psi ultimate, 550 psi design, tested to ASTM D 198.

- 2). Perpendicular: 1944 psi ultimate, 625 psi design, tested to ASTM D 143.
- n. Tensile strength: 854 psi ultimate, 250 psi design, tested to ASTM D 198.
- o. Shear strength: 561 psi ultimate, 200 psi design, tested to ASTM D 143.
- p. Modulus of rupture: 1423 psi ultimate, 250 psi design, tested to ASTM D 4761.
- q. Modulus of elasticity: 175,000 psi ultimate, 100,000 PSI design, tested to ASTM D 4761.
- r. Thermal conductivity: 1.57 Btu per inch per hour per square foot at 85 degrees F, tested to ASTM C 177.

2.3 ACCESSORIES

- A. Fasteners: Stainless steel composite wood screws of length recommended by composite wood manufacturer for profile being fastened.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where composite wood decking is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install composite wood in accordance with manufacturer's instructions.
- B. Cut, drill, and rout composite wood using carbide tipped blades.
- C. Pre-drill fastener holes located closer than 1 inch from edges.
- D. Cut ends square and true.
- E. Do not use composite wood products as structural members.
- F. Do not exceed maximum spans recommended by manufacturer.
- G. Place boards perpendicular to supports.
- H. Stagger end joints in adjacent rows at least one support.
- I. Leave expansion spaces between abutting boards and between boards and adjacent construction:
 - 1. End gaps between boards: 1/8" at ambient temperatures of 60 degrees F and above and 3/16" at ambient temperatures below 60 degrees F.
 - 2. Side gaps between boards: 1/4" at ambient temperatures of 60 degrees F and above and 3/8" at ambient temperatures below 60 degrees F.

3. Gaps between boards and adjacent construction: 1/4" at ambient temperatures of 60 degrees F and above and 1/2" at ambient temperatures below 60 degrees F.

J. Place boards to span three or more supports.

K. Fasten each board to each support with two fasteners.

L. Install railings in accordance with Building Code.

3.3 CLEANING

A. Clean composite wood to remove stains:

1. Mold, Mildew, and Berry and Leaf Stains: Clean surfaces with conventional deck wash containing detergent or sodium hypochlorite.
2. Rust and Ground-in Dirt: Clean surfaces with cleaner containing oxalic or phosphoric acid.
3. Oil and Grease: Clean surfaces with detergent containing degreasing agent.

END OF SECTION

SECTION 06 15 20
COMPOSITE WOOD DECK OVERLOOK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special conditions included in the Contract Documents.
- B. Related Work Specified Elsewhere:
 - 1. Site Preparation Section 31 10 00
 - 2. Excavation and Fill Section 31 23 00
 - 3. Trenching and Backfilling Section 31 23 33
 - 4. Cement and Concrete for Exterior Improvements Section 32 05 23

1.2 DESCRIPTION OF WORK

- A. Furnish all labor, materials, tools, equipment, and services necessary for and reasonably incidental to complete the composite wood deck, as shown on the drawings, or specified, including, but not limited to the following:
 - 1. Drainage Fill Course
 - 3. Concrete subslab.
 - 5. Composite wood decking, fascia, and sleeper installation.
- B. Preparation of subgrade and backfill are specified in "Excavation and Fill" Section 31 23 00.

1.3 QUALITY ASSURANCE

- A. Materials and methods of construction shall comply with the following Standards:
 - 1. American Society for Testing and Materials, (ASTM)
 - 2. National Design Specifications for Wood Construction
- B. Installation performed only by a skilled carpenter with satisfactory record of performance, minimum of five years experience on at least three installations similar in type, size, and quality to that of this project.

C. Sample panel:

1. Before installing composite wood deck, provide a sample panel indicating sleepers, fasteners and deck spacing.

1.4 SUBMITTALS

- A. Submit shop drawings indicating profiles, sizes, connection attachments, and types of fasteners for deck construction.
- B. Samples: Provide samples of sleeper, decking, and fascia boards for approval.
- C. Product Data: Submit product data for approval, consisting of complete manufactures product description and specifications.
- D. Certificates: Submit certificates of grading, treatment, and conformance to specified standards.

1.5 PROJECT CONDITIONS

- A. Allow concrete subslab to fully cure prior to installing decking.
- B. Establish and maintain required lines and grade elevations.

PART 2 PRODUCTS

2.1 COMPOSITE WOOD DECKING SLEEPERS AND FASCIA BOARDS

- A. Wood: Composite wood materials as manufactured by TimberTec "Pro" series or equal.
- B. Pressure treated 2x4 lumber sleeper secured to subslab with stainless steel concrete screws.
- C. Color: Earthtone, color to be determined.
- D. Size: 1x4 grooved board decking, 1x4 solid board for edge boards. 1x6 fascia board grooved.
- E. Fasteners: Hidden stainless steel anchoring devises as supplied by manufacturer. Concrete screws as manufactured by Tapcon or equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Concrete subslab to be fully cured prior to installing sleepers. Concrete to pitch $\frac{1}{4}$ " foot in direction of sand pit.
- B. Contractor to ensure proper pitch at concrete subslab for drainage and air ventilation is achieved prior to installing finished decking.
- C. Notify Professional prior to installation of deck.

3.2 PROTECTION

- A. Protect composite wood work from damage due to construction and vehicular traffic until final acceptance. Exclude construction and vehicular traffic from deck.
 - 1. After completion, avoid construction activities which would damage surface.
 - 2. Where construction traffic is necessary across completed areas, protect finish wood deck with temporary panels placed in conjunction with traffic pattern.

3.3 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from operations.
- B. Wash wood free of stains, discoloration, dirt and other foreign material immediately prior to final acceptance. Follow manufacturer's cleaning instructions rigidly.

END OF SECTION

SECTION 06 20 00

CARPENTRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the carpentry work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Exterior plywood sheathing.
 - 2. Blocking and miscellaneous wood.
 - 3. Plywood backing panels for telephone and electrical closets.
 - 4. Rough hardware.
 - 5. Installation only of finish hardware.
 - 6. Installation only of doors and hollow metal frames.

1.3 RELATED SECTIONS

- A. Cabinetry and millwork - Section 06 20 23.
- B. Roofing - Division 7.
- C. Steel Doors and Frames - Section 08 11 13.
- D. Wood Doors - Section 08 14 16.
- E. Finish Hardware - Section 08 71 00.

1.4 QUALITY ASSURANCE

- A. Lumber Standard: Comply with PS 20.
- B. Plywood Standard: Comply with PS 1 and American Plywood Assoc. (APA).
- C. Shop fabricate carpentry work to the extent feasible and where shop fabrication will result in better workmanship than feasible for on-site fabrication.
- D. Grade Marks: Identify lumber and plywood by official grade mark.

1. Lumber: Grade stamp to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number or name, grade of lumber, species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.
 - a. S-Dry: Maximum nineteen (19) percent moisture content as per ASTM D 2016.

- E. Installation of doors, frames and hardware shall conform to the minimum standards of "Installation Guides for Doors and Hardware" of the Door and Hardware Institute.

1.5 SUBMITTALS

- A. Pressure Treatment: Include certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
- B. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with governing ordinances and that treatment will not bleed through finished surfaces.

1.6 PRODUCT HANDLING

- A. Deliver carpentry materials to the site ready to use with each piece of lumber clearly marked as to grade, type and mill, and place in an area protected from the elements.
- B. Deliver rough hardware in sealed kegs and/or other containers which shall bear labels as to type and kind.
- C. Pile lumber for rough usage, when delivered to the site in stacks to insure drainage and with a minimum clearance of six (6) inches above grade. Cover stacks with tarpaulins or other watertight coverings. Store grounds and similar small sized lumber inside the building as soon as possible after delivery.
- D. Do not store seasoned lumber in wet or damp portions of the building.
- E. Protect fire retardant treated materials against high humidity and moisture during storage and erection.
- F. Remove delivered materials which do not conform to specified grading rules or are otherwise not suitable for installation from the job site and replace with acceptable materials.
- G. All items specified in Section 08 71 00 of this specification entitled "Finish Hardware" shall be received, accounted for, stored and applied under this Section.
- H. Hardware shall be sorted and stored in space assigned by Contractor and shall be kept at all times under lock and key. The safety and preservation of all items delivered will be the responsibility of the Contractor.

1.7 JOB CONDITIONS

- A. Installer must examine the substrates 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 and the Architect.
- B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

PART 2 PRODUCTS

2.1 WOOD MATERIAL

A. General

- 1. All wood shall be sound, flat, straight, well-seasoned, thoroughly dry and free from all defects. Warped or twisted wood shall not be used.
- 2. For miscellaneous wood blocking, grounds, furring as required, use Utility Grade Coastal Douglas Fir or Southern Pine, free from knots, shakes, rot or other defects, straight, square edges and straight grain, air seasoned with maximum moisture content of nineteen (19) percent. Wood shall be S4S, S-Dry, complying with PS-20.
- 3. Plywood Sheathing: Provide 5/8" thick CDX APA Structural 1 Rated Sheathing, Exposure 1, with span rating to suit stud spacing.
- 4. Plywood and rough carpentry for telephone and electrical closets, provide 3/4" thick C-D EXT-APA plywood, fire retardant treated as specified herein.

B. Wood Treatment

- 1. All interior wood material specified herein shall be fire retardant treated to comply with the AWP standard U1 to achieve a flame spread rating of not more than 25 (UL Class "FR-S") when tested in accordance with UL Test 723 or ASTM E 84. The fire-retardant chemicals used to treat the lumber must comply with FR-1 of AWP Standard P49 and be free of halogens, sulfates and ammonium phosphate.
 - a. After treatment, kiln dry to a moisture content of fifteen (15) percent; if wood is to be painted or finished, kiln dry to a moisture content of twelve (12) percent. Treatment shall be equal to "Dricon" made by Arch Wood Protection Inc. or approved equal. Provide UL approved identification on treated materials.
- 2. For exterior blocking, roofing and sheet metal, pressure treat wood with copper azole, Type B (CA-B); ammoniacal copper quat (ACQ) or similar preservative product that contains no arsenic or chromium. Preservative shall comply with AWP Standard U1, (.25 lbs./cubic foot of chemical in wood).

- a. After treatment, kiln dry to a maximum moisture content of fifteen (15) percent. Treatment shall be equal to "Wolmanized Natural Select" made by Arch Wood Protection Inc. or approved equal.
3. Treated wood which is cut or otherwise damaged shall be further treated in accordance with the AWP Standard M-4.

2.2 HARDWARE

- A. Rough Hardware for Treated Woods and Exterior Use: Hot-dipped galvanized or Type 304 stainless steel.
- B. Nails: Common steel wire, untreated for interior work as per ASTM F 1667.
- C. Bolts: Standard mild steel, square head machine bolts with square nuts and malleable iron or steel plate washers or carriage bolts with square nuts and cut washers conforming to the following:
 1. Bolts: ASTM A 307, Grade A.
 2. Nuts: ASTM A 563.
 3. Lag Screws and Bolts: ASME B 18.2.1.
- D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 1. Material for Treated Woods and Exterior Use: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.
 2. Material for Other Uses: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- E. Wood Screws: ASME B 18.6.1.
- F. Concrete and Masonry Anchors: Standard expansion-shield self-drilling type concrete anchors where so shown or noted on the drawings, or where approved by the Architect.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where carpentry is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION OF FINISH HARDWARE

- A. Hardware shall be carefully fitted and securely attached, in accordance with these specifications and the instructions of the various manufacturers.
- B. Unless otherwise noted, mount hardware units at heights established in Section 08 11 13.
- C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.
- G. All keys used shall be construction keys which are to be tagged with fiber discs as approved, clearly labeled with identifying inscriptions and then neatly arranged in a temporary cabinet. All construction keys shall be returned to the Owner.
- H. Adjusting and Cleaning
 - 1. Adjust and check each operating item of hardware and each door, to ensure proper operation and function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.
 - 2. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make a final check and adjustment of all hardware items in such space or area. Clean and re-lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.3 INSTALLATION OF DOORS AND FRAMES

- A. Preparation
 - 1. Remove welded-in shipping spreaders installed at factory.

2. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
3. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

B. Installation

1. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
2. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Install frames in accordance with ANSI 250.11-20001, Recommended Erection Instructions for Steel Frames, unless more stringent requirements are specified herein.
 - b. At fire-protection-rated openings, install frames according to NFPA 80.
 - c. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - d. Install frames with removable glazing stops located on secure side of opening.
 - e. Frames set in masonry walls shall have door silencers installed in frames before grouting.
 - f. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - g. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

4. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames conforming to the requirements of Section 07 21 00, "Thermal Insulation."
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar; refer to Section 04 20 00 "Unit Masonry" for installation of frames in masonry walls.
6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Installation Tolerances: Adjust steel door frames for squareness, alignment, twist, and plumb to the tolerance given in HMMA 841 of ANSI/NAAMM, current edition.
8. Steel Doors: Fit hollow metal doors accurately in frames to the tolerances given in HMMA 841 of ANSI/NAAMM, current edition.
 - a. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
9. Glazing: Comply with installation requirements in Division 8 Section "Glass and Glazing" and with standard steel door and frame manufacturer's written instructions.
 - a. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

C. Wood Doors

1. Condition doors to average prevailing humidity in installation area prior to hanging.
2. Install doors in accordance with manufacturer's instructions.
3. Fit door to frames and machine for hardware to whatever extent not previously worked at factory as required for proper fit and uniform clearance at each edge.
4. Clearances: Install doors to meet clearance requirements specified in Section 08 14 16.
5. Fire-Rated Doors: Install in corresponding fire-rated frames in accordance with the requirements of NFPA No. 80. Provide clearances complying with the limitations of the authority having jurisdiction.

- D. Adjustments: Check and readjust operating finish hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.

3.4 BLOCKING AND MISCELLANEOUS WOOD

A. General

1. Erect rough carpentry true to line, levels and dimensions required; squared, aligned, plumbed, and securely fastened in place.
2. Shim where required to true up furring, blocking and the like. Use wood or metal shims only.
3. Do all cutting, fitting, drilling and tapping of other work as required to secure work in place and to perform the work included herein. Do all the cutting and fitting of carpentry work, for the work of other trades as required.

B. Blocking and Miscellaneous Wood

1. Furnish and install all wood grounds, furring, blocking, curbs, bucks, nailers, etc., that may be necessary and required in connection with the carpentry and with the work described for any other trades and including required carpentry for electrical fixtures. All blocking and nailers shall be continuous wherever required, whether or not so indicated.
2. Blocking shall be as required for the proper installation of the finished work and for items in mechanical sections as required. Blocking, edgings, stops, nailing strips, etc., shall be continuous, unless distinctly noted otherwise. Provide blocking as required to install all equipment. Provide blocking and nailers where shown or required to fasten interior sheet metal work.
3. Fastening for wood grounds, furring and blocking shall be of metal and of type and spacing as best suited to conditions. Hardened steel nails, expansion screws, toggle bolts, self-clinching nails, metal plugs, inserts or similar fastenings shall be used, of suitable type and size to draw the members into place and securely hold same.

C. Rough Lumber for Roofing and Sheet Metal

1. Furnish and install all wood nailing strips and wood blocking required in connection with respective types of roofing, fans, flashings, and sheet metal work, using preservative treated wood as herein before specified.
2. Wood blocking shall be of sizes and shapes as indicated on the drawings and/or designed for the reception of curb flashings for roof ventilators and similar items.
3. All nailing strips and blocking shall be carried out in accordance with the printed installation instructions, and/or recommendations of the accepted manufacturer of the roofing materials, and in coordination and cooperation with the sheet metal work trades.
4. All blocking and nailing strips shall be firmly secured in place using counter bored bolt and nut fastenings, or secured by any other proposed flush surfaced fastenings.

5. Wood nailing strips or blocking required to be embedded in concrete work shall be furnished in time due for placing, prior to start of concrete operations. Locations and spacings of nailing strips or blocking shall be performed in coordination with the concrete trades, as required for respective installations.

3.5 PLYWOOD SHEATHING

- A. Install plywood wall sheathing horizontally or vertically using panels continuous over 2 or more spans. Nail edges and ends over supports at 6" o.c. and at 12" o.c. over intermediate studs using 6d nails for panels not more than 1/2" thick and 8d nails for thicker panels. Allow 1/8" spacing at panel ends and 1/4" at panel edges.

3.6 TELEPHONE AND ELECTRICAL EQUIPMENT MOUNTING BOARDS

- A. Furnish and install 3/4" thick plywood panels to the walls of the telephone and electrical equipment rooms in accordance with the requirements of the local utility company.
- B. Secure to wall using proper devices for substrates encountered, spaced twelve (12) inches o.c., maximum around the edges, 1-1/2" from corners, and in three (3) rows of three (3) each in the field. Recess fastening devices flush with the plywood surface. Adjacent panels shall be butted with 1/16" space between without lapping.

3.7 ROUGH HARDWARE

- A. Securely fasten rough carpentry together. Nail, spike, lag screw or bolt as required by conditions encountered in the field and the Contract Documents.
- B. Provide rough or framing hardware, such as nails, screws, bolts, anchors, hangers, clips, inserts, miscellaneous fastenings, and similar items of the best quality and of the proper size and kind to adequately secure the work together and in place, in a rigid and substantial manner.
- C. Secure rough carpentry to masonry with countersunk bolts in expansion sleeves or other acceptable manner, with fastenings not more than sixteen (16) inches apart. Secure woodwork to hollow masonry with toggle bolts spaced not more than sixteen (16) inches apart.
- D. Countersink bolts in nailers and other rough woodwork and include washers and nuts. Cut bolts off flush with surfaces and peen as may be required to receive finished work.
- E. Inserts to secure wood nailers to concrete shall be malleable iron threaded inserts with 3/8" diameter bolts of length to allow for countersinking. Locate at end of each nailer and at intervals not exceeding thirty (30) inches o.c.
- F. Furnish to the mason for building into the work or attaching the work which is to be built in, anchors, bolts, wall plates bolted to masonry, corrugated wall plugs, nailing blocks, etc., which are required for the proper fastening and installation for the work or other items as called for in this Section.
- G. Detailed instructions with sketches of necessary requirements, shall be given to the masonry trade showing the location and other details of such nailing devices.

3.8 CLEANING UP

- A. General: Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends and debris.
- B. Sweeping
 - 1. At the end of each working day, or more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the work has settled.
 - 2. Remove the refuse to the area of the job site set aside for its storage.
 - 3. Upon completion of this portion of the work, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 06 20 23

CABINETRY AND MILLWORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the cabinetry and millwork as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Wood casework with plastic laminate finish.
 - 2. Countertops for cabinet work.
 - 3. Cabinet hardware.
 - 4. Butcher block countertops.
 - 5. Solid surface countertops.
 - 6. Wood handrails and guardrails.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.
- B. Laboratory Storage - Section 11 56 13.

1.4 QUALITY ASSURANCE

- A. Qualifications of Fabricators and Installers: For actual fabrication and installation of cabinetry and millwork, use only personnel who are thoroughly trained and experienced in the products involved and in the recommended methods for their fabrication and installation.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with "Quality Standards" of the Architectural Woodwork Institute (AWI) for the grades specified.

1.5 SUBMITTALS

- A. Shop Drawings: Before any cabinetry and millwork are fabricated and delivered to the job site, submit complete Shop Drawings to the Architect for approval.

- B. Quality Certification: Submit fabricator's certification stating that the fabricated work meets the woodwork grade specified and that the wood used is fire retardant treated in accordance with these specifications.
- C. Samples: Submit samples of all proposed materials to the Architect for the selection of actual colors and patterns.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect architectural woodwork before, during, and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Architect and at no additional cost to the Owner.
- C. Delivery: Do not deliver woodwork until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.7 JOB CONDITIONS

- A. Examination: The installer must examine the substrates and conditions under which the work is to be installed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Architect.
- B. Conditioning: Do not install woodwork until the required temperature and relative humidity have been stabilized and will be maintained in installation areas.

PART 2 PRODUCTS

2.1 CABINETRY AND MILLWORK

- A. General
 - 1. Fabricate all cabinetry and millwork to the "Premium" grade standards of the AWI, Section 10.
 - 2. Wood core to receive plastic laminate finish shall be fire retardant treated in accordance with the requirements of Section 06 20 00. Particleboard or plywood core conforming to AWI standard noted herein; particleboard shall be equal to "Duraflake FR," 45 lbs. per cubic foot density, made by Willamette Industries, or approved equal.
 - 3. Face construction of cabinets shall be "Flush Overlay."
 - 4. Provide 3/4" thick doors, drawer fronts and fixed panels (including thickness of plastic) except where required to be thicker by Standards; and provide flush units.

5. Provide dust panels of 1/4" thick plywood or tempered hardboard above compartment and drawers, except where located directly below countertops.
6. Exposed Edges: Plastic laminate matching exposed panel surfaces. Ease exposed edge of overlap sheet.

B. Plastic Laminate

1. Plastic Laminate for Horizontal Surfaces: 0.050" thick, General Purpose Type (high pressure).
2. Plastic Laminate for External Vertical Surfaces: 0.028" thick, General Purpose Type (high pressure).
3. Plastic Laminate for Postforming: 0.042" thick, Postforming (high pressure).
4. Plastic Laminate for Cabinet Linings: 0.020" thick, Cabinet Liner (high pressure).
5. Plastic Laminate for Concealed Panel Backing: 0.020" thick, Backer Type (high pressure).
6. Plastic Laminate Colors and Patterns:
Wilsonart – 1st floor Cabinets- Vertical surfaces- Manitoba Maple 7911-60 Matte
2nd floor Cabinets -Vertical surfaces -Color: Standard Grey 1500-60 Matte
Formica- Horizontal countertops, Color: Citadel Wrap 5882-58

2.2 COUNTERTOPS

- A. Butcher Block: Provide at Fab Lab and Print room . See Millwork Schedule.

2.3 SOLID SURFACE COUNTERS

- A. Provide 1/2" thick "Corian" counters as manufactured by E.I. Du Pont or approved equal made by WilsonArt or Gibraltar meeting standards specified herein. Corian Color: "Carbon Aggregate." See schedule for locations.
- B. Material: Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124-1980, Type Six, and ISS FA-2.01 "Classification and Standards Publication of Solid Surfacing Material" as published by the International Solid Surface Fabricator Association.
- C. Counters shall be adhesively joined with no exposed seams, having edge details shown on drawings.
- D. Material shall conform to the published performance characteristics of ISSFA-2-01.
- E. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints.
- F. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in colors matching components.
- G. Fabrication
1. Fabricator must be approved by the solid surface manufacturer.

2. Factory fabricate components to custom sizes and shapes indicated, in accordance with approved shop drawings.
 3. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints.
 4. Provide factory cutouts for plumbing fittings and accessories as indicated on the drawings.
 5. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.
- H. Warranty: The manufacturer shall warrant to the Owner that Du Pont will at its option repair or replace without charge, such product if it fails due to a manufacturing defect during the first 10 years after initial installation. This includes all labor charges needed to repair or replace the product covered hereunder.

2.4 CABINET HARDWARE (SEE SCHEDULE AT END)

- A. General: Provide complete cabinet hardware and accessory material associated with cabinetry and millwork and as required for installation and operation of cabinets. Hardware design shall be as selected by the Architect.
- B. Hardware Standards: Comply with ANSI A156.9 "American National Standard for Cabinet Hardware." Quality Level: Type 2 (Institutional).
- C. Cabinet Door Hardware: Provide hinges, catches and pulls to properly accommodate each door size and style.
- D. Sliding Door Hardware: Provide sets including pulls, to properly accommodate each pair of sliding doors.
- E. Drawer Hardware: Provide slides and pulls to properly accommodate each drawer size and style. Equip each drawer with side mounted, full extension, ball bearing, nylon roller drawer slides.
- F. Locks: Provide standard pin-type or disc-type (5 pins or discs) tumbler locks, keyed individually except as otherwise indicated.
- G. Shelf Supports: Where shelving is indicated as "adjustable," provide slotted type needed to properly support the shelves with uniform forty (40) lbs. per square foot loading.
- H. Exposed Hardware Finish: Provide exposed hardware with BHMA Code 626 satin chrome plate finish (US26D).
- I. Glass Doors and Shelves: Clear plate or sheet glass; FS DD-G-451, Type I, 1/4" thick; which has been seamed at exposed edges, and tempered to 4 x normal flexural strength.

2.5 STAIR HANDRAILS AND GUARDRAILS

- A. Lumber: AWI Section 3 with the following requirements:

1. Hardwood for Transparent Finish: Premium Grade, select Maple, straight cut light heartwood with clear top coat, matching adjoining veneers unless otherwise shown or specified, and free from cat's eyes, bird's eyes, burls, curls or cross grains.
- B. Quality Standard: For the following types of interior architectural woodwork, comply with indicated standards as applicable.
 1. Stair Handrails: AWI Section 7.
- C. Transparent finish as selected by Architect.
- D. Woodwork for Transparent Finish: Except as otherwise indicated, comply with the following:
 1. Grade: Premium.
 2. Species of Solid Wood: Maple.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where cabinetry and millwork are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 FABRICATION

- A. Fabricate all architectural woodwork in strict accordance with the approved Shop Drawings and the referenced standards.

3.3 INSTALLATION

- A. Install cabinetry and millwork in accordance with Section 10 of AWI standards.
- B. Install the work plumb, level, true and straight, with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops), 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. 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.
- E. Casework
 1. Install without distortion so that doors and drawers will fit openings properly and be accurately aligned.

2. Adjust casework and hardware so that doors and drawers operate smoothly and with tolerances as established by standards. Lubricate operating hardware as recommended by manufacturer.

F. Countertops: Anchor securely to base units and other support systems.

3.4 WOOD RAILS

- A. Wood shall be planed straight, square and level, then sanded smooth with flush finished surfaces. Joints shall occur over supports. Right angle joints shall be mitered.
- B. All exposed fastening devices shall be countersunk and set below finished wood surfaces, and fitted with matching wood plugs; sand plugs and finish smooth and flush with exposed surfaces.
- C. Handrails shall be capable of withstanding a force of two hundred (200) lbs. applied to rail at any point from any direction.
- D. Provide all hardware and metal supports required for complete installation as detailed on drawings.

3.5 PROTECTION

- A. Cover casework with four (4) mils polyethylene film, for protection against soiling and deterioration during remainder of construction period.

3.6 MILLWORK SCHEDULE

- A. See Drawing A 501.

END OF SECTION

SECTION 07 13 26

SHEET MEMBRANE WATERPROOFING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sheet membrane waterproofing as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Sheet membrane waterproofing for underslab conditions at elevators.
 - 2. Sheet membrane waterproofing for foundation wall surfaces.

1.3 RELATED SECTIONS

- A. Earthwork - Section 31 20 00.

1.4 SUBMITTALS

- A. Shop Drawings: Typical installation details, showing details at flashings, at terminations, at joints, at intersection of horizontal and vertical surfaces, and at penetrations in membrane system.
- B. Samples - Submit
 - 1. Membrane, 6" x 6" samples of each membrane.
 - 2. 6" x 6" sample of flashing.
 - 3. 6" x 6" sample of drainage board.
- C. Manufacturer's Literature: Submit manufacturer's technical, safety data sheets, and installation literature for all materials of this Section. Submit Independent Test data indicating that membrane meets properties specified herein.
- D. General Contractor's Certification: Submit per Article 1.5.

1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Approximately 2 weeks prior to scheduled commencement of waterproofing installation, meet at Project site with Waterproofing Installer; preparer of substrate to receive waterproofing; installers of other work in and around waterproofing that must precede, follow, or penetrate waterproofing (including Mechanical and Electrical Installers as applicable); Architect; Owner; and waterproofing

manufacturer's representative to review materials, procedures, schedules, and other requirements and conditions related to installing waterproofing.

B. Qualifications of Subcontractors

1. Subcontractors: All work of this Section shall be performed by a subcontractor who is approved by the manufacturer of the waterproofing material.
2. Qualifications of Subcontractors: Subcontractors shall submit evidence of being bona fide waterproofing subcontractors, for a period of not less than five (5) years, and that they are approved by the manufacturer of the waterproofing material for the installation of the manufacturer's material in accordance with the requirements of this Section.
 - a. Subcontractor shall submit a letter from manufacturer of waterproofing material stating that subcontractor is approved by the manufacturer for the application of the waterproofing systems specified and accepted for use on the Project.
 - b. Letter shall certify that the subcontractor has previously and satisfactorily applied the waterproofing systems specified herein on jobs of similar size and scope, under manufacturer's supervision.
 - c. Letter shall be on manufacturer's letterhead and shall be signed by an officer of the company, not by a local sales representative.

C. Manufacturer's Representative/Contractor's Certification

1. Representative of the waterproofing material manufacturer shall be required to provide field instructions and supervision for the installation of the waterproofing systems at the start of the work of this Section.
2. The manufacturer's representative shall be required to make sure that the workmen for waterproofing systems on the site of the Project are fully instructed and trained in the handling and application of all the materials and shall see that all the materials are correctly installed.
3. Upon completion of the Installation, submit to the Architect written certification that the representative of the manufacturer of the waterproofing material has supervised the work of this Section and that all materials were correctly installed.

D. The project Geotechnical Report shall be provided to the Manufacturer for review and approval at time of waterproofing applicator's bid.

E. A preinstallation meeting shall be coordinated by the General Contractor and attended by an Owner's Representative, the Waterproofing Consultant, the waterproofing applicator and membrane manufacturer's representative. Any trade having relevant or adjacent work to blindside system before, during and after installation should also be present and properly represented by a Project Manager and Job Foreman. These trades include the Foundation Contractor, the Concrete Contractor, the Steel Reinforcement Contractor, the Mechanical Contractor, the Electrical Contractor and the Plumbing Contractor. The purpose of this meeting is to discuss the necessity of ensuring proper waterproofing membrane protection during all phases of installation and to review other applicable requirements or unusual field conditions.

- F. Upon request by the Approved Applicator, an inspection will be conducted by the Manufacturer's representative to ensure that the waterproofing membrane has been installed according to the Manufacturer's specifications and details. This inspection shall be coordinated prior to installing the blindside components so that access to the membrane is not impaired.
- G. An in-progress inspection may be scheduled after the initial inspection (after the membrane installation is completed) to ensure proper protection procedures are being followed to prevent possible damage to the membrane during the installation of above membrane components
- H. Manufacturer shall have access to the job site at the start of installation, periodically as work progresses and after installation completion for the waterproofing and any other relevant or adjacent work

1.6 STORAGE OF MATERIALS

- A. All materials shall be stored in their original tightly sealed containers or unopened packages; shall be clearly labeled with the manufacturer's name, brand name and number, and batch number of the material with expiration date where appropriate.
- B. Materials shall be stored in a neat and safe manner so as not to exceed the allowable live load of the storage area.
- C. Material shall be stored out of the weather in a clean, dry area.
- D. Liquid materials, such as adhesives, thinners and primers, shall be stored in areas away from sparks, open flames and excessive heat.

1.7 JOB CONDITIONS

- A. No application of waterproofing shall commence or proceed during inclement weather, or the threat of imminent precipitation.
- B. All surfaces to receive the system shall be thoroughly dry and free of dew or frost.
- C. Materials shall be stored until time of mixing at temperatures above 60 deg. F. to maintain a consistency suitable for mixing. Do no work below 40 deg. F.
- D. Prior to and during application, all dirt and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air, or similar methods.
- E. Surfaces not designated to receive the system shall be properly masked or otherwise protected against accidental spillage or application of the material to those areas.

1.8 PROTECTION

- A. Against Loads: Protect work of this Section against concentrated loads and any other loads or equipment that would damage the materials or work.
- B. Against Traffic: Do not permit traffic on horizontally installed work of this Section, except for workmen doing the work, during the installation, and after the installation

until membrane systems are covered with protective boards or with the specified finishing materials.

- C. Against Damage: Protect vertically installed work of this Section from damage by reinforcing and placement.
 - 1. Take and maintain necessary preventive measures to protect work of this Section from damage until Project is accepted.
 - 2. Rejection of Damaged Work
 - a. Damaged materials or work will be rejected.
 - b. Rejected materials or work must be immediately removed and replaced with new materials.

1.9 FIELD QUALITY CONTROL

- A. Construction Traffic:
 - 1. Limit construction traffic over completed membrane.
 - 2. General Contractor shall provide 1/2 in. plywood protection layer, where construction traffic is unavoidable.
- B. Inform Architect in writing on a daily basis of any of the following events. State specific location of each occurrence.
 - 1. Buckling to the Waterproofing and other deformations as a result of ground water events.
 - 2. Leakage through the finished waterproofing installation.
 - 3. Damage by other trades.
- C. Provide Manufacturer's Representative's report (prior to backfill) stating that the waterproofing has been inspected and is acceptable and eligible for manufacturer's warranty.

1.10 WARRANTY

- A. The manufacturer of the waterproofing system executed under this Section warrants the waterproofing system to be watertight and free from defects in materials and workmanship for a period of ten (10) years from date of acceptance of this Contract, and that he, agrees to promptly make repairs or replace defective waterproofing materials during the warranty period.
- B. Contractor's Two-Year Workmanship Warranty: Provide a written guarantee for all work of this Section, stating that if, within two years after the Date of Substantial Completion of the Work, any of the work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so. The guarantee shall state that the Contractor shall bear all costs incurred by the Owner, including reasonable attorney's fees, to enforce compliance with the obligations of this Guarantee, and will replace any material

or system that requires repeated maintenance or repair to function effectively. The obligation of this Guarantee shall run directly to the Owner and may be enforced by the Owner against the Contractor, shall survive the termination of the Contract and shall not be limited by Conditions other than this Contract.

PART 2 PRODUCTS

2.1 WATERPROOFING MEMBRANE

- A. Trade names used herein for membrane waterproofing are those of GCP Applied Technologies. Other acceptable manufacturers will be Carlisle Coatings and Waterproofing (CCW) or approved equal.
- B. For foundation walls, provide "Bituthene 4000" sheet waterproofing membrane, 60 mils thick and "Liquid Membrane," 60 mils thick, for flashing, as manufactured by GCP Applied Technologies or approved equal.
- C. At underslab conditions, provide adhesive coated HDPE Composite Sheet "Preprufe 300R Plus" system by GCP Applied Technologies or approved butyl alloy adhesive coated reinforced TPO Composite Sheet "MiraPly H" system by CCW.
 - 1. Blindside HDPE membrane or reinforced TPO membrane shall have a protective layer to protect the membrane from the weather and U.V. for up to 56 days before casting concrete against it.
- D. Primer/Conditioner: "Bituthene 4000" latex/water-based primer specifically formulated to provide adhesion of Bituthene Waterproofing Membranes.
 - 1. If water-based primer does not provide sufficient adhesion to substrate, substitute Bituthene Primer B-2 solvent-based primer.
- E. Mastic: "Bituthene Elastomeric Mastic" rubberized asphalt-based mastic.
- F. Tape: Double sided synthetic adhesive tape equal to "Preprufe LT" and "HC."
- G. Protection Board: 1/4" thick semi-rigid protection board, "Bituthene Asphaltic Hardboard."
- H. Bituthene Liquid Membrane: Two-component 100% solids trowel grade asphalt modified urethane.
- I. Drainage Board/Composite
 - 1. For vertical application, use "Hydroduct 220" prefabricated dimpled polystyrene drainage core with a non-woven filter fabric on one side and a polymer film on the reverse side, by GCP Applied Technologies.
 - 2. At horizontal applications, use "Hydroduct 660" by GCP Applied Technologies.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where membrane waterproofing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work. Starting of work implies acceptance of substrate.

3.2 PREPARATION OF SURFACES TO RECEIVE WATERPROOFING

- A. Conform to the requirements of specified manufacturer.
- B. Earth or crushed stone substrates shall be compacted to produce an even, sound substrate. Loose aggregate, sharp protrusions and standing water shall be removed.

3.3 INSTALLATION OF FOUNDATION WALL WATERPROOFING

- A. General: Conform to recommendations and published specifications of the manufacturer' including environmental requirements and preparation requirements to receive waterproofing.
- B. Accessible Foundation Walls
 - 1. General: The membrane, when in place must withstand a minimum static ground water pressure of 150 feet.
 - 2. Priming: Application of primer shall be limited to what can be covered with Bituthene Waterproofing Membrane in a given work day. Primed areas not covered by membrane during the work day will be reprimed. Apply primer by spray, roller or brush at a rate of 250 - 350 sq. ft. per gallon. Roller shall be natural material such as lamb's wool, having a nap of approximately one inch. Primer shall be applied to a clean, dry, frost-free and dust-free surface. Sufficient primer must be used on the day surface to condition it to a dust-free state suitable for the application of Bituthene Waterproofing Membranes.
 - a. Bituthene 4000 Surface Conditioner should not be applied below 25 deg. F. on vertical surfaces. Allow primer to dry 30 minutes. Conditioner is considered dry when the substrate returns to its original color.
 - b. Re-prime areas that become dusty or dirty prior to membrane installation.
 - 3. Membrane Installation: Apply Bituthene Waterproofing Membrane vertically in sections of 8' in length or less. On higher walls apply two or more sections with the upper overlapping the lower by a least 2-1/2". Press all membrane in place with heavy hand pressure or rollers during application.
 - 4. Sealing Edges: Bituthene Waterproofing Membrane shall be applied over the edge of the slab or over the top of the foundation or parapet wall. If the membranes are terminated on the vertical surface, a reglet or counter flashing may be used or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene Mastic to all

vertical and horizontal terminations. Bituthene Liquid Membrane can be used as an alternative method at the General Contractor's option.

5. Sealing Seams: All edges and end seams must be overlapped at least 2-1/2". Apply succeeding sheets with a minimum 2-1/2" overlap and stagger end laps. Roll or press the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Membrane. Slit any fish mouths, overlap the flaps, and repair with a patch of Bituthene and press or roll in place. The edges of the patch shall be sealed with a troweling of mastic. Laps within 12" of all corners shall be sealed with a troweling of mastic.
6. Corner Forming: Outside corners must be free of sharp edges. Inside corners shall receive a fillet formed with Liquid Membrane, latex modified cement mortar equal to Daraweld C made by Grace mixed with cement mortar or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners at the General Contractor's option:
 - a. Apply Bituthene Liquid Membrane 6" in each direction from the corner and form a fillet with a minimum 3/4" face.
 - b. Install an 11" minimum strip of Bituthene Membrane centered on the corner. Install Bituthene Membrane over the treated inside and outside corners.
7. Over waterproofing, apply drainage composite board by adhering board to cured membrane using tape or adhesive per manufacturer's recommendations; lap all edges 4" and conform to the following:
 - a. Install drainage layer directly over the membrane. Start at the low points on the wall and shingle all laps to the flow of water.
 - b. Splice drainage panels together by butting longitudinal edges of adjacent sheets and peeling back fabric to expose the cores of the panels. Install precut "lock strips" consisting of 4 dimple x 5 dimple sections of the drainage panel centered on the joint between the panels and spaced every 10 dimples along the length of the joint. Snap dimples of "lock strip" to dimples of each panel and reattach fabric over the panel joint.
 - c. Cut the core of the drainage panels around penetrations and cut an 'X' in the filter fabric and tape the fabric to the sides of the penetration.
 - d. Cover all terminal edges of the drainage composite with an integral fabric flap by tucking the fabric around the edge of the core and adhering the fabric to the bottom of the core.

3.4 INSTALLATION OF BLIND-SIDE WATERPROOFING

- A. General: Install adhesive coated HDPE composite sheet according to waterproofing manufacturer's written instructions.
 1. Install drainage layer directly over the membrane.
 2. Splice drainage panels together by butting longitudinal edges of adjacent sheets and peeling back fabric to expose the cores of the panels. Install precut "lock strips" consisting of 4 dimple x 5 dimple sections of the drainage panel centered on the joint between the panels and spaced every 10 dimples along the length of the

joint. Snap dimples of "lock strip" to dimples of each panel and reattach fabric over the panel joint.

3. Cut the core of the drainage panels around penetrations and cut an 'X' in the filter fabric and tape the fabric to the sides of the penetration.
4. Cover all terminal edges of the drainage composite with an integral fabric flap by tucking the fabric around the edge of the core and adhering the fabric to the bottom of the core.

B. Preparation

1. Surfaces to receive blind side membranes must be smooth and sound, with no gaps or voids in excess of 1/2". Earth and stone substrates must be compacted to produce an even, solid substrate. If required by membrane manufacturer, provide an additional layer of underlayment protection board over sharp or angular stone substrates. Surfaces to receive waterproofing shall be thoroughly dry and free of moisture.
2. General: Comply with manufacturer's instructions for preparing surface including joint or crack treatment.
3. Apply primer to substrate surfaces at rate recommended by manufacturer of primary waterproofing materials. Prime only area that will be covered by waterproofing membrane in same working day. Reprime areas not covered by waterproofing membrane within 24 hours.

C. Underslab Applications

1. Apply Hydroduct 660 drainage composite board as recommended by manufacturer over the compacted sub-grade.
2. Apply the membrane over the drainage composite board with the HDPE side facing the drainage composite board and the treated white coating surface facing the concrete to be poured. The membrane may be installed at any convenient length. Apply succeeding sheets by overlapping previous sheets 3" along the self-adhesive edge of the membrane. Remove the silicone coated release liner covering the membrane and roll the side lap to assure a tight seal.

3.5 SEAM REINFORCEMENT FOR HDPE COMPOSITE SHEETS ONLY

- A. Provide a 6" strip of modified bituminous sheet membrane (Bituthene 4000) centered behind all laps.
- B. At locations where a salvage edge is not present and at end laps, lap sheets 6", apply a 1/8" thick by 6" wide application of liquid membrane between sheets, to provide a 6" wide seal.
- C. Integration of old onto new pre-applied sheet membrane.
 1. Integration of Sheet Membrane onto Sheet Membrane that has been installed in excess of 30 days prior

- a. Lap sheets 12", apply a 1/8" thick by 12" wide application of fluid membrane between sheets, to provide a 12" wide seal at this location.
- b. Install Waterproofing Tape centered at edge of lap and roll firmly into place with an approved roller.
- c. Install additional Waterproofing Tape to cover white film that has been installed over 30 days prior.

2. Repair of pre-applied sheet membrane

- a. Scratch on white coating exposing underlying black surface of Sheet Membrane. Install Waterproofing Tape at areas where the white coating of the membrane is damaged, including boot scuff marks and abrasions by rebar.
- b. Damage or Puncture of Sheet Membrane: Install Patch of short Membrane set in Liquid Membrane. Patch must extend 3" in every direction around extent of damaged area. Install Waterproofing Tape centered over the edge of the patch. If the damaged area does not have 5" of sound material around it, inject Liquid Membrane into puncture until Liquid Membrane backs out, and proceed with patch as space allows.

3.6 CLEAN-UP

- A. Upon completion of the waterproofing system, the General Contractor shall remove all equipment, material and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the thermal insulation as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Insulation under slabs-on-grade.
 - 2. Foundation wall insulation.
 - 3. Concrete-faced insulated wall panels.
 - 4. Insulated wood sheathing panels.
 - 5. Foil-faced blanket insulation.
 - 6. Closed-cell spray foam insulation.
 - 7. Attachment devices.

1.3 RELATED SECTIONS

- A. Roof insulation - Division 7.
- B. Firestops and Smoke seals - Section 07 84 13.
- C. Gypsum Drywall - Section 09 29 00, for acoustical insulation.
- D. Earthwork - Division 31.

1.4 SUBMITTALS

- A. Submit product data for each type of product indicated, including re-cycled content.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Vertical and Lateral Fire Propagation Test Characteristics: The exterior wall assembly is required to comply with NFPA 285 "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components." The base wall, stud cavity insulation, wall sheathing, air barrier, continuous wall rigid insulation and exterior cladding are components that are required to be evaluated as part of this specific assembly test. The basis of design product listed herein is a component of the design test assembly selected by the Architect.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.
- C. Take every precaution to prevent the insulation from becoming wet, cover with tarps or other weather/watertight sheet goods.

PART 2 PRODUCTS

2.1 FOUNDATION WALL AND UNDERSLAB INSULATION

- A. Provide extruded polystyrene board insulation equal to "Styrofoam" manufactured by Dow Chemical Co. or approved equal made by Owens Corning or PACTIV Building Products, conforming to ASTM C 578, Type IV, with a maximum flame spread and smoke developed indices of 75 and 450 respectively.
- B. Insulation shall have an aged R value of not less than 5/inch; shall be 2" thick unless otherwise noted on the drawings.

2.2 CONCRETE-FACED INSULATED WALL PANELS

- A. Perimeter Insulation: Provide "WallGUARD" as manufactured by T. Clear Corporation; extruded polystyrene board conforming to ASTM C 578, Type IV, rigid, closed-cell, with integral 5/16" (8mm) thick, latex-modified concrete facing.
 - 1. Thermal Resistance: Long term aged R-value of 5 per inch, to ASTM C 518.
 - 2. Board Size: 24" x 48", with insulation thickness of 3" (R-15).
 - 3. Compressive Strength: Conforming to ASTM D 1621, minimum 40 psi.

4. Water Absorption: Conforming to ASTM D 2842, <0.1 (0.7% by volume max).
 5. Edges: Tongue-and-groove sides, square edge ends.
 6. Water Vapor Permeance: Conforming to ASTM E 96, 0.8.
- B. Clips and Fasteners: Corrosion-resistant type, stainless steel, sized to suit application; as supplied by insulation manufacturer.

2.3 INSULATED SHEATHING PANELS

- A. Board Insulation Bonded to Wood Panel: Provide continuous insulation wall panels equal to "Hunter Xci Ply" manufactured by Hunter Panels, or approved equal, composed of a closed cell polyisocyanurate foam core bonded on both sides to a coated glass facer and bonded to wood panel on one side, conforming to ASTM C 1289, Type V, Grade 3. Insulation joints shall be taped with manufacturer's compatible waterproof tape.
1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 2. Boards shall be 48" wide x 96" long, thickness as noted on the drawings.
 3. Insulation shall have an aged R-value/inch @ 75 deg. F. of not less than 4.5 hr.ft.²F/Btu, per ASTM C 518.
- B. Fasteners: Corrosion-resistant type with oversized heads. Length of fasteners shall be as recommended by the panel manufacturer.
1. Provide Hunter SIP HD (16 gauge steel stud up to ¼ inch steel), Hunter SIP SD (Concrete, CMU, 18 gauge and lighter Steel Stud), and Hunter SIP WD (FRT Wood).

2.4 BLANKET INSULATION

- A. Unfaced, Glass-Fiber Blanket Insulation (within Floor System): ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
1. Thickness: 6-1/4" nominal
 2. Density: 0.5 pcf
- B. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim Kraft, or foil-scrim polyethylene.
1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2. Insulation shall have an R value of not less than 3.7/inch and shall be 3.5" thick unless otherwise noted on the drawings.

2.5 SPRAY FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: "Icynene MD-C-200" spray-applied, rigid closed-cell polyurethane insulation manufactured by Icynene, or approved equal; 2.2 lb./cu. ft. density material per ASTM D 1622; meets Class 1 requirements of ASTM E 84.
 1. R-Value shall be 6.5 per inch per ASTM C 518.
 2. Bond strength shall be greater than 100 psf per ASTM E 736.
 3. Product shall be Class 1 Class A per ASTM E 84/ UL 723.
 4. Product shall be tested in accordance with UBC 26-2 Test Method for the evaluation of Thermal Barriers (ASTM E 119).
 5. Product shall pass Full-Scale Corner Test.
 6. Product shall have passed the Air Barrier Association of America (ABAA) testing and be an approved air barrier product.
 7. Provide manufacturer's written certification that product contains no asbestos.
- B. Thermal Barrier: DC315 thermal ignition barrier over spray-applied insulation, or approved equal.
- C. NOTE: Ensure that closed-cell spray foam insulation is compatible with spray-applied fireproofing.

2.6 ACCESSORIES

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place. Provide "Series T TACTOO Insul-Hangers" by AGM Industries, Inc., "Sprindle Type" by Gemco, or approved equal.
 1. Plate: Perforated, galvanized carbon-steel sheet, 0.030" thick by 2" square.
 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105" in diameter; length to suit depth of insulation indicated.
 3. Affix plate with stainless steel staple or screw.
- B. Adhesive for Bonding Insulation: The type recommended by the insulation manufacturer and complying with fire-resistance requirements.
 1. For bonding rigid polystyrene insulation to masonry or concrete, provide adhesive equal to "Foamgrab PS" made by Dacor Products Co. or equal made by ChemRex Inc. or Miracle Adhesives.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where thermal insulation is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION, GENERAL

- A. Clean substrates of substances that are harmful to insulation including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.
- B. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- C. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- D. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24" below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 36" in from exterior walls.

3.4 INSTALLATION OF BLANKET INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

- B. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96", support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward interior of construction as indicated on Drawings.

3.5 INSTALLATION OF INSULATED SHEATHING PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Fasten insulation to substrate. Provide base support for the insulation panels as required for the exterior cladding to be installed over the panels. Exterior cladding must be attached through to the framing as required by the cladding manufacturer. Coordinate with the cladding or wall finish manufacturer for the attachment requirements over insulation panels.

3.6 INSTALLATION OF SPRAY FOAM INSULATION

- A. Apply self-supported, spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make it flush with face of studs by using method recommended by insulation manufacturer.

3.7 PROTECTION

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

END OF SECTION

SECTION 07 26 16

BELOW-SLAB VAPOR RETARDER

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the below-slab vapor retarder as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Confirm that the substrates for the below-slab vapor retarder are acceptable.
 - 2. Provide a below-slab vapor retarder below structural slab.
 - 3. Integrate the vapor retarder with all surrounding work; coordinate all work with related trades.
 - 4. Provide all necessary permits and fees for this work, including building permits, inspection fees, police detail, etc.

1.3 RELATED SECTIONS

- A. Review specifications for related work for purposes of coordination.
- B. Work in conjunction with the other trades employed on the project by promptly completing the work of this Section as required to meet the project schedule and so as not to impede other trades. Coordinate the work of this Section with other trades so that the intent of the Drawings and Specifications is carried out. Coordinate with other trades to maximize efficient use of scaffolding, to minimize disruption to the building, and to avoid unnecessary traffic over unprotected roof areas.

1.4 SUBMITTALS

- A. Submit the following items in time to allow for review by the Architect and resubmittals, if needed, without delaying the work. Do not order materials or start work before receiving the Architect's written approval.
 - 1. Shop drawings of all conditions and details, including connection to all surrounding work and isometric (3D) details of complex conditions. Include work sequence for conditions between work of this Section and surrounding work; coordinate with related trades.
 - 2. Contractor's qualifications.

3. Samples and/or manufacturer's literature for all materials specified or proposed for use on the project, properly labeled and referenced to the appropriate specification section. Samples required include, but are not limited to, the following:
 - a. Vapor retarder.
 - b. Seam tape.
 - c. Protection layer.
 - d. Any product or material proposed for substitution.
4. Certifications (in time for review to prevent delay in the work) by the producers of all materials stating that the materials supplied comply with all the requirements of the referenced standards and that all materials are suitable for the use specified herein.
5. Material Safety Data Sheets (MSDS) for each material where appropriate.
6. Project Schedule and Sequencing. Submit updated project schedule weekly throughout the project to reflect current status and project schedule.
7. Vapor retarder manufacturer's sample guarantees.

1.5 QUALITY ASSURANCE

- A. Conduct a quality control program that includes the following as a minimum:
 1. Inspect conditions and materials to ensure conformity to the contract requirements.
 2. Continuously inspect substrate conditions and coordinate with the Architect to ensure proper substrate preparation in conformance with the contract requirements.
 3. The Contractor shall arrange with the vapor retarder manufacturer to have a competent field representative visit the site to inspect the workmanship and the quality of the work. The manufacturer should visit the site as required to observe the progress of the work, but at least three times during the course of the project. The field representatives shall issue written reports of their findings and recommendations for corrective work, if any, to the Architect. The Contractor shall include all costs for the field representative, including all expenses, in the project bid price.
 - a. The representative shall review and approve the condition of substrates prior to application of vapor retarder.
 - b. The representative shall observe the first one to two days of application of vapor retarder.
 - c. Representative shall review and approve below-slab-vapor-retarder conditions prior to pouring concrete.
 4. Inspect work in progress and during inclement weather to ensure that the work is in compliance with approved procedures.

- 5. Inspect all completed and any corrected work for compliance with the Contract Documents and the vapor retarder manufacturers' recommendations.
- B. The vapor retarder system shall be applied by an approved contractor authorized by the vapor retarder manufacturer to perform the work.
- C. Attend a preconstruction conference to be held with representatives of the Owner, Contractor, Architect, and all other involved trades and parties to discuss the work covered under this Section.
- D. Attend weekly job meetings during the course of the work as required by the Owner.
- E. The Contractor/Subcontractor and its site superintendent(s) and Foreman shall have at least five years' experience with similar vapor retarder and flashing work with success.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor is responsible for protecting all materials and equipment stored on the site.
- B. All materials to be new. Handle all materials to prevent damage. Place materials on pallets. Use waterproof and fireproof canvas tarpaulins (not polyethylene) to cover all stored materials top to bottom.
- C. Deliver materials clearly marked with legible and intact labels with manufacturer's name and brand name, and identifying contents of containers.
- D. Materials shall be marked with the date of manufacture and shelf life. Do not use products beyond the expiration of their shelf life.
- E. Protect all materials in original unopened labeled containers and packaging and in compliance with manufacturer's directions. Comply with manufacturer's recommendations for minimum and maximum time and temperature limits for storage. Store flammable materials in a cool, dry, protected area away from sparks and open flames.
- F. Promptly remove from the site all materials rejected by the Architect or exposed to any moisture anywhere, at any time, during transportation, storage, handling, and installation.
- G. Do not stockpile materials or equipment to overload any building or site component.
- H. Protect materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed when not in use and away from open flames. Protect liquid components from freezing.
- I. Store rolled goods on ends only. Discard rolls that have been flattened, creased, or otherwise damaged. Unroll sheets and allow them to "relax" prior to use.
- J. Do not dilute primers, waterproofing cements, adhesives, coatings, or sealants. Keep containers closed, except when removing materials. Do not use equipment that is contaminated with materials that may be incompatible with the work.

- K. Dispose of debris as required by state and local ordinances. All debris shall be removed from the site and the site returned to its original condition upon completion of the project.
- L. Do not allow wrappers, packaging materials, or any other debris to be included in the vapor retarder system.

1.7 PROJECT CONDITIONS

- A. Coordinate the work, use of the site, storage areas, and staging areas with the Contractor. Limit use of the site and working hours to dates, times, and locations approved by the Contractor.
- B. All equipment used on the project shall comply with all applicable municipal and safety regulations – including OSHA guidelines – and be suitable for reasonable access for inspection of the Owner's representative, who shall have free access to the work via the Contractor's equipment.
- C. Compliance with OSHA and all other safety laws and regulations is the exclusive responsibility of the Contractor, its Subcontractors, suppliers, consultants, and servants.

1.8 WARRANTY/GUARANTEE

- A. Guarantee all work under this Section in a document stating that if, within two years after the Date of Substantial Completion of the Work, any of the work of this Section is found to be defective or not in accordance with the Contract Documents, the Contractor shall, at its sole cost and expense, correct it promptly after receipt of a written notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. Also, state that the Contractor shall bear all costs incurred by the Owner, including reasonable attorney's fees, court costs, and expert witness and consultant fees, to enforce Contractor's compliance with the obligations of this Guarantee. The obligations of this Guarantee shall run directly to the Owner and its successors and assigns and may be enforced by the Owner and its successors and assigns against the Contractor, shall survive the termination of the Contract, and shall not be limited by conditions other than this Contract.

PART 2 PRODUCTS

2.1 GENERAL

- A. Check the availability of all specified items early and report any long lead times that may impact the intended schedule to the Owner promptly to prevent delays in the work.
- B. All materials are to be new. Handle, store, and install materials as recommended by the manufacturer. Materials shall be delivered to the job site in their original containers with the manufacturer's name, grade, number, and batch identification on the container or packaging.

2.2 MATERIALS

- A. Unless approved by the Architect, obtain all vapor retarder materials from the same manufacturer. All components of the vapor retarder system shall be as manufactured by, or approved by, the vapor retarder manufacturer and will be included in the vapor retarder system manufacturer's warranty.
- B. Vapor Retarder Materials
 - 1. Manufacturers: "Florprufe 120" made by GCP Applied Technologies or approved equal.
 - 2. Membrane: Self-adhering rubberized asphalt and polyethylene sheet membrane, 0.021" thick, and tensile strength 65 lbs./in., vapor permeance 0.03 perms.

PART 3 EXECUTION

3.1 GENERAL WORKMANSHIP

- A. Vapor retarder systems shall be installed by contractors specifically authorized by the appropriate manufacturer prior to bid. Perform all work with trained personnel.
- B. Arrange work sequence to avoid use of newly constructed vapor retarder for storage, walking surface, and equipment movement. Where access is absolutely required, protect surfaces with smooth 1/2 in. thick plywood runways to ensure full protection of vapor retarder surfaces and all other work against mechanical damage. Provide additional protection if needed to prevent damage. Move equipment and ground storage areas as work progresses to avoid abuse of completed vapor retarder.
- C. Replace any new materials scheduled to remain that are damaged due to weather or other causes during the period of the work at no additional cost to the Owner. If water causes damage, remove and replace all wet materials at no additional cost to the Owner.
- D. Do not work in temperatures below 40°F. Comply with applicable recommendations by manufacturers of all materials and workmanship and handling, except as modified in this Section.
- E. Promptly remove from the site all damaged, defective, or rejected materials. Remove from the site all materials rejected by the Owner or Architect.
- F. Components of the vapor retarder system may be toxic and flammable. Heed all manufacturer's cautions and warnings concerning their use. Completed vapor retarder is slippery when wet or frost-covered. Take proper precautions.
- G. Do not use equipment for vapor retarder installation that is contaminated with materials that may be incompatible.
- H. Workers and all others that walk on the waterproofing membrane shall wear clean soft-soled shoes so as not to damage vapor retarder and related materials.

3.2 REPAIR AND PREPARATION OF SURFACES TO RECEIVE VAPOR RETARDER

A. General

1. Examine all surfaces scheduled to receive vapor retarder for roughness, contaminants, unsound structural substrates, or other conditions that may impair the vapor retarder application. Notify the Architect in writing of any such conditions; do not commence work until all defects are remedied.
2. Clean the all substrates of all foreign substances and remove loose materials, grease, oil, and other contaminants. The vapor retarder contractor and manufacturer shall inspect and approve the substrates before application of the vapor retarder system.

- B. For horizontal surfaces to receive vapor retarder, the earth and crushed stone substrates shall be compacted to produce an even, sound substrate. Loose aggregate, sharp protrusions, and standing water shall be removed.

3.3 VAPOR RETARDER INSTALLATION

A. General

1. Conform to recommendations and published specifications of the manufacturer, including environmental requirements.
2. Do not allow water to pond on vapor retarder. Promptly remove water that collects on vapor retarder with vacuum or other method acceptable to Architect.

B. Installation of Below-Slab Vapor Barrier

1. Loose lay membrane over prepared, compacted 6" gravel base placing membrane with smooth side down and plastic liner side up facing concrete slab. Overlap membrane 2" and tape joints. Remove liner before concrete pour.
2. Mix and apply Bituthene liquid membrane compound to seal around slab penetrations.

3.4 VAPOR RETARDER INSPECTION AND REPAIR

- A. Inspection and repair of the below-slab vapor retarder system shall occur before installation of the reinforcement steel, before installation of formwork, and prior to placement of the concrete. Punctures shall be repaired as follows:

1. Clean surface with damp cloth, or water jet if required. Allow to dry.
2. For pinholes, apply repair tape, centered over puncture, roll firmly, remembering to remove release liner.
3. For damage other than pinholes, apply vapor retarder patch that extends 6 in. beyond opening; seal edges with seam tape.
4. Remove and reinstall concrete reinforcement if required for installation of patch.

3.5 CLEAN-UP

- A. Upon completion of the vapor retarder system, the General Contactor shall remove all equipment, material, and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.
- B. All water shall be removed from the vapor retarder before placement of concrete.

END OF SECTION

SECTION 07 27 00

VAPOR PERMEABLE AIR BARRIER LIQUID MEMBRANE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the vapor permeable air barrier liquid membrane as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Vapor permeable/air barrier applied over sheathing board and cold-formed metal framing.
 - 2. Materials and installation to bridge and seal the following air leakage pathways and gaps:
 - a. Connections of the walls to the roof.
 - b. Connections of the walls to the foundations.
 - c. Seismic and expansion joints.
 - d. Openings and penetrations of window frames, storefront, curtain wall.
 - e. Door frames.
 - f. Piping, conduit, duct and similar penetrations.
 - g. Masonry ties, screws, bolts and similar penetrations.
 - h. All other air leakage pathways in the building envelope.

1.3 RELATED SECTIONS

- A. Cold-Formed Metal Framing, including sheathing - Section 05 40 00.

1.4 SUBMITTALS

- A. Provide evidence to the Architect of licensing and certification under the Air Barrier Association of America's (ABAA's) Quality Assurance Program.
- B. Submit shop drawings showing locations and extent of air/vapor barrier and details of all typical conditions, intersections with other envelope systems and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated and how miscellaneous penetrations such as conduits, pipes electric boxes and the like are sealed.
- C. Submit manufacturer's product data sheets for each type of membrane, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.

- D. Submit manufacturer's data showing solids content of fluid applied membranes and coverage rates and wet film thickness upon application in order to achieve minimum dry film thickness required by this specification.
- E. Submit manufacturer's installation instructions.
- F. Submit certification by air/vapor barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- G. Submit certification of compatibility by air/vapor barrier manufacturer, listing all materials on the project that it connects to or that come in contact with it, including sealant as specified in Section 05 40 00 for caulking joints between sheathing panels.
- H. Submit samples, 3 by 4 inch minimum size, of each air/vapor barrier material required for Project.
- I. Test results of air permeability testing of primary air barrier material (ASTM E 2178-01).
- J. Test results of assembly in accordance with ASTM E 2357.

1.5 PERFORMANCE REQUIREMENTS

- A. Provide air/vapor barrier constructed to perform as a continuous air/vapor barrier, and as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. Membrane shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.
- B. Provide an air barrier assembly that has been tested in accordance with the Air Barrier Association of America's (ABAA's) approved testing protocol to provide air leakage results not to exceed 0.01 cfm/sf @ 1.57 psf.
- C. NFPA 285 Compliance.
- D. Connections to Adjacent Materials: Provide connections to adjacent materials at the following locations and show same on shop drawings:
 - 1. Foundation and walls, including penetrations, ties and anchors.
 - 2. Walls, windows, curtain walls, storefronts, louvers or doors.
 - 3. Different wall assemblies, and fixed openings within those assemblies.
 - 4. Wall and roof connections.
 - 5. Floors over unconditioned space.
 - 6. Walls, floor and roof across construction, control and expansion joints.
 - 7. Walls, floors and roof to utility, pipe and duct penetrations.
 - 8. Seismic and expansion joints.
 - 9. All other leakage pathways in the building envelope.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. The air barrier contractor shall be, during the bidding period as well as for the duration of the installation, officially recognized as a Licensed Contractor by the Air Barrier Association of America (ABAA). The contractor shall carry liability insurance and bonding.
2. Each worker who is installing air barriers must be either a Certified Applicator or an installer who is registered with ABAA.
3. Each Lead Certified Applicator can supervise a maximum of five registered installers. The Certified Applicator shall be thoroughly trained and experienced in the installation of air barriers of the types being applied. Lead Certified Applicators shall perform or directly supervise all air/vapor barrier work on the project.

B. Single-Source Responsibility: Obtain air/vapor barrier materials from a single manufacturer regularly engaged in manufacturing the product.

C. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

D. Field-Constructed Mock-Ups: Prior to installation of air/vapor barrier, apply air/vapor barrier as follows to verify details under shop drawing submittals and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution:

1. Construct typical exterior wall panel, 8 feet long by 8 feet wide (one of CMU and one of sheathed areas, incorporating back-up wall, cladding, window and doorframe and sill, insulation, flashing, building corner condition, and typical penetrations and gaps; illustrating materials interface and seals.

E. Test mock-up in accordance with ASTM E 783 and ASTM E 1105 for air and water infiltration.

F. Manufacturer shall be on-site at least once a week to observe installation and provide written report within 3 days.

G. Manufacturer shall confirm all termination details and compatibility with materials being terminated to.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air/vapor barrier manufacturer. Protect stored materials from direct sunlight.

C. Avoid spillage. Immediately notify Owner, Architect if spillage occurs and start clean up procedures.

- D. Clean spills and leave area as it was prior to spill.

1.8 WARRANTY

- A. System Warranty: Provide the manufacturer's five (5) year system warranty, including the primary air/vapor barrier and installed accessory sealant and membrane materials which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Liquid Membrane: "Air-Bloc 31MR" or "Air-Bloc 17MR Vapor Permeable Liquid Membrane" by Henry Company, "Perm-A-Barrier VP" by GCP Applied Technologies or approved equal. Trade names used herein are those of Henry Company.
- B. Sheet Transition Membrane: Blueskin SA or VP 160.
- C. Window and Door Opening Flashing: Blueskin SA or Metal Clad.
- D. Alternative Liquid Applied Flashing: Henry Air-Bloc LF.
- E. Through-Wall Flashing: Blueskin TWF.
- F. Primer for Blueskin: Blueskin LVC Adhesive.
- G. Air Barrier Sealant: HE 925 BES Sealant.
- H. Substrate Cleaner: Mineral spirits or Xylol.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where the above grade waterproof membrane is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected to permit proper installation of the work.

3.2 SURFACE PREPARATION

- A. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants.
- B. Cracks in masonry and concrete up to 1/4" wide shall be filled with a trowel application of Air-Bloc 31MR, Air-Bloc LF or HE 925 Sealant and allowed to cure overnight prior to application of the liquid membrane to the surface, or alternatively, the cracks may be sealed with a strip of Blueskin membrane applied to the substrate. Cracks wider than 1/4" should be sealed with Blueskin membrane adhered to the substrate lapped a minimum of 3" on both sides of the crack.
- C. Joints in sheathing up to 1/2" can be treated with HE 925 BES Sealant or Air-Bloc LF.

- D. Surfaces should be tied in with beams, columns, etc. using strips of Blueskin SA or VP 160 lapped a minimum of 3" on both substrates. Mechanical attachment should be made to all window and door frames, or a properly designed sealant joint provided.

3.3 TRANSITION MEMBRANE

- A. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 3" overlap at all ends and side laps.
- B. Tie-in to window frames, metal door frames, etc., and at the interface of dissimilar materials as indicated on the Drawings.
- C. Promptly roll all laps and membrane with a counter top roller to effect seal.
- D. Ensure all preparatory work is complete prior to applying Air-Bloc 31MR.

3.4 THROUGH-WALL FLASHING MEMBRANE

- A. Align and position the leading edge of Blueskin TWF self-adhering through-wall flashing membrane with the front horizontal edge of the foundation walls or shelf angles, partially remove protective film and roll membrane over surface and up vertically.
- B. Press firmly into place. Ensure minimum 50mm overlap at all end and side laps.
- C. Promptly roll all laps and membrane to effect the seal.
- D. Ensure all preparatory work is complete prior to applying Blueskin TWF.
- E. Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry veneer. Trim off excess as directed by the consultant.
- F. Apply through-wall flashing membrane along the base of masonry veneer walls, over windows, doors and all other wall openings. Membrane shall form continuous flashing and shall extend up a minimum of 4-1/2" up the back-up wall.
- G. When flashing at window openings, wrap the entire window opening with air barrier flashing membrane.

3.5 LIQUID MEMBRANE APPLICATION

- A. Apply Air-Bloc 31MR to wall substrates in a continuous coat at manufacturer's recommended rate by spray or trowel to provide a minimum wet film thickness of 0.093".
 - 1. Minimum dry film thickness shall be 0.078".
- B. Overlap liquid membrane on to transition membrane at connections a minimum of 1".
- C. Trowel Air-Bloc 31MR around ties and other projections to ensure a complete seal.
- D. Do not leave membrane exposed for any longer than 6 weeks.

- E. Penetrations: Seal all penetrations with termination mastic liquid membrane, sealant, flashing or other procedures in accordance with manufacturer's instructions.

3.6 PROTECTING AND CLEANING

- A. Protect air/vapor barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Protect air/vapor barrier from exposure to the elements as required by the manufacturer.
- D. Remove any masking materials after installation. Clean any stains on materials that would be exposed in the completed work using procedures as recommended by manufacturer.
 - 1. Schedule work to ensure that the air and vapor barrier system is covered as soon as possible after installation. Protect air and vapor barrier system from damage during subsequent operations. If the air and vapor barrier system cannot be permanently covered within 90 days after installation, apply temporary UV protection.

3.7 FIELD QUALITY CONTROL

- A. Air Barrier Association of America Installer Audits: Cooperate with ABAA's testing agency. Allow access to work areas and staging. Notify ABAA in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted. Arrange and pay for site inspections by ABAA to verify conformance with the material Manufacturer's instructions, the site Quality Assurance Program used by ABAA, and this Section of the project specification.
 - 1. Audits and subsequent testing shall be carried out at the following rate:
 - a. Up to 10,000 ft² of air barrier contract requires one (1) audit.
 - b. 10,001 – 35,000 ft² of air barrier contract requires two (2) audits.
 - c. 35,001 – 75,000 ft² of air barrier contract requires three (3) audits.
 - d. 75,001 - 125,000 ft² of air barrier contract requires four (4) audits.
 - e. 125,001 – 200,000 ft² of air barrier contract requires five (5) audits.
 - f. 200,001 ft² and over of air barrier contract requires six (6) audits.
 - 2. Forward written audit reports to the Architect within 10 working days of the inspection and test being performed.
 - 3. If the inspections reveal any defects, promptly remove and replace defective work at no additional cost to the Owner.
- B. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.

2. Remove and replace deficient air-barrier components for retesting as specified above.
- C. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

END OF SECTION

SECTION 07 41 13

STANDING-SEAM METAL ROOFING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the metal roofing as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Preformed, standing-seam metal roof system.
 - 2. Nailable roof insulation below metal roof system.
 - 3. Snow guards.
 - 4. Closure, flashing, trim, caps, roof edges, gutter, and related sheet metal work.
 - 5. Supports and accessories.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.

1.4 REFERENCES

- A. ASTM A 463 Steel sheet, zinc-coated (galvanized) by the hot dip process, structural physical quality.
- B. ASTM A 653 Steel sheet, zinc-coated by the hot dip process.
- C. ASTM A 792 Steel sheet, aluminum-zinc alloy coated.
- D. ASTM B 209 Aluminum and aluminum alloy sheet and plate.
- E. ASTM E 1592 Test Method for Structural Performance of Sheet Metal Roofing and Siding Systems by Uniform Air Pressure Difference.
- F. SMACNA Architectural Sheet Metal Manual.
- G. Manufacturer shall have had at least ten (10) years' experience in architectural roofing, and the roof systems shall have been in use for at least ten (10) years. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.

- H. The installer shall be authorized by the manufacturer, and the actual work shall be supervised by personnel trained by the manufacturer in proper application of the product. The installer shall have capability for preparation of shop details and fabrication of all flashings not furnished by the panel manufacturer.

1.5 SUBMITTALS

- A. Shop Drawings: Shop drawings must be in scale large enough to clearly show all details. Include dimensions of fabricated work, reference dimensions to the structure, type, size and spacing of fasteners, material thickness and finishes, plan layout with erection sequence and coordination required with other trades. Shop drawings must be reviewed and approved by the Architect prior to commencement of work.
- B. Manufacturer's Data: Submit for information only, metal manufacturer's specifications, installation instructions and general recommendations for roofing applications. Include manufacturer's certification or other data substantiating that the materials comply with the requirements and are adequate to support roof loads as required by Code. Indicate by copy of transmittal that the Fabricator/Installer has received copy of manufacturer's instructions and recommendations.
- C. Samples: Submit 12" square samples of each specified metal and gauge to be used on roofing. Samples will be reviewed by Architect for thickness and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.
- D. Submit certification indicating manufacturer's experience qualifications.

1.6 PERFORMANCE REQUIREMENTS

- A. Provide manufactured roof panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.
- B. Air Infiltration: Provide manufactured roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed roof area when tested according to ASTM E 1680 at a static-air-pressure difference of 4.0 lbf/sq. ft.
- C. Water Penetration: Provide manufactured roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward acting, wind load design pressure of not less than 6.24 lb./sq. ft and not more than 12.0 lb./sq. ft.
- D. Metal roof assembly shall be capable of passing ASTM E 1592 testing without failure of any kind when subject to wind uplift pressure as required by Code.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Protection shall be provided during fabrication, shipment, storage and erection. During shipment, finished surfaces shall be protected from abrasion by a removable plastic film between areas of contact. Job site storage shall be in a clean, dry area out of

direct contact with the ground, under cover or sloped for drainage, protected from abuse by traffic and from contamination by corrosive or staining materials. Stored materials and unfinished work shall be secured against wind damage. Installed panels shall be protected from abuse by other trades.

1.8 WARRANTY

- A. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Architect a written warranty signed by the Roofing Contractor, and endorsed by the roofing materials manufacturer guaranteeing that the installed roofing will remain intact and free from leaks for a period of at least ten (10) years.
- B. Paint finish shall have a twenty (20) year guarantee against cracking, peeling and fade.

PART 2 PRODUCTS

2.1 METAL ROOFING

- A. Metal roof shall be structural seam standing seam roof system equal to "Zip-Rib" as manufactured by Merchant & Evans, Inc. or comparable product by Atlanta Metal Products, Inc., Berridge Manufacturing Co., Centria, or approved equal.
- B. Panels shall be fabricated in full lengths from ridge to eave without end laps. Panels shall be 16" wide maximum with concealed anchors that resist wind uplift yet permit expansion and contraction with temperature changes. Standing ribs 2-1/2" high minimum shall have a continuous groove capillary break. Ribs shall be securely locked over anchor clips with a field operated roll-forming tool. Individual panels shall be removable for replacement of damaged material. Panel shall be:
 - 1. Smooth between ribs (no intermediate stiffener ribs).
 - 2. Smooth prefinished AZ-50 aluminum-zinc alloy coated steel (Galvalume) 50 ksi per ASTM A792 in 22 gauge.
- C. Finish shall be a full strength 70% Kynar 500/Hylar 5000 fluorocarbon (polyvinylidene fluoride, PVG) baked-on coating, factory applied prior to forming. The treatment shall be a two coat system consisting of a single coat of 0.3 mil primer followed by a finish coat of 0.8 mil of 70% Kynar with a total dry film thickness of 1.0 mil + 0.2 mil and panel color to be selected from manufacturers standard color chart. The reverse side of the panels shall be treated with a back coat system consisting of a 0.2 mil. primer with a 0.35 mil topcoat, total dry film thickness 0.5 mil + m 0.1 mil.
 - 1. Custom color and gloss as selected by the Architect. Architect shall select from manufacturer's standard and premium Zip rib colors.
- D. Standing seam roof panels shall be factory formed, and panel assembly designed for concealed mechanical attachment of panels to roof purlins or deck.
 - 1. Provide minimum 0.0625" thick, stainless steel panel clips designed to meet negative load requirements.

2. Mechanically seamed cleats formed from minimum 0.0250" thick, stainless-steel- or nylon-coated aluminum sheets.
- E. OSB Nail Board Insulation: "Nailboard" polyisocyanurate nailable roof insulation manufactured by Johns Manville or approved equal.
- F. Self-Adhering, High-Temperature Underlayment: Provide "Titanium PSU 20" by Interwrap Roofing Products, or approved equal; self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

2.2 MISCELLANEOUS MATERIALS

- A. Provide components required for a complete roof panel assembly including trim, copings, fascia, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
 1. Closure Strips: Closed-cell, self extinguishing, expanded, cellular, rubber or cross-linked, polyolefin foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.
 2. Sealing Tape: Pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape.
 3. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to seal joints in panel roofing and remain weathertight. Provide sealant recommended by panel manufacturer.
- B. Snow Guards: Provide "ColorGard" as manufactured by S-5!, non-penetrating, seam-mounted, clip-on, rail-type snow guards, compatible with preformed metal roofing system and factory-finished to match adjacent metal roofing system finish.
- C. Fasteners shall be self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Use stainless steel fasteners for all exterior applications and galvanized steel fasteners for interior applications.
- D. Bituminous coating shall be cold applied asphalt mastic, SSPC - Paint 12, compounded for 15 mil dry film thickness per coat. Provide inert type non corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 PANEL SUPPORTS AND ANCHORAGE

- A. Secondary Framing: Provide components complying with the Light Gage Structural Institute's "Guide Specifications," and "Manufactured Roof and Wall Panels."
- B. Roof Purlins: C- or Z-shaped sections fabricated from 0.0598" thick (16 gauge), shop painted, roll-formed steel. Purlin spacers fabricated from 0.079" thick, cold-formed, galvanized steel sections.
- C. Eave Struts: Unequal flange, C-shaped sections formed to provide adequate back-up for roof panels. Fabricate from 0.0598" thick, shop-painted, roll formed steel.
- D. Flange and Sag Bracing: 1-5/8" by 1-5/8" angles, fabricated from 0.0598" thick, shop painted, roll-formed steel.

2.4 FABRICATION

- A. Comply with dimensions, profile limitations, gauges, and fabrication details shown on drawings and specified herein.
- B. Fabricate components of the system in factory, ready for field installation.
- C. Fabricate components and assembly units to comply with performance requirements specified.
- D. Apply specified finishes in conformance with manufacturer's standards, and according to manufacturer's instructions.
- E. In addition to requirements specified herein or shown on drawings, all surfaces exposed to view shall be clean, and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs and other defects which mar appearance of finished work. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.
- F. Materials used shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where the metal roof systems are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions for assembly, installation and erection of roof systems.
- B. Install roof purlins securely anchoring same to metal deck.
- C. Metal Separation: Apply a coat of bituminous paint, concealed, on one or both surfaces wherever dissimilar metals would otherwise be in contact.
- D. Install rigid insulation between purlins. Fasten to metal deck using FM approved fasteners spaced 2'-0" both direction.
- E. Anchor component parts securely in place, providing for necessary thermal and structural movement.
- F. Joint Sealers: Install gaskets, joint fillers and sealants where required for weatherproof performance of system. Provide type of gaskets and sealants/fillers recommended by manufacturer.
- G. Installation of Metal Roof Panels
 - 1. Conform to standards set forth in the SMACNA architectural sheet metal manuals and manufacturer's recommendations.
 - 2. Install panels so that they are weathertight, without waves, warps, buckles or distortions, and allow for expansion and contraction.
 - 3. Caulk all flashing and panel joints that require caulking to prevent water penetration.
 - 4. Seam panels together with electric powered seaming machine supplied by the manufacturer to ensure a weathertight seam.
 - 5. Remove any strippable film immediately upon installation.
- H. Damaged Material: Remove and replace panels and component parts of the work which have been damaged (including finish) beyond successful repair, as directed by the Architect. Repair minor damage.
- I. Clean exposed surfaces of metal panels promptly after completion of installation. Comply with recommendations of the manufacturer.

END OF SECTION

SECTION 07 46 46

FIBER-CEMENT SIDING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the fiber-cement siding as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Fiber cement siding and trim.
 - 2. Air infiltration barrier.
 - 3. Fasteners and accessories.

1.3 RELATED SECTIONS

- A. Cold-Formed Metal Framing - Section 05 40 00.
- B. Joint Sealers - Section 07 92 00.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups for siding including accessories.
 - a. Size: As directed by the Architect.
 - b. Show exposure, shadow detail with trim piece, and corner lapping.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 SUBMITTALS

A. Submit the following:

1. Materials List of items proposed to be provided under this Section.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Manufacturer's recommended installation procedures.
5. Submit three 6" x 6" samples of shingle siding, and full size samples of fasteners.

1.6 MATERIALS STORAGE

- A. Store materials in an area protected from the weather and other trades in a clean, dry, well ventilated area. As soon as siding has been delivered and stored under cover, unwrap to allow for ventilation to prevent excessive water condensation.
- B. All materials shall be delivered and stored in their original packaging, bearing the manufacturer's name, related standards and any other specification or reference accepted as standard.

1.7 WARRANTY

- A. Provide manufacturer's standard 30-year warranty for fiber-cement siding.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cementitious Siding Panels (Basis of Design): Provide fiber cement siding panels as manufactured by James Hardie Co., or approved equal; types as follows:
 1. "HardiePanel Vertical Siding" in combination with "HardieTrim Smooth Batten Boards," smooth finish, factory painted, white, 0.31" x 48" wide x 120" high.
 2. Soffits: "HardieSoffit," 1/4" smooth soffit panels, vented and non-vented, as indicated.
 3. Trim: "HardieTrim" factory painted white, 5/4" thick boards by widths per drawings x 144".
- B. Composition: Portland cement, ground sand, cellulose fiber, select additives and water; panels shall contain no asbestos, glass fibers or formaldehyde, and shall comply with ASTM C 1186, Grade II, Type A.
 1. Flexural Strength (ASTM C 1185)
 - a. Along Direction of Sheet: 2500 psi.

- b. Across Direction of Sheet: 1850 psi.
- 2. Surface Burning Capabilities (ASTM E 136)
 - a. Flame Spread: 0.
 - b. Fuel Contributed: 0.
 - c. Smoke Developed: 5.
- 3. Thermal Resistance: Approximately R=0.51.
- 4. Provide factory finish on siding using manufacturer's "Color Plus" system; provide custom color as selected by the Architect.
- 5. Agency Approvals: Panels shall be recognized as exterior claddings by the following:
 - a. National Evaluation Service (NES), Inc., Report No. NER-405 (BOCA, ICBO, SBCCI).
 - b. U.S. Department of Housing and Urban Development Materials release 1263a.
 - c. CCMC Evaluation Report 12678-R.

2.2 HOUSE WRAP

- A. Provide Driwall Rainscreen 020-1 by Keene or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where fiber-cement siding is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect.

3.2 PREPARATION OF SUBSTRATE

- A. Clean substrate of any projections and substances detrimental to siding work.
- B. Coordinate installation of fiber-cement siding with flashing and other adjoining work to ensure proper sequencing. Do not install siding until all penetrations have been installed and are securely fastened against movement.

3.3 INSTALLATION

- A. General: Comply with instructions and recommendations of shingle siding manufacturer, except to extent more stringent requirements are indicated.
- B. Install accessories and trim as recommended by manufacturer.

END OF SECTION

SECTION 07 53 23

EPDM MEMBRANE ROOFING AND ROOF INSULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the membrane roofing, roof insulation and sheet metal work as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. EPDM sheet membrane roofing, fully adhered.
 - 2. Rigid roof insulation below roof membrane.
 - 3. Sheet flashing.
 - 4. Vapor retarder.
 - 5. Walkway pads.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.
- B. Sheet Metal Flashing - Section 07 62 00.
- C. Plumbing - Division 22, for drains and vents.

1.4 DESCRIPTION OF THE SYSTEM

- A. The membrane roofing system specified herein shall consist of factory fabricated large sections of sheet membrane fully adhered over the rigid roof insulation. Provide flashing at roof penetrations and vertical surfaces.

1.5 QUALITY ASSURANCES

- A. Qualifications
 - 1. The membrane roofing system specified herein shall be the product of a manufacturer who can furnish supporting evidence of experience in the manufacture of the membrane roofing system and of having been regularly engaged in this business for not less than five (5) years. Such experience shall be in projects similar to the requirements and scope for this project.

2. The details and specifications are based on a particular manufacturer. It is not the intention of this specification to restrict competition. If a manufacturer other than the one specified is selected, it shall be his obligation and responsibility to modify and adjust his materials to suit the encountered conditions and to consult and coordinate his work with other trade Contractors to ensure that the installation will be watertight and function for use intended and that the guarantee will be issued to the Owner.

3. Acceptable manufacturers:

- a. Firestone Building Products Company.
- b. Carlisle Syntec Incorporated.
- c. Johns Manville.
- d. or an equal acceptable to the Architect.

- B. Installer: A firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this project and which is acceptable to or licensed by the manufacturer of the primary roofing materials.

- C. UL Listing: Provide system which has been tested and listed by UL for application indicated and which has a "Class A" rating.

- D. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a roofing system and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-120.

- E. The specified roofing assembly must have been successfully tested by a qualified testing agency following ANSI/FM 4474 to resist the design uplift pressures calculated according to American Society of Civil Engineers (ASCE) 7 and after multiplying the results with a safety factor of 3, but assembly uplift pressures shall be not less than 60 lbs./sq. ft.

1.6 SUBMITTALS

- A. The samples and certificates listed below are required to be submitted by the Contractor to the Architect, for review. An omission of an item or items does not relieve the Contractor from this responsibility and for compliance with the Contract Documents, of which this is a part.

1. Samples

<u>Item No.</u>	<u>Size</u>	<u>Description</u>
a. S1	6" x 6"	Membrane w/splice
b. S2	6" x 6"	Rigid insulation
c. S3	6" x 6"	Flashing materials
d. S4	6" x 6"	Walkway material

2. Notarized Certificates of Compliance

<u>Item No.</u>	<u>Description</u>	<u>Standard</u>
a. C1	Sheet membrane	As specified
b. C2	Submit manufacturer's published specifications that completely describe the preparation of surfaces and application of roofing systems.	
c. C3	Submit a letter from membrane manufacturer issuing sample guarantee and approving the applicator, prior to pre-application conference.	

- B. Submit complete shop drawings showing details, dimensions, fabrication and fastening elements for each condition encountered, layout of each sheet noting seam locations, perimeter and penetration flashing, and other details where roofing abuts other materials and/or conditions.
- C. Submit copies of pre-roofing conference records.
- D. Submit a letter signed by the manufacturer and Contractor acknowledging that the submitted roofing system complies with ASCE-7 and FM I-90 for wind speed code requirements based on height and geographic location of project.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall match approved samples. Fire classification labels shall be intact and visible.
- B. Store materials under cover in a dry and clean location, off the ground and remove materials which are damaged, torn or otherwise not suitable for installation and replace with acceptable materials.
- C. Keep insulation and membrane dry before and during installation. Remove wet materials from project site.
- D. Store roofing materials on platforms or pallets, above ground, on roof level and cover with tarpaulins or on other suitable watertight covering. Store membrane and handle, in such a way as to prevent damage to edges or ends.

1.8 PREROOFING CONFERENCE

- A. Prior to ordering of materials, a preroofing conference will be held to discuss the specified roofing system and its proper application. Conference shall include installer, roofing manufacturer, installers of related work, Architect and representatives of Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to participants prior to convening conference.
- B. Coordinate application of the roofing system in such a manner that the complete installation is weather-tight and in accordance with guarantee requirements.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Work shall not be installed when the roof deck is damp, wet or spotted with frost or if the ambient temperature is 35 deg. F. and falling or if there is a forecast for inclement weather which will be adverse to the proper installation of the roofing system.

1.10 WARRANTY

- A. The warranties specified under this Article shall not deprive the Owner of any remedies as stated within the Contract Documents.
- B. Special Project Warranty: Provide written warranty, signed by Manufacturer of primary roofing materials, flashings, base flashings, all roof components and his authorized Installer, agreeing to replace/repair defective materials and workmanship as required to maintain roofing system in watertight condition.
 - 1. Warranty period for manufacturer is twenty (20) years; no dollar limit.
- C. Installer warranty shall be five (5) years after date of Substantial Completion; no dollar limit. Installer shall provide in addition to roofing warranty, a maintenance bond for the specified warranty period.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials, General: The materials provided shall be part of a roofing system developed by the approved manufacturer and shall in every respect be compatible with each other and with the substrates and conditions encountered in the field.
- B. Membrane Sheets: 0.060" thick, black, reinforced EPDM (Ethylene Propylene Diene Monomer) compounded elastomer, conforming to ASTM D4637, Type II. Membrane shall be fully adhered; refer to Part 3.2,C of this specification section.
- C. Membrane Flashing: 0.060" thick uncured EPDM; or as recommended by roofing manufacturer.
- D. Bonding Adhesives, Mastics and Splicing Cement: Compatible with the materials with which they will come in contact.
- E. Lap Sealant: For sealing the exposed edge of the splices and as otherwise required shall be of a consistency recommended by the manufacturer.
- F. Prefabricated Pipe Seal Assemblies: Provide assemblies to accommodate vents, pipe penetrations and other similar roof penetrations. Provide prefabricated split pipe seals, square tubing wraps and curb wrap corners.
- G. Sealers: Provide sealers and other similar accessory materials as recommended by the manufacturer.
- H. Cant Strips, Tapered Edge Strips, and Flashing Accessories: Types recommended by membrane manufacturer, including adhesive tapes, flashing cements, and sealants.

- I. Membrane Adhesive: As recommended by membrane manufacturer for particular substrate and project conditions, formulated to withstand ASCE 7-02 wind uplift force requirements of the geographic area of the building.
 - 1. Provide adhesives that comply with local requirements limiting amounts of volatile organic compounds.
- J. Roof Insulation: Provide closed-cell polyisocyanurate foam insulation with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, 20 psi compressive strength when tested in accordance with ASTM C 1289; with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, and with an average R value (LTTR) of 35.5.
 - 1. Manufacturer of roofing system must approve use of insulation in writing in advance. Acceptable Product: "ISO 95+ GL" by Firestone.
- K. Cover Board and Deck Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, thickness as indicated on drawings, equal to "Dens Deck Prime" by Georgia-Pacific Corporation or approved equivalent.
- L. Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where roofing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. Nailers

- 1. Continuous pressure treated (See Section 06 20 00) nailers shall be firmly anchored to resist a force of 75 pounds per lineal foot in any direction. The thickness of the nailer shall be such that the top of the nailer is flush with the surface to which the membrane is attached at the horizontal plane.
- 2. Nailers shall be installed continuous at perimeters and around all roof penetrations unless otherwise noted.
- 3. Wood Nailer Securement: Wood nailers shall be attached with No. 10 galvanized screws in conjunction with galvanized steel washers (minimum 5/8 inch outside diameter) using a staggered fastening pattern in two rows at 24 inches apart. Within eight feet of outside corners, the staggered fastening pattern shall be increased to a maximum 12 inches on center in each row. When additional wood nailers are required, they must be attached with galvanized screws and washers that penetrate into the bottom wood nailer at 1-1/4 inches using a staggered

fastening pattern in two rows at 24 inches on center in addition to the enhanced fastening pattern within eight feet of outside corners. Contractor shall examine existing wood nailers to remain to determine if existing wood nailers are attached in compliance with the above criteria. If not, existing wood nailers shall be refastened in accordance with the fastening requirements noted above.

4. Install roof deck board to metal deck following manufacturers guidelines based on FM and ASCE requirements.

B. Insulation and Cover Board

1. Clean the deck prior to installation of the insulation. Mechanically attach insulation to deck using F.M. approved fasteners in pattern to meet F.M. I-90 minimum and ASCE 7-02 wind uplift requirements, including greater requirements for corners and perimeters as required. For tapered insulation, follow pattern of taper to insure correct pitch.
2. Moderately butt end joints over flutes, stagger joints in adjacent boards. Do not install more insulation in any one day than can be covered by the membrane roof sheets.
3. Where two layers of insulation or cover boards are required, stagger joints two (2) feet in length and width in both directions.
4. Neatly cut around all projections encountered and at abutting vertical surfaces. Where large gaps occur fill with a urethane foam pack.
5. Conform to applicable specified FM class wind uplift resistance test.

- C. Sheet Membrane Application (Fully Adhered): Where required by manufacturer, install membrane by unrolling over prepared substrate, lapping adjoining sheets. Apply adhesive to surfaces to be bonded and roll into place when adhesive has properly cured. Treat seams with cleaner and prime finish with 4" seam tape and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer. Install mechanical fasteners, flashings and counterflashings, and accessories at locations indicated and as recommended by manufacturer.

D. Splicing

1. Fold the top sheet back about twelve (12) inches and clean both mating surfaces at the splice area using clean rags with membrane manufacturer's recommended cleaner.
2. Apply the inseam tape primer with a synthetic scrub pad at a rate of 375 lineal feet of five (5) inch splice per gallon. Allow tape primer to dry to the touch.
3. Roll the top sheet toward the splice area until the cemented area is nearly touching the cement on the bottom sheet along the entire length of the splice. Allow the top sheet to fall freely into place avoiding stretching and wrinkling. Roll the splice with a two (2) inch wide steel roller, using positive pressure, toward the outer edge of the splice.

4. Solvent clean the splice edge, extending at least one (1) inch onto the top and bottom membranes. Apply a bead of lap sealant completely covering the splice edge, feathering the lap sealant with a preformed putty knife or trowel.
5. Lap sealant application shall be completed on all splices by the end of each working day.

E. Membrane Flashing

1. Perimeter flashing and flashing around vents and other roof penetrations shall be preformed using the recommended flashing, compatible with the approved roofing system and utilizing the longest pieces practicable.
2. The splice between the flashing and the main roof sheet should be completed before bonding the flashing to the vertical surface. Seal this splice at least three (3) inches beyond the fasteners which attach the membrane to the horizontal nailer.
3. Bonding adhesive shall be applied to both the flashing and the surface to which it is being bonded. After the adhesive has dried to the point where it does not string or stick to a dry finger touch, roll the flashing into the adhesive. Take care to ensure that the flashing is not bridging where there is any change of direction of the flashing (e.g., where the parapet meets the roof deck).
4. Nail the flashing at the top every 12 inches on center maximum under metal counterflashing or cap. Metal counterflashing is specified under Section 07 62 00.

F. Pipe Flashing

1. Flashing for pipes, conduits and other similar items which are scheduled to penetrate (pass through) the membrane shall be provided with factory prefabricated elements when such use is possible. When prefabricated devices are not possible, field fabricated seals shall be used.
2. Bases of the pipe seals shall be spliced to the membrane roofing sheet as specified above for sheet laps and the top portion shall be secured to the pipe with a stainless steel clamping ring and continuously sealed with sealant in a watertight manner.
3. Field fabricated pipe seals shall be fabricated with base and cap membrane flashing which shall be spliced to the membrane and to itself and continuously sealed with sealant in a watertight manner.

- G. Drains: At drain locations, where the insulation is tapered to form a smooth transition from roof surface to membrane, the membrane sheet shall be accurately cut-out so as to fit the encountered clamping ring and shall be secured to the ring with the addition of the approved mastic in a secure, neat and watertight manner.

H. Curbs, Corners

1. Field fabricated outside corners shall consist of approved membrane flashing which shall have not less than 6" horizontal legs which shall be spliced to the roof membrane, and vertical legs as required which shall be nailed at 12" o.c.

maximum. Corners shall be lapped a minimum of 3" and be secured by splicing to each flashing section

2. Field fabricated inside corners shall consist of approved membrane flashing with 6" horizontal legs which shall be spliced to the roof membrane, and vertical legs as required which shall be nailed at 12" o.c. maximum. Corners shall be lapped a minimum 6" and secured by splicing to each flashing section.
 3. Install lap type sealant along all seams to insure a watertight installation.
- I. Daily Seal: Care should be exercised to ensure that the water does not flow beneath any completed sections of roof. Temporarily seal loose edge of membrane with sealant when weather is threatening.
1. Mix the two components thoroughly according to the instructions on the label.
 2. Apply the sealant at a rate of 100 lineal feet per gallon, on smooth surface, 12" back from edge of sheet onto exposed substrate surface. If necessary, use a trowel to spread material in order to achieve complete seal.
 3. After embedding membrane in sealant, check for continuous contact. Then weight the edge, providing continuous pressure over the length of the cutoff. The recommended weight for the continuous pressure is a ten (10) foot length of 2-1/2" tubing filled with dry sand.
 4. When work is resumed, pull sheet free before continuing installation.
- J. Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.3 CLEANING AND PROTECTION

- A. From time to time during the progress of the work and at the completion of the work, remove all rubbish, debris, dirt, equipment and unused materials from the site. Clean adjoining surfaces which may have been soiled by roofing work.
- B. Protect installed roofing from damage and abuse by other trades. Repair damages to watertight conditions at no additional cost to the Owner.
- C. Exercise care to protect installed work. Work which does become damaged in any way or is not watertight, shall be repaired and/or replaced as directed to the satisfaction of Architect and/or Owner at no additional cost or time.

END OF SECTION

SECTION 07 62 00

SHEET METAL WORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sheet metal work as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Stainless steel cap metal flashing.
 - 2. Field fabricating (including bending, cutting, soldering, etc.), if required, of stainless steel flashing.
 - 3. Stainless steel flashing elsewhere, where metal flashing is indicated on drawings.
 - 4. Separation of contacting surfaces of dissimilar metals.

1.3 RELATED SECTIONS

- A. Roofing - Division 7.

1.4 SUBMITTALS

- A. Shop Drawings: Submit, showing all materials, finishes, fastenings, joint details, fabrication, construction and relation to adjoining construction.
- B. Samples: Submit 12" x 12" samples of flashing materials and finishes.

1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.6 WARRANTY

- A. The Contractor shall warrant that all Metal Flashing Work executed under this Section will be free from defects in materials and workmanship for a period of ten (10) years from date of acceptance of the Project, and he shall remedy any defects in the Metal Flashing Work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Stainless Steel Flashing Materials

1. Stainless Steel Flashing: ASTM A 240, Type 304, stainless steel, with 2D finish, dead soft temper, fully annealed, as manufactured by International Nickel Co., Republic Steel Corp., United States Steel, or Washington Steel Corp. Thickness of stainless steel shall be as listed below.
 - a. Concealed Flashings: 0.012" thick, thirty (30) gauge (U.S. Standard).
 - b. Exposed Flashings: 0.015" thick, twenty-eight (28) gauge (U.S. Standard).
 - c. Edge Strips: 0.025" thick, twenty-four (24) gauge (U.S. Standard).
2. Through-wall flashing shall have sawtooth ribs at three (3) inch intervals, as manufactured by Keystone Flashing Co., or approved equal.
3. Accessories and Fastenings: AISI, Types 302 and 304 stainless steel.
4. Solder: Composed of sixty (60) percent block tin and forty (40) percent pig lead, except that solder at seams exposed to public view shall be eighty (80) percent tin and twenty (20) percent lead.
5. Flux: An acid type flux manufactured specifically for soldering stainless steel, as approved.

- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where sheet metal work is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 METAL FLASHING INSTALLATION

- A. Reference Standard: Conform to the requirements of 7th Edition of the Sheet Metal and Air Conditioning Contractors Association (SMACNA) Architectural Sheet Metal Manual.
- B. General: Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work

accurately to required profiles, with flat surfaces, straight edges and corners, free from defects. Fold exposed metal edges back not less than 1/2" and form drip.

- C. Nailing: Confine to sheets twelve (12) inches or less in width. Confine nailing to one edge only, locate nails where concealed. Use No. 12 x 1" long flat headed, annular threaded, Type 302 stainless steel nails for nailing to wood blocking; use one (1) inch long masonry nails for nailing to concrete. Space nails four (4) inches o.c. maximum.
- D. Cleating: Use cleats where sheets are more than twelve (12) inches in width. Space cleats approximately twelve (12) inches o.c. Cleats two (2) inches wide by three (3) inches long, of the same material and weight as the metal flashing being installed. Secure one end of the cleat with two (2) nails and fold edge back over the nail heads. Lock other end into seam or into folded edge of metal flashing sheets. Pre-tin cleats for soldered seams.
- E. Joining: Join metal flashings with one (1) inch locked and soldered seams except at slip joints. Mallet seams flat and solder full length of seam as specified below.
- F. Soldering: Clean and pre-tin edges of metal flashing to be soldered before soldering is begun with solder on both sides for a width of not less than 1-1/2". Solder slowly with well heated metal surfaces. Use ample solder. Show not less than one full inch of evenly flowed solder on seam. Seams shall have a liberal amount of flux brushed in before soldering is commenced. Where soldering paste or killed acid is employed as a flux, soldering shall follow immediately after application of the flux. Upon completion of soldering, clean surfaces of all flux.
- G. Slip Joints: Locate slip joints not more than twenty-four (24) feet apart and not more than eight (8) feet from corners. Form slip joints as three (3) inch wide joints with cover piece behind flashing and fill locked ends neatly with sealant.
- H. Cap Flashing: Install over base flashings, in eight (8) to ten (10) foot lengths, lapped six (6) inches at ends. Cap flashing shall be increased longitudinally to produce spring action to hold bottom edge of cap flashing firmly against base flashing. Cap flashing shall lap base flashing at least four (4) inches, with exposed bottom edge at a forty-five (45) degree angle downward and folded back on underside at least 1/2" to form drip. Make cap flashing continuous at corners and angles.
- I. Miscellaneous Flashing: Provide all other miscellaneous metal flashing not specifically mentioned herein but indicated on drawings and/or required to provide a watertight installation.
- J. Separation of Dissimilar Materials: Back paint surfaces of metal flashing in contact with dissimilar metals or with concrete or masonry with bituminous paint.
- K. Reglets
 - 1. Provide watertight reglets in masonry and concrete work to receive cap flashing. Form reglets of stainless steel using same thickness as stainless steel sheet metal specified.
 - 2. In masonry work use open or closed slot reglets with slot at least one (1) inch deep and 3/16" wide. Provide hook dams or turn-ups for anchoring securely into mortar

joints. Insert cap flashing into slot full depth using button punch or lead wedges to lock in place.

3. In concrete work, use open or closed slot reglets with slot sloped upward at forty-five (45) degrees, at least one (1) inch deep and 3/16" wide. For fastening reglets to concrete forms use double-head stainless steel nails spaced twelve (12) inches apart maximum.
4. Insert cap flashing full depth into reglet slot, and wedge in place using lead strips spaced on twelve (12) inch centers maximum or lead caulking rope. When lead strips are used for continuous caulked reglets, use approved weather-resistant fibrous compounds.

END OF SECTION

SECTION 07 71 00

ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the roof specialties and accessories as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Aluminum gutters and downspouts.
 - 2. Aluminum gravel stops.
 - 3. Roof hatches.
 - 4. Equipment supports.

1.3 RELATED SECTIONS

- A. Snow guards - Section 07 41 13.
- B. Roofing - Division 7.
- C. Sheet Metal Flashing - Section 07 62 00.

1.4 SUBMITTALS

- A. Before any roof specialties and accessories are delivered to the job site, submit shop drawings showing profiles and anchoring devices.
- B. Engineering Data
 - 1. Before any ladders and railings are fabricated, submit engineering data drawings to the Architect for review indicating how performance standards specified here shall be met. The Contractor is responsible for the structural design and supports for these systems and must show his proposed systems on these drawings.
 - 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.

1.5 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 ALUMINUM GUTTERS AND DOWNSPOUTS

- A. Provide aluminum gutters and downspouts fabricated of formed aluminum, 0.050" thick, alloy 5005-H154, smooth, no pattern.
- B. Gutters shall be manufactured in 10'-0" lengths, tapered and notched to provide a 1" telescoping lap joint and manufacturer's standard cover plate. Gutters shall be pre-punched at 12" o.c. to provide for thermal movement after installation.
 - 1. Provide manufacturer's standard support brackets and interior straps for installation at 24" o.c. Brackets shall be of a compatible material to gutter, with matching finish and color.
 - 2. Provide continuous screened leaf guard with sheet metal frame.
- C. Downspout shall be manufactured in 10'-0" lengths, round, closed-face with mitered elbows, factory offset on one end to provide for a 3/4" telescope joint. Downspout shall contain a factory mounted back, non-sealed to allow seepage of water in overflow conditions.
 - 1. Elbows for downspouts shall be of welded construction, with matching finish applied after welding. Such finish shall be of quality equal to finish for non-welded parts. Grinding and spray painting of parts to match will not be permitted. Elbows shall be provided with a factory offset on its lower end to allow a 3/4" telescope joint.
 - 2. Provide manufacturer's standard wall brackets of compatible material to downspout with matching finish and color.
 - 3. Provide concrete splash blocks where indicated.
- D. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: Cleaned with inhibited chemicals; Chemical Finish: Acid-chromate-fluoride-phosphate conversion coating; Organic Coating: As specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 - 1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color

topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

2. Custom color and gloss as selected by the Architect.

2.2 ALUMINUM GRAVEL STOPS

- A. Fabricate of 0.063" thick aluminum alloy 5005-H154, smooth, no pattern.
- B. Provide concealed splice plates 12'-0" o.c. fabricated of 0.050" thick aluminum to match exposed aluminum; finished to match exposed aluminum.
- C. Provide pre-fabricated mitered and welded corner units.
- D. Provide concealed anchors and hold down clips 24" o.c.
- E. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: Cleaned with inhibited chemicals; Chemical Finish: Acid-chromate-fluoride-phosphate conversion coating; Organic Coating: As specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 2. Custom color and gloss as selected by the Architect.

2.3 PRE-FABRICATED ROOF CURBS

- A. Provide manufacturer's standard shop fabricated units made of 14 ga. zinc coated steel factory primed with rust inhibitive primer, and insulated with 1-1/2" thick fiberglass board. Provide units manufactured by Pate, Louvers & Dampers, Inc., Industrial Louvers, Inc., or approved equal.
- B. Reinforce units over 8'-0" long and units requiring reinforcement due to heavy loads by forming units of double-walled box-type construction with stiffeners of heavy gauge with flanges as required to provide sufficient rigidity and strength to withstand max. lateral forces in addition to super imposed vertical loads.
- C. Sloping Roof Decks: For deck slopes of 1" per ft. and more, fabricate curb units (except expansion joint curbs) to form a level top edge. Where slope is less than 1" per ft., and curb is used to support equipment with moving parts, or supports vertical elements such as gravity ventilators which are intended to be plumb, provide tapered wood nailers (treated wood) at top of curb units to form a level top edge.
- D. Provide treated wood nailer, not less than 1-5/8" thick and of the width shown, but not less than the width of the curb wall assembly. Anchor nailer securely to the top of the metal frame unit. Refer to Section 06 20 00 of these specifications for pressure-treatment required for wood nailers.

- E. Provide 22 ga. galvanized steel curb liners; where required extend curb liners through deck construction to coordinate with work below.
- F. Provide 18 ga. galvanized steel cap flashing to cover a min. of 3" over roof flashing.
- G. Where curb units are shown to support shop fabricated items of equipment, do not proceed with fabrication of curb units until size or dimensions have been checked for coordination with equipment.

2.4 EQUIPMENT SUPPORTS

- A. Equipment Supports: Provide metal equipment supports, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with integral metal cant and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AES Industries, Inc.
 - b. Curbs Plus, Inc.
 - c. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
 - d. The Pate Company
 - e. Vent Products Co., Inc.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Load Requirements: As indicated, and if not indicated, as required to support specified equipment.
- D. Material: Zinc-coated (galvanized) steel sheet, 0.079 inch thick.
- E. Construction
 - 1. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
 - 2. Factory-installed continuous wood nailers at tops of equipment supports.
 - 3. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
 - 4. Fabricate equipment supports to minimum height of 12 inches, unless otherwise indicated.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where roof specialties and accessories are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and with roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
- B. Isolation: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.
- C. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.
- D. Operational Units: Test operational units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.
- E. Gutters
 - 1. Support Bracket Installation: Locate low and high points of gutter installation and chalk a guide line to allow a maximum 1/4"/40'-0" slope. Install support brackets at 30" on center aligned with the chalk or other type of guide line. Take care to avoid locating bracket directly over downspout outlet locations. Attach brackets with non-corrosive screw anchors.
 - 2. Gutter Installation: Install gutter sections into support brackets. Insert each telescoping section into previous section for a distance of 1". Provide sealants and fasteners as recommended by manufacturer. Attach rear upper portion of gutter through pre-punched elongated holes at 12" o.c.
 - 3. Inside Strap Installation: Install straps at 30" o.c. alternating with support brackets. Strap shall be hooked into leading edge (bead) of gutter and riveted at its rear side. In no case shall strap be nailed, screwed, or otherwise fastened which would restrain thermal movement of product.
 - 4. Expansion Joints: At 40'-0" intervals, or as shown on plans, install manufacturer's standard elastomeric expansion joint assembly.

5. Miter Corners: Install manufacturer's welded miter units at locations shown on plans. Corners shall have 30" legs, pre-punched, notched, and telescoping to match gutter. All units shall be finished after fabrication; grinding and touch-up painting will not be allowed.
6. End/Caps Terminations: Install manufacturer's end caps at all end terminations. End caps shall be riveted at 2" o.c. and sealed.
7. Outlets: Locate all outlet locations and field cut hole in a neat workmanlike manner. Hole shall be located a distance of 1" from backside of gutter. Insert manufacturer's stainless steel outlet, fasten in place with 4 rivets (one being located on each flange), and seal.

F. Downspouts

1. Install downspouts with brackets 24" o.c.; attach brackets to structure, use non-corrosive screw anchors.
2. Join sections with manufacturer's standard telescoping joints. Provide fasteners designed to hold downspouts securely 1" away from walls, locate fasteners at top and bottom and at approximately 60" o.c. in between. Provide elbows at base of downspout to direct water away from building.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION

SECTION 07 84 13

FIRESTOPS AND SMOKESEALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the firestops and smoke seals as shown on the drawings and/or specified herein, 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.
 - 5. Penetrations at each floor level in shafts and/or stairwells.
 - 6. Construction joints, including those between top of fire rated walls and underside of floors above; and those between exterior curtain walls and the outer perimeter edge of floor assemblies.

1.3 RELATED SECTIONS

- A. Cast-in-Place Concrete - Section 03 30 00.
- B. Unit Masonry - Section 04 20 00.
- C. Joint Sealers - Section 07 92 00.
- D. Gypsum Drywall - Section 09 29 00.
- E. Piping penetrations - Division 22.
- F. Duct penetrations - Division 23.
- G. Communications – Division 27.

- H. Electronic safety and security – Division 28.
- I. Cable and conduit penetrations - Division 26.

1.4 REFERENCES

- A. ASTM E 814 "Standard Method of Fire Tests of Through-Penetration Firestops."
- B. UL 1479, UBC 7-5 (Both are same as A. above).
- C. ASTM E 119 "Standard Method of Fire Tests of Building Construction and Materials."
- D. UL 263, UBC 7-1 (Both are same as C. above).
- E. UL 2079 "Tests For Fire Resistance of Building Joint Systems."
- F. ASTM E 1399 "Test For Dynamic Movement Conditions."
- G. ASTM E 1966 (Same as E. above).
- H. ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi."
- I. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus."
- J. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Firestops."
- K. Published Through-Penetration Systems by recognized independent testing agencies.
 - 1. UL Fire Resistance Directory, Volume II of current year.
 - 2. Warnock Hersey Certification Listings, current year.
 - 3. Omega Point Laboratories, current year.
- L. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

1.5 SUBMITTALS

- A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance, limitation criteria, test data and indication that products comply with specified requirements.
- B. Submit shop drawings detailing materials, installation methods, and relationships to adjoining construction for each firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of

qualified testing and inspection agency evidencing compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, for proposed UL listed (or equal) firestop and smoke seal assembly required for the Project.
- C. Material Safety Data Sheets: Submit MSDS for each firestop product.
- D. Submit qualifications of firestop installer, including letter from firestop manufacturer of products proposed to be installed, wherein manufacturer approves or recognizes as trained/ or certifies installer for installation of that manufacturer's products.
- E. Engineering Judgment: For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.6 QUALITY ASSURANCE

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire and the passage of smoke and other gases.
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
- C. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479. The F-rating must be a minimum of one (1) hour, but not less than the fire resistance rating of the assembly being penetrated. T-rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
 1. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
 - a. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
 - b. T-Rating: When penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
 - c. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
 2. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
 - a. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

- D. Firestopping products shall be asbestos free and free of any PCBs.
- E. Do not use any product containing solvents or that requires hazardous waste disposal.
- F. Do not use firestop products which after curing, dissolve in water.
- G. Do not use firestop products that contain ceramic fibers.
- H. Firestopping Installer Qualifications: Firestop application shall be performed by a single firestopping contractor who specializes in the installation of firestop systems, whose personnel to be utilized have received specific training and certification or approval from the proposed respective firestop manufacturer, and firestop installer shall have a minimum of three years' experience (under present company name) installing firestop systems of the type herein specified.
- I. Mock-Up: Prepare job site mock-ups of each typical Firestop System proposed for use in the project. Approved mock-ups will be left in place as part of the finished project and will constitute the quality standard for the remaining work.
- J. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - 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 or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- K. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of less than or equal to 1 as determined by ASTM G 21.
- L. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post-installed." Provide cast-in-place firestop devices prior to concrete placement.
- M. Firestop systems do not reestablish the structural integrity of load bearing partitions or assemblies or support live loads and traffic. Installer shall consult the Structural Engineer prior to penetrating any load bearing assembly.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened containers with manufacturer's name, product identification, lot numbers, UL or Warnock Hersey labels, and mixing and installation instructions, as applicable.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.
- C. All firestop materials shall be installed prior to expiration of shelf life.

1.8 PROJECT CONDITIONS

- A. Verify existing conditions and substrates before starting work
- B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.
- C. During installation, provide masking and drop cloths as needed to prevent firestopping products from contaminating any adjacent surfaces.
- D. Conform to ventilation requirements if required by manufacturer's installation instructions or Material Safety Data Sheet.
- E. Weather Conditions: Do not proceed with installation of firestop products when temperatures are in excess or below the manufacturer's recommendations.
- F. Schedule installation of firestop products after completion of penetrating item installation but prior to covering or concealing of openings.
- G. Coordinate this work as required with work of other trades.

1.9 SEQUENCING AND SCHEDULING

- A. Pre-Installation Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Sequence: Perform work of this and other sections in proper sequence to prevent damage to the firestop systems and to ensure that their installation will occur prior to enclosing or concealing work.
- C. Install all firestop systems after voids and joints are prepared sufficiently to accept the applicable firestop system.
- D. Do not cover firestop systems until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - 1. Tremco.
 - 2. Bio-Fireshield.
 - 3. 3M.
 - 4. Specified Technologies Inc.
 - 5. U.S. Gypsum Co.

6. Nelson.
7. Hilti, Inc.
8. GCP Applied Technologies.

2.2 FIRESTOPPING, GENERAL

- A. 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.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials. 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 including 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. Fire-rated form board.
 - d. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.
- C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- D. Smoke seals at top of partitions shall be flexible to allow for partition deflection.
- E. Polypropylene Sleeves (PP): (For cast-in device options.)

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
- B. Intumescent, Latex Sealant: Single-component, Intumescent, latex formulation.
- C. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum or polyethylene foil on one side.

- E. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
- F. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- G. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- H. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.
- I. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping/gunnable sealant, unless firestop system limits use to non-sag grade for both opening conditions.
- J. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic or polypropylene sleeve lined with an intumescent strip, an extended rectangular flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- K. Fire Rated Cable Management Devices: Factory-assembled round metallic sleeve device for use with cable penetrations, containing an integrated smoke seal fabric membrane that can be opened and closed for re-penetration.
- L. Drop-In Firestop Devices: Factory-assembled devices for use with combustible or noncombustible penetrants in cored holes within concrete floors. Device shall consist of galvanized steel sleeve lined with an intumescent strip, an extended rectangular flange attached to one end of the sleeve for fastening to concrete floor, and neoprene gasket.
- M. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- N. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- O. Blocks/Plugs: Intumescent flexible block/plug suitable for reuse in re-penetration of openings. Blocks shall allow up to 12" of unreinforced annular space.
- P. Tub Box Kit: Cast-in place pre-formed plastic tub box kit with three support legs for use with drain piping assembly associated with bathtub installations.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
 - 1. Sealant Colors: Color of exposed joint sealants as selected by the Architect.
- B. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand 33 percent movement in both extension and compression for a total of 66 percent movement.
- C. Multi-Component, Non-Sag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated.
- D. Single-Component, Non-Sag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

2.5 MINERAL FIBER/CERAMIC WOOL NON-COMBUSTIBLE INSULATION (FIRE SAFING)

- A. Provide min. 4 pcf Thermafiber as manufactured by Thermafiber Co., min. 4 pcf FBX Safing Insulation as manufactured by Fibrex, or approved equal to suit conditions and to comply with fire resistance and firestop manufacturer's requirements.
- B. Material shall be classified non-combustible per ASTM E 119.

2.6 MIXING

- A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer present, for compliance with requirements for opening configuration, penetrating items, substrates, and other

conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 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 by firestopping 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 firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 CONDITIONS REQUIRING FIRESTOPPING

- A. Building Exterior Perimeters
 - 1. Where exterior facing construction is continuous past a structural floor, and a space (i.e. construction joint) would otherwise remain open between the inner face of the wall construction and the outer perimeter edge of the structural floor, provide firestopping to equal the fire resistance of the floor assembly.
 - a. If mineral wool is part of firestop system, the mineral wool must be completely covered by appropriate thickness of UL or Warnock Hersey listed firestop sealant or spray.
 - b. Refer to Article 3.6 herein for description of fire safing insulation.
 - 2. Firestopping shall be provided whether or not there are any clips, angles, plates, or other members bridging or interconnecting the facing and floor systems, and whether or not such items are continuous.
 - 3. Where an exterior wall passes a perimeter structural member, such as a girder, beam, or spandrel, and the finish on the interior wall face does not continue up to close with the underside of the structural floor above, thus interrupting the fire-resistive integrity of the wall system, and a space would otherwise remain open between the interior face of the wall and the structural member, provide firestopping to continuously fill such open space.

B. Interior Walls and Partitions

1. Construction joints between top of fire rated walls and underside of floors above, shall be firestopped.
2. Firestop system installed shall have been tested by either UL or Omega Point, including exposure to hose stream test and including for use with steel fluted deck floor assemblies.
3. Firestop system used shall allow for deflection of floor above.

C. Penetrations

1. Penetrations include conduit, cable, wire, pipe, duct, or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.
2. Except for floors on grade, where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, provide firestopping to fill such spaces in accordance with ASTM E 814.
3. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall of opening.

- D. Provide firestopping to fill miscellaneous voids and openings in fire rated construction in a manner essentially the same as specified herein before.

3.4 INSTALLING THROUGH PENETRATION FIRESTOPS

- A. General: Comply with the through penetrations 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.

3.5 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with ASTM C 1193, 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 no sag 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.

3.6 INSTALLING FIRESAFING INSULATION

- A. Install fire safing insulation utilizing welded or screw applied galvanized steel impaling pins and retaining clips; space clips or pins 24" o.c. maximum.
- B. Completely fill voids in areas where safing insulation is required. At spandrel conditions/floor edges, depth of insulation top to bottom shall be at least four (4) inches.
- C. Cover top of all safing insulation with firestop sealant or spray.

3.7 FIELD QUALITY CONTROL

- A. Inspecting agency employed and paid by the Owner will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.
- B. Inspecting agency will report observations promptly and in writing to Contractor, Owner and Architect.
- C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.
- D. Where deficiencies are found, Contractor must repair or replace firestopping so that it complies with requirements.

3.8 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 openings and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to product firestopping complying with specified requirements.

END OF SECTION

SECTION 07 92 00

JOINT SEALERS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the joint sealers work as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Flashing reglets and retainers.
 - 2. Exterior wall joints not specified to be sealed in other Sections of work.
 - 3. Interior wall joints not specified to be sealed in other Sections of work, including caulking to fill between architectural woodwork and any wall, floor and/or ceiling imperfections.
 - 4. Control and expansion joints in walls.
 - 5. Joints at wall penetrations.
 - 6. Joints between items of equipment and other construction.
 - 7. All other joints required to be sealed to provide a positive barrier against penetration of air and moisture.

1.3 RELATED SECTIONS

- A. Roofing - Division 7.
- B. Firestop sealants - Section 07 84 13.
- C. Aluminum and entrances - Section 08 41 13.
- D. Glazing sealants - Section 08 80 00.
- E. Sealant within drywall construction - Section 09 29 00.
- F. Sealant at tile work - Section 09 30 13.
- G. Sealant at paving - Division 32.

1.4 QUALITY ASSURANCE

- A. Qualification of Installers: Use only personnel who are thoroughly familiar, skilled and specially trained in the techniques of sealant work, and who are completely familiar with the published recommendations of the sealant manufacturer.
- B. Pre-Construction Field Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to project joint substrates according to the method in ASTM C 794 and C 1521 that is appropriate for the types of Project joints.
- C. Perform testing per ASTM C 1248 on interior and exterior sealants to determine if sealants or primers will stain adjacent surfaces. No sealant work shall start until results of these tests have been submitted to the Architect and he has given his written approval to proceed with the work.

1.5 SUBMITTALS

- A. Shop Drawings: Submit shop drawings showing all joint conditions, indicating relation of adjacent materials, all sealant materials (sealant, bond breakers, backing, primers, etc.), and method of installation.
 - 1. Submit joint sizing calculations certifying that movement capability of sealant is not being exceeded.
- B. Samples: Submit the following:
 - 1. Color samples of sealants, submit physical samples (not color chart).
 - 2. Sealant bond breaker and joint backing.
- C. Product Data: Submit manufacturer's technical information and installation instructions for:
 - 1. Sealant materials, indicating that material meets standards specified herein.
 - 2. Backing rods.
- D. Submit manufacturer's certification as required by Article 1.6 herein.
- E. Submit results of testing required in Article 1.4 herein.

1.6 MANUFACTURER'S RESPONSIBILITY AND CERTIFICATION

- A. Contractor shall require sealant manufacturer to review the Project joint conditions and details for this Section of the work. Contractor shall submit to the Architect written certification from the sealant manufacturer that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vaportight seals (as applicable), and that materials supplied meet specified performance requirements.

1.7 ENVIRONMENTAL CONDITIONS

- A. Temperature: Install all work of this Section when air temperature is above forty (40) degrees F. and below eighty (80) degrees F., unless manufacturer submits written instructions permitting sealant use outside of this temperature range.
- B. Moisture: Do not apply work of this Section on surfaces which are wet, damp, or have frost.

1.8 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section, before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.
- C. Storage
 - 1. Store sealant materials and equipment under conditions recommended by their manufacturer.
 - 2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material.
 - 3. Material shall be stored in unopened containers with manufacturers' name, batch number and date when shelf life expires.

1.9 WARRANTY

- A. Provide a written, notarized warranty from the manufacturer stating that the applied sealants shall show no material failure for a period of ten (10) years.
- B. Contractor to provide a written, notarized warranty stating that the applied sealants shall show no failure due to improper installation for a period of five (5) years.
- C. Warranty shall be in a form acceptable to the Owner and executed by an authorized individual.
- D. Include in warranty provision agreement to repair and/or replace, at Contractor's expense, sealant defects that develop during warranty period as a result of faulty labor and/or materials.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

- A. Exterior Wall Sealant: Provide one (1) part non-sag sealant equal to No. 790 or 795 made by Dow Corning, "Silpruf SCS 2000" or "LM SCS 2700" made by G.E., "Spectrem 1" or "Spectrem 3" made by Tremco or "Sonolastic 150" by Sonneborn conforming to the minimum standards of ASTM C 920, Type S, Grade NS, Class 50.

- B. Interior Sealant: Provide a one (1) part acrylic based sealant conforming to ASTM C 834, equal to "AC-20+ Silicone" made by Pecora, Masterseal NP 520 by BASF or equal made by Tremco.
- C. Colors: Colors selected from manufacturer's standard selection.

2.2 MISCELLANEOUS MATERIALS

- A. Back-Up Materials: Provide back-up materials and preformed joint fillers, non-staining, non-absorbent, compatible with sealant and primer, and of a resilient nature, equal to "HBR" made by Nomaco Inc. or approved equal, twenty-five (25) percent wider than joint width. Materials impregnated with oil, bitumen or similar materials shall not be used. Provide back-up materials only as recommended by sealant manufacturer in writing.
- B. Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.
- C. Provide primers recommended by the sealant manufacturer for each material to receive sealant. Note that each exterior joint must be primed prior to sealing.
- D. Provide solvent, cleaning agents and other accessory materials as recommended by the sealant manufacturer.
- E. Materials shall be delivered to the job in sealed containers with manufacturer's original labels attached. Materials shall be used per manufacturer's printed instructions.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where joint sealers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with instructions and recommendations of the manufacturer and in accordance with ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions required by this Project where more stringent installation requirements are specified herein, such requirements shall apply.
- B. Sample Section of Sealant
 - 1. During sealant installation work in exterior wall, the manufacturer of sealant shall send his representative to the site, under whose supervision a section of the wall (used as "control section") shall be completed for purposes of determining performance characteristics of sealant in joints. Architect shall be informed of time and place of such installation of control section.

2. Control section shall be installed according to specification given herein and shall not be considered as acceptable until written acceptance is provided by the Architect.
 3. Accepted control section shall be standard to which all other sealant work must conform.
- C. Supervision: The Contractor shall submit to the Architect written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. The Contractor shall use only skilled and experienced workmen for installation of sealant.
- D. Apply sealant under pressure with a hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed. Neatly point or tool joint to provide the contour as indicated on the drawings.
- E. Preparation and Application
1. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt and frost. Sealant must be applied to the base surface. Previously applied film must be entirely removed.
 2. Stone, masonry and concrete surfaces to receive sealant shall be cleaned where necessary by grinding, water blast cleaning, mechanical abrading, or combination of these methods as required to provide a clean, sound base surface for sealant adhesion.
 - a. Do not use any acid or other material which might stain surfaces.
 - b. Remove laitance by grinding or mechanical abrading.
 - c. Remove loose particles present or resulting from grinding, abrading, or blast cleaning by blowing out joints with compressed air, oil and water free, or vacuuming joints prior to application of primer or sealant.
 3. Clean non-porous surfaces such as metal and glass chemically. Remove protective coatings on metallic surfaces by solvent that leaves no residue and is compatible with sealant. Use solvent and wipe dry with clean, dry lint free paper towels. Do not allow solvent to air dry without wiping. Clean joint areas protected with masking tape or strippable films as above after removal of tape film.
 4. Do not seal joints until they are in compliance with drawings, or meet with the control section standard.
 5. Joint Size and Sealant Size: Joints to receive sealant shall be at least 1/4" wide. In joint 1/4" to 3/8" wide, sealant shall be 1/4" deep. In joints wider than 3/8" and up to 1" wide, sealant depth shall be one half the joint width. For joints wider than 1", sealant depth shall be as recommended by the sealant manufacturer. Depth of joint is defined as distance from outside face of joint to closest point of the filler.
 6. Primer: Thoroughly clean joints and apply primer to all surfaces that will receive sealant. Apply primer on clean, dry surfaces, and prior to installation of joint

backing. Completely wet both inner faces of the joint with primer. Mask adjacent surfaces of joint with non-staining masking tape prior to priming. Apply primer with clean brush and only when temperature is above 45 deg. F.

7. Joint Backing: In joints where depth of joint exceeds required depth of sealant, install joint backing (after primer is dry) in joints to provide backing and proper joint shape for sealant. Proper shape for sealant is a very slight "hourglass" shape, with back and front face having slight concave curvature. Use special blunt T-shaped tool or roller to install joint backing to the proper and uniform depth required for the sealant. Joint backing shall be installed with approximately twenty-five (25) percent compressions. Do not stretch, twist, braid, puncture, or tear joint backing. Butt joint backing at intersections.
8. Bond Breaker: Install bond breaker smoothly over joint backing so that sealant adheres only to the sides of the joint and not backing.
9. Sealant Application: Apply sealant in accordance with the manufacturer's application manual and manufacturer's instructions, using hand guns or pressure equipment, on clean, dry, properly prepared substrates, completely filling joints to eliminate air pockets and voids. Mask adjacent surfaces of joint with non-staining masking tape. Force sealant into joint in front of the tip of the "caulking gun" (not pulled after it) and force sealant against sides to make uniform contact with sides of joint and to prevent entrapped air or pulling of sealant off of sides. Fill sealant space solid with sealant.
10. Tooling: Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C 1193. Finished joints shall be straight, uniform, smooth and neatly finished. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Neatly remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition.
11. Replace sealant which is damaged during construction process.

END OF SECTION

SECTION 08 11 13

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the steel doors and frames work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Interior hollow metal doors and frames for fire-rated and unrated door openings.
 - 2. Interior hollow metal vision panels.
 - 3. Preparation of metal doors and frames to receive finish hardware, including reinforcements, drilling and tapping, as necessary.
 - 4. Preparation of hollow metal doors to receive glazing where required.
 - 5. Steel louvers for hollow metal doors.
 - 6. Furnishing anchors for building into masonry and drywall.
 - 7. Factory prime painting of work of this Section.

1.3 RELATED SECTIONS

- A. Unit Masonry - Section 04 20 00.
- B. Carpentry - Section 06 20 00, for installation of doors and frames.
- C. Wood Doors - Section 08 14 16.
- D. Finish Hardware - Section 08 71 00.
- E. Glass and Glazing - Section 08 80 00.
- F. Gypsum Drywall - Section 09 29 00.
- G. Painting and Finishing - Section 09 90 00.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, compliance with standards referenced herein, sound and fire-resistance ratings, and finishes for each type of door and frame specified.
- B. Shop Drawings: Show fabrication and installation of doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, reinforcement for surface applied hardware, dimensions of profiles and hardware preparation, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessories.
- C. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Drawings.
 - 1. Coordinate glazing frames and stops with glass and glazing requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing custom steel doors and frames similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- C. Source Limitations: Obtain custom steel doors and frames through one source from a single manufacturer.
- D. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
 - 1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40" or less above the sill.
 - 2. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating as required by prevailing Building Code in 30 minutes of fire exposure.
- E. **Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.**
- ~~E.F.~~ Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- ~~F.G.~~ Fire rated assemblies must have UL approved label.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use nonvented plastic.
- B. Inspect doors and frames, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames under cover at building site. Conform to the requirements of ANSI/SDI A250.11 for site storage unless more stringent requirements are noted herein. Place units on minimum 4-inch high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 PRODUCTS

2.1 FABRICATION - GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable.
- B. Unless otherwise indicated, provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.
- C. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with Finish Hardware Schedule and templates provided by hardware suppliers. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation for Hardware."
- D. Locate finish hardware as shown on final shop drawings in accordance with locations noted herein.

2.2 MANUFACTURERS

- A. Provide products manufactured by Steelcraft, Curries, Ceco Door Products, or approved equal meeting these specifications.

2.3 FRAMES

- A. Materials
 - 1. Frames for interior openings shall be either commercial grade cold-rolled steel conforming to ASTM A 1008, Type B or commercial grade hot-rolled steel conforming to ASTM A 1011, Commercial Steel, Type B. Metal thickness shall be not less than sixteen (16) ga. for frames in openings 4'-0" or less in width; not less than fourteen (14) ga. for frames in openings over 4'-0" in width.

B. Design and Construction

1. All frames shall be welded units with integral trim, of the sizes and shapes shown on approved shop drawings. Knock-down frames are not permitted.
2. All finished work shall be strong and rigid, neat in appearance, square, true and free of defects, warp or buckle. Molded members shall be clean cut, straight and of uniform profile throughout their lengths.
3. Jamb depths, trim, profile and backbends shall be as shown on drawings.
 - a. Frames at drywall partitions shall be formed with double return backbends to prevent cutting into drywall surface.
4. Welded frames shall have corners mitered and reinforced and faces of welded frames shall be continuously back welded full depth and width of frame conforming to NAAMM Standard HMMA-820; face joints shall be hairline.
5. Minimum depth of stops shall be 5/8".
6. Frames for multiple or special openings shall have mullion and/or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
 - a. Mullions shall have 16 ga. internal steel stiffeners welded not less than 4" o.c.
7. Hardware Reinforcements
 - a. Frames shall be mortised, reinforced, drilled and tapped at the factory for fully-templated mortised hardware only, in accordance with approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates.
 - b. Minimum thickness of hardware reinforcing plates shall be as follows:
 - 1). Hinge and pivot reinforcements - seven (7) ga., 1-1/4" x 10" minimum size.
 - 2). Strike reinforcements - twelve (12) gauge
 - 3). Flush bolt reinforcements - twelve (12) gauge
 - 4). Closer reinforcements - twelve (12) gauge
 - 5). Reinforcements for surface mounted hardware - twelve (12) gauge.
8. Floor Anchors
 - a. Provide adjustable floor anchors, providing not less than two (2) inch height adjustment.
 - b. Minimum thickness of floor anchors shall be fourteen (14) gauge.
9. Jamb Anchors
 - a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the wire type. Anchors shall be not less than 0.156"

- diameter steel wire. Provide three (3) anchors on each jamb for frames up to 7'-6" height.
- b. Frames for installation in stud partitions shall be provided with steel anchors of suitable design, not less than eighteen (18) gauge thickness, securely welded inside each jamb. Provide four (4) anchors on each jamb for frames up to 7'-6" height.
 - c. Frames to be anchored to previously placed concrete or masonry shall be provided with minimum 3/8" concealed bolts set into expansion shields or inserts at six (6) inches from top and bottom and twenty-four (24) inches o.c. Reinforce frames at anchor locations with sixteen (16) gauge sheet steel stiffeners welded to frame at each anchor.
- 10. Anchors in masonry walls shall be hot dip galvanized per ASTM A 153.
 - 11. Frames for installation in masonry wall openings more than 4'-0" in width shall have an angle or channel stiffener factory welded into the head. Such stiffeners shall be not less than twelve (12) gauge steel and not longer than the opening width and shall not be used as lintels or load bearing members.
 - 12. Dust cover boxes (or mortar guards) of not thinner than twenty-six (26) gauge steel shall be provided at all hardware mortises on frames to be set in masonry or plaster partitions.
 - 13. Ceiling Struts: Minimum 3/8" thick x 2" wide steel.
 - 14. All frames shall be provided with a steel spreader temporarily attached to the feet of both jambs to serve as a brace during shipping and handling.
 - 15. Loose glazing stops shall be of cold rolled steel, not less than twenty (20) gauge thickness, butted at corner joints and secured to the frame with countersunk cadmium-or zinc-plated screws. Interior frames may be provided with snap-on glazing stops.
 - 16. Except on weather stripped frames, drill stops to receive three (3) silencers on strike jambs of single door frames and two (2) silencers on heads of double-door frames.
- C. Finish: After fabrication, all tool marks and surface imperfections shall be removed, and exposed faces of all welded joints shall be dressed smooth. Frames shall then be chemically treated to insure maximum paint adhesion and shall be coated on all surfaces with one coat of rust-inhibitive baked-on alkyd primer standard with the manufacturer which is fully cured before shipment to a dry film thickness of 2.0 mils.
- 1. Frames set in masonry walls shall be grouted in as described in Section 04 20 00 "Unit Masonry." These frames shall have surfaces in contact with grout shop coated with epoxy coating equal to Series 27 FC Typoxy made by Tnemec or approved equal spray applied at 4 to 6 mils, passing NFPA 101, Class A for smoke and flame spread, tested per ASTM E 84.

2.4 HOLLOW METAL DOORS

- A. Materials: Doors shall be made of commercial quality, level, cold rolled steel conforming to ASTM A 1008, Commercial Steel, Type B and free of scale, pitting or other surface defects. Face sheets for interior doors shall be not less than eighteen (18) gauge.
- B. Design and Construction
 - 1. All doors shall be of the types and sizes shown on the approved shop drawings and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Minimum door thickness shall be 1-3/4".
 - 2. All doors shall be strong, rigid and neat in appearance, free from warpage or buckles. Corner bends shall be true and straight and of minimum radius for the gauge of metal used.
 - 3. Face sheets shall be stiffened by continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be not less than twenty-two (22) gauge spaced not more than six (6) inches apart and securely attached to face sheets by spot welds not more than five (5) inches o.c. Spaces between stiffeners shall be sound deadened and thermal insulated the full height of the door with an inorganic non-combustible batt type material.
 - 4. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. All such welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
 - 5. Top and bottom edges of all doors shall be closed with a continuous recessed steel channel not less than fourteen (14) gauge, extending the full width of the door and spot welded to both faces.
 - 6. Edge profiles shall be provided on both vertical edges of doors as follows:
 - a. Single-Acting Swing Doors: Beveled 1/8" in two (2) inches.
 - b. No square edge doors permitted.
 - 7. Hardware Reinforcements
 - a. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only in accord with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation - such as top and bottom pivots, floor closers, etc.) is to be applied, doors shall have reinforcing plates.
 - b. Minimum gauges for hardware reinforcing plates shall be as follows:
 - 1). Hinge and pivot reinforcement - seven (7) gauge.
 - 2). Reinforcement for lock face, flush bolts, concealed holders, concealed or surface mounted closers - twelve (12) gauge.

- 3). Reinforcements for all other surface mounted hardware - sixteen (16) gauge.

8. Glass Moldings and Stops

- a. Where specified or scheduled, doors shall be provided with hollow metal moldings to secure glazing by others in accordance with glass opening sizes shown on drawings.
- b. Fixed moldings shall be securely welded to the door on the security side.
- c. Loose stops shall be not less than twenty (20) gauge steel, with mitered corner joints, secured to the framed opening by cadmium or zinc-coated countersunk screws spaced eight (8) inches o.c. Snap-on attachments will not be permitted. Stops shall be flush with face of door.

9. Louvers shall be sixteen (16) gauge sheet steel, stationary type, closely spaced inverted "V" blade design, flush with face sheets of door, integral with and welded to door. Fifty (50) percent free area, unless indicated otherwise on drawings.

- C. Finish: After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall then be chemically treated to insure maximum paint adhesion and shall be coated, on all exposed surfaces, with manufacturer's standard rust-inhibitive alkyd primer as specified for frames which shall be fully cured before shipment.
- D. Flatness: Doors shall maintain a flatness tolerance of 1/16" maximum, in any direction, including in a diagonal direction.

2.5 LABELED DOORS AND FRAMES

- A. Labeled doors and frames shall be provided for those openings requiring fire protection ratings as scheduled on drawings. Such doors and frames shall be labeled by Underwriters' Laboratories or other nationally recognized agency having a factory inspection service.
- B. If any door or frame specified by the Architect to be fire-rated cannot qualify for appropriate labeling because of its design, size, hardware or any other reason, the Architect shall be so advised before fabricating work on that item is started.

2.6 HARDWARE LOCATIONS

- A. The location of hardware on doors and frames shall be as noted in "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames" of the Door Hardware Institute unless otherwise required by prevailing Handicapped Codes.

2.7 CLEARANCES

- A. Fabricate doors and frames to meet edge clearances as follows:
 1. Jambs and Head: 1/8" plus or minus 1/16".

2. Meeting Edges, Pairs of Doors: 1/8" plus or minus 1/16".
3. Bottom: 3/8" at threshold; 3/4" if no threshold.

- B. Fire rated doors shall have clearances as required by NFPA 80.

2.8 MANUFACTURING TOLERANCES

- A. Manufacturing tolerance shall be maintained within the limits given in HMMA 841 of ANSI/NAAMM, current edition.

2.9 PREPARATION FOR FINISH HARDWARE

- A. Prepare door and frames to receive hardware:
 1. Hardware supplier shall furnish hollow metal manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to insure correct fitting and installation.
 2. Preparation includes sinkages and cut-outs for mortise and concealed hardware.
- B. Provide reinforcements for both concealed and surface applied hardware:
 1. Drill and tap mortise reinforcements at factory, using templates.
 2. Install reinforcements with concealed connections designed to develop full strength of reinforcements.

2.10 REJECTION

- A. Hollow metal frames or doors which are defective, have hardware cutouts of improper size or location, or which prevent proper installation of doors, hardware or work of other trades, shall be removed and replaced with new at no cost.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where steel doors and frames are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Refer to Section 06 20 00 for installation procedures for all work of this Section.

END OF SECTION

SECTION 08 14 16

WOOD DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the wood doors as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Solid core flush wood doors.
 - 2. Fire-rated flush wood doors.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00, for installation of wood doors.
- B. Steel Doors and Frames - Section 08 11 13, for hollow metal frames.
- C. Finish Hardware - Section 08 71 00.
- D. Glass and Glazing - Section 08 80 00.

1.4 SUBMITTALS

- A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.
 - 1. Include details of core and edge construction and trim for openings.
 - 2. Include factory finish specifications.
 - 3. Include certifications to show compliance with specifications.
 - 4. Include certification to show compliance with AWI and WDMA requirements specified herein.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for finishing and other pertinent data.
 - 1. Include requirements for veneer matching.

- C. Submit samples of factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated"; latest edition "Premium" grade and WDMA "Extra Heavy Duty" Performance Level.
 - 1. Only manufacturers that are certified and listed by AWI to be QCP qualified are acceptable for this project.
 - 2. Provide letter of licensing for Project indicating that doors comply with requirements of grade specified.
- C. Fire-Rated Wood Doors: Doors complying with Category A, Positive Pressure or Neutral Pressure testing standards per UBC 7-2-1997 and UL 10-C (UBC 7-2-1994 and UL 10B) that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated on Door Schedule, based on testing according to NFPA 252.
 - 1. Conform to prevailing Code requirements to determine which pressure standard (Positive or Neutral) is required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) in excess of permitted standard noted in Article 2.2 herein, or show telegraphing of core construction in face veneers.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect for the life of the installation starting from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SOLID CORE FLUSH WOOD DOORS

- A. Provide AWI PC-5 Premium Grade hot pressed 5-ply solid core particleboard doors, 1-3/4" thick, conforming to standards specified herein. Subject to meeting standards specified herein, the following manufacturers are acceptable: Marshfield Door Systems, Inc., Algoma Hardwoods Inc., or Eggers Industries.
 1. Core shall consist of a formed flat panel consisting of wood particles bonded together with synthetic resins or other added binder, with an average density of 30 to 32 lbs. per cubic foot. The material shall meet or exceed the requirements of ANSI A208.1, Grade 1-LD-2 covering mat formed particleboard with face screw holding of 124 lbs., modulus of rupture of minimum 700 psi and modulus of elasticity of not less than 148,000 psi.
 2. Core shall be capable of satisfying this WDMA TM-7 cycle slam test for 1 million slams for surface mounted hardware. Where the manufacturer's core does not meet this criterion, stiles and rails must measure a minimum of 5-1/2" and must be fabricated of hardwood.
 - a. Surface-mounted hardware must be installed with minimum 1-1/4" screw penetrations using threaded to the head screws; coordinate with Section 08 71 00.
- B. Cross Bands: Shall be 1/16" thick hardwood extending full width of door and laid with grain at right angles to face veneers. Cross bands and faces shall be laminated to the core with Type I MF or PVA glue.
- C. Stiles, Rails: Stile and rail shall be a minimum of 1-3/8" solid hardwood or structural composite lumber (after trimming) laminated to the core. Stiles and rails must be securely glued to the core with no voids allowed. Stiles and rails must be capable of screw holding of 550 lbs. per WDMA TM-10.
- D. Transparent Finish: Finish in the shop with clear satin catalyzed polyurethane finish conforming to AWI System "Catalyzed Polyurethane Transparent."
 1. Doors with transparent finish to have center balanced, slip matched, plain sliced, Select maple veneer conforming to AWI, "AA" grade veneer with 3" wide leaf. Minimum veneer thickness shall be not less than 1/50" after sanding.
 2. Doors shall be stained to match Architect's sample.
 3. Veneers shall be continuous or end matched at transoms.

- E. Where glass lites are noted, factory cut openings. Trim openings with solid hardwood moldings of same type of wood as face veneer. Lite openings in fire-rated doors shall have manufacturer's approved, fire-rated hardwood system.
- F. Doors shall have hinge-loading capacity of 500 lbs. per WDMA TM-8.
- G. Vertical door edge must be capable of screw holding of 550 lbs. per WDMA TM-10; horizontal door edge must be capable of screw holding of 400 lbs. per WDMA TM-10.
- H. Fire-Rated Wood Doors: Provide mineral core 1-3/4" thick solid core wood doors conforming to standards specified herein, manufactured by one of the manufacturers noted above. Stile construction on both stiles shall conform to the following:
 - 1. Stile edge screw withdrawals when tested in accordance with ASTM D 1037-78 shall exceed 650 lbs. This applies to both stiles.
 - 2. Stile edge split resistance when tested in accordance with ASTM D 143-52 (78) Modified must exceed 950 lbs. This applies to both stiles.
 - 3. Door to have face finish as specified above.
 - a. Where the core is free of urea formaldehyde, provide a layer of veneer over the substrate prior to application of finish veneer to prevent telegraphing of patterns from the adhesive.
 - 4. Blocking: For surface mounted hardware only, provide composite blocking designed to maintain fire resistance of door but with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
 - a. 5-inch top rail blocking.
 - b. 5-inch bottom rail blocking.
 - c. 1 – 5" x 18" lock block at cylinder or mortise locksets.
 - d. 2 – 5" x 18" lock blocks at exit devices.
 - 5. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.
- I. Barn Doors: Provide two (2) 6'-0" w x 9'-0" h, 1-3/4" thick, sliding maple doors.
 - 1. Provide eight (8) WP-3 wall pads as specified in Section 11 66 00, four (4) to be applied onto each door, at custom size of 22" x 72".
 - 2. Hardware for Sliding Door: Rustica Barn Door Hardware, color black.
 - a. Standard bard door hardware track.
 - b. Six top mount hangars in total (3) each door.
 - 1). Each door: Two (2) straps on either side of door in style "Garrick spoked hardware", one centered top mount without strap
 - c. Support Header: 24'-0" long
 - d. Guides: Floor mount standard - 2
 - e. Door Pulls: Two (2) Santa Fe barn door pulls - 32" H

3. Barn door hardware is decorative but must be fastened into a continuous header to support the weight of the doors.

2.2 FABRICATION

- A. Prefit and premachine wood doors at the factory.
- B. Comply with the tolerance requirements specified herein. Machine doors for hardware requiring cutting of doors. Comply with final hardware scheduled and door frame shop drawings, and with hardware templates and other essential information required to ensure proper fit of doors and hardware.
- C. Take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in the factory.
- D. Doors shall be factory sized to door opening so that trimming and fitting are not required in the field.
- E. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances unless otherwise indicated.
 1. Three-degree bevel or bevel to suit frame sizes indicated, with 3/16" prefit in width, +0/-1/32" tolerances. Prefit top of door 1/8" + 1/16"/-0" and undercut as required by floor condition. Undercut shall not exceed 1/8" from bottom of door to top of finished floor; where threshold occurs undercut shall not exceed 1/8" from bottom of door to top of threshold.
 2. Comply with requirements in NFPA 80 for fire-rated doors.
- F. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3 unless otherwise noted. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Provide concealed intumescent seals at fire-rated pairs of doors meeting the requirements of U.L. 10 C.
- G. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kinds of doors required.
- H. Once doors are installed, maximum allowable warp, bow, cut or twist in doors shall be 1/16" as measured by the 1/16-inch feeler gauge and a straight-edge extending from corner to corner of the door face at stiles, top and bottom rails and along both diagonals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Refer to Section 06 20 00 for installation procedures for all work of this Section.

12 August 2021
Issued for Bid

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END OF SECTION

SECTION 08 14 18

EXTERIOR BARN DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the exterior barn doors as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Swinging wood exterior barn doors.

1.3 RELATED SECTIONS

- A. Wood blocking - Section 06 21 00.
- B. Flashing - Section 07 62 00.
- C. Sealant work - Section 07 92 00.
- D. Finish hardware - Section 08 71 00.
- E. Painting - Section 09 90 00.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Fabricator: Single fabricator regularly engaged for at least ten (10) years fabricating products of the kind and quality required for the Project.
 - 2. Installer: Experienced carpenter contractor who has completed comparable work.
- B. Design Criteria
 - 1. Wall Openings: Accommodate allowable building wall construction tolerances and moisture caused brick masonry swelling without stressing or deforming window units or over stressing anchorage.
 - 2. Moisture Changes: Accommodate wood shrinking and swelling caused by ambient condition at the Project without stressing window units, over-stressing anchorage, causing sash to bind, or exceeding air/water entry limits.

1.5 DEFINITIONS

- A. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.
- B. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

1.6 PERFORMANCE REQUIREMENTS

- A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
 - 1. Minimum size required by AAMA/NWWDA 101/I.S.2.

1.7 SUBMITTALS

- A. Wood Samples: Duplicate pairs of samples for each species of unfinished and transparent finished wood proposed for production work.
 - 1. Samples shall be large enough to accurately show typical appearance characteristics.
 - 2. Each pair of samples shall show extremes of appearance characteristic of range proposed for the work. Wood used for production shall be within this range.
- B. Shop Drawings
 - 1. Window types, sizes, locations, and quantities, keyed to scale elevations. Identify materials, finish and species of woods, glazing types, hardware and anchoring provisions.
 - 2. Door types, sizes, locations, and quantities keyed to scale elevations. Identify materials, finish and species of woods, glazing types, hardware and anchoring provisions.
 - 3. Details: Full or large scale, keyed to scale elevations. Show frame and sash construction, glazing, weep/vent provisions, hardware, weatherstripping and anchorage.
 - 4. Installation: Clearly show relation to adjoining construction. Give blocking requirements, clearances, and instructions necessary for proper installation.
- C. Certifications
 - 1. Fabricator Qualifications: Not less than ten (10) years prior successful production of units similar to those required. List projects having windows of the kind required for the project. Installations shall have been done to meet job conditions and performance requirements of the kind shown and specified for this Project. Give installation dates, locations, contact names, addresses, and phone numbers for each project.

2. Test Report: Certified independent testing agency reports to show compliance with specified window and door performance requirements. Tests shall have been made within five (5) years of submission. They shall include test descriptions and results, and complete enough product descriptions to show that tested products are representative of those proposed for the project.

- a. Independent testing laboratory shall meet criteria of ASTM E 548.

- D. Maintenance Instructions: Two copies of manufacturer's Technical Manual with recommendations for routine Owner maintenance of window and door units, hardware and wood finishes, and instructions for removing and replacing sash and glass.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver factory assembled windows and doors in enclosed vans. Bundle and label loose materials as necessary to prevent loss and damage.
- B. Store products in a clean, protected, dry, well-ventilated building, on platforms or blocking at least 4" above floor. Stack products so they do not warp, bend or twist. Store windows and doors upright, not flat or leaning, with at least 1/4" air space between units.
- C. Handle windows and doors with clean hands or canvas gloves.

1.9 JOB CONDITIONS

- A. Connecting Work: Constructed or specified tolerances. Field dimensions agreed upon, prior to fabrication.
- B. Reference Points: Bench marks and other required reference points shall be established.
- C. Environmental Conditions: Air temperature during installation shall be at least 40 deg. F. and rising, and the wind light or still. Work areas and materials shall be dry and free of ice and snow.
- D. Field Measurements: Verify wood window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating wood windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.10 WARRANTY

- A. Warrant doors for a period of five (5) years against damage or defects of any kind, including defective materials and installation.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber: Wood species for exterior and interior members shall be Mahogany (*Swietenia Macrophylla* or *Khayd Ivorensis*). All pieces shall be dried to an average moisture content of 12% (9-14% for individual pieces) before assembly and treatment.
- B. Anchor Bolts and Screws: Hex head thru bolts and flat head wood screws shall be of corrosion resistant type (galvanized or stainless steel).
- C. Waterproof Adhesive: Resorcinol or melamine type.
- D. Anchor Clips: Teco, Simpson or equal.
- E. Weatherstripping: Extruded ethylene propylene, neoprene or other plastic that remains flexible and non-sticky at project ambient temperature extremes.
- F. Door Hardware: Refer to Section 08 71 00.

2.2 SHOP FINISH

- A. Transparent Finish: Finish in the shop with clear satin catalyzed polyurethane finish conforming to AWI System TR-6, Premium grade.
- B. Opaque Finish: For doors to be field painted, shop prime on all surfaces with one coat of alkyd wood primer applied to a dry film thickness of 1.5 mils.

2.3 FABRICATION

- A. Doors
 - 1. Door Panels: AWI premium grade, produced from standard components. Stiles and rails shall be glued block construction with 1/8" minimum veneers. Joinery shall be blind mortise and tenon construction, sized for a drive fit, with tenon set in adhesive and pinned. Glazed doors to incorporate interior removable glass stops for reglazing. Glazing channels to be weeped to exterior. Sections of stiles, rails and muntins to match details on drawings.
 - 2. Door Frame, Swing: AWI Premium grade, wood components shall be solid wood.
 - 3. Machining for swing door hardware must be predicated on the issuance of physical samples, not templates.
 - 4. Doors shall be fabricated of sliced Mahogany sections, 2-1/2" thick as shown on drawings meeting AWI Premium grade standards.
- B. Permanent Joints and Facings: Bonded with water resistant adhesive.
- C. Preservative Treatment: Water repellent preservative treatment per NWMA I.S.4.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions to which this work is to be attached or applied, and correct any conditions which are detrimental to the proper and expeditious installation of the work. Starting of the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- B. Verify dimensions taken at the job site affecting the work. Bring field dimensions which are at variance to the attention of the Architect. Obtain decision regarding corrective measures before the start of installation.

3.2 INSTALLATION

- A. General: Install doors per approved shop drawings, in proper relation to adjoining construction. Do not twist frames or force fit them into poorly prepared openings. Anchor windows and doors as required to satisfy design requirements. See manufacturer's installation instructions and approved shop drawings.
- B. Center window and door units in wall openings, leaving a uniform interface caulking recess on all four sides.
- C. Set sill members in bed of sealant or with gaskets, as required, for weathertight construction.
- D. Anchorage: Install anchors through frame centerline beside shims. Anchor units to wood blocking with wood screws and to metal framing with toggle bolts; countersink anchor heads. All anchors shall be concealed by closed sash, or in the case of fixed units, with plugs.
- E. Installation to conform to window manufacturer's requirements as indicated in the manufacturer's Technical Manual.
- F. Field installation of finish hardware for swing doors to conform to provisions of Section 08 71 00.
- G. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

- A. Protect window and door surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence

of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

- B. Clean exposed surfaces immediately after installing windows and doors. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows and doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 17 43

FRP/ ALUMINUM HYBRID DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the FRP/ aluminum hybrid doors shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. FRP/ aluminum hybrid doors in aluminum framing.

1.3 RELATED SECTIONS

- A. Finish Hardware - Section 08 71 00.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 12,000,000 cycles.
- E. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- F. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- G. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- H. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503.1: Maximum of 0.09 BTU/hr x sf x degrees F.
- I. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:

1. Flame Spread: Maximum of 200, Class C.
 2. Smoke Developed: Maximum of 450, Class C.
- J. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
1. Flame Spread: Maximum of 25.
 2. Smoke Developed: Maximum of 450.
- K. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- L. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- M. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- N. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- O. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- P. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- Q. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to Sharpie ink pen and white spray paint.
- R. Chemical Resistance: ASTM D 543. Excellent rating.
1. Acetic acid, 5 percent solution.
 2. Chlorine bleach, 10 percent solution.
 3. Sodium hypochlorite, 4 to 6 percent solution.
 4. Citric acid, 10 percent solution.
 5. Sodium carbonate, 20 percent solution.
 6. Turpentine.
- S. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 84.2 psi.
- T. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 448 psi.
- U. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 48 psi.
- V. Thermal and Humid Aging, Nominal Value @ 158°F and 100% Humidity for 14 Days, ASTM D 2126: -4.89 Volume Change.

1.5 SUBMITTALS

- A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of door.
- B. Shop Drawings:
 - 1. Plans: Indicate location of each door and frame opening assembly in project.
 - 2. Elevations: Dimensioned elevation of each type door opening assembly in project; indicate sizes and locations of door hardware, and lites and louvers, if specified.
 - 3. Details: Installation details of each type installation condition in project; indicate installation details of glazing, if specified.
 - 4. Schedule: Indicate each door opening assembly in project; cross reference to plans, elevations and details.
- C. Selection Samples: Manufacturer's standard color chips.
- D. Verification Samples: Two (2) samples to verify color match.
- E. Manufacturer's Instructions: Printed installation instructions for door opening assemblies.
- F. Warranty Documents: Manufacturer's standard warranty documents, executed by manufacturer's representative, countersigned by Contractor.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's ten (10) year warranty against failure due to corrosion from specified environment.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading: Package door opening assemblies in manufacturer's standard containers.
- B. Store door assemblies in manufacturer's standard containers, on end, to prevent damage to face corners and edges.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Products and Manufacturers: Provide "SL-17 Pebble Grain Texture" FRP/aluminum hybrid door as manufactured by Special-Lite, Inc., or approved equal.

2.2 MATERIALS

- A. FRP Sheet: Pebble Grain texture, 0.120-inch thickness, finish color throughout. Color as selected by Architect from manufacturers standard and custom colors.

B. Aluminum Members

1. Extrusions: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
4. Anodized Finish: Class I finish, 0.7 mils thick. Color as selected by Architect.

C. Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings, and stainless steel masonry tee anchors for new construction.

D. Fasteners: Stainless steel.

2.3 MANUFACTURED UNITS

A. FRP/ Aluminum Hybrid Doors:

1. Thickness: 1-3/4.
2. Thermal Insulating Value: 'R' factor 11.
3. Construction:
 - a. Core: Poured-in-place polyurethane foam, min. 5 lb./cf density.
 - b. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth.
 - c. Corners: Mitered.
 - d. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom as standard tubular shaped stiles and rails reinforced to accept hardware as specified.
 - e. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.
 - f. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
 - g. Rail caps or other face sheet capture methods are not acceptable.
 - h. Extrude top and bottom rail legs for interlocking continuous weather bar.
 - i. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
 - j. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
4. Sizes: Indicated on drawings.

2.4 FABRICATION

A. FRP/ Aluminum Hybrid Doors

1. Fabricate to size and profiles of doors and frames indicated on Drawings.
2. Welding of doors and frames is not acceptable.

3. Maintain continuity of line and accurate relation of panels and angles. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.5 DOOR FRAMING SYSTEMS

- A. Aluminum tube framing.

2.6 VISION LITES

- A. Factory Glazing: 1/4-inch glass.
- B. Lites in Exterior Doors: Allow for thermal expansion.
- C. Rectangular Lites
 1. Size: As indicated on the Drawings
 2. Factory glazed with screw-applied aluminum stops anodized to match perimeter door rails.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 1. Openings are correctly prepared to receive doors.
 2. Openings are correct size and depth in accordance with shop drawings.
- B. Installer's Examination
 1. Have installer examine conditions under which construction activities of this Section are to be performed and submit written report if conditions are unacceptable.
 2. Transmit two copies of installer's report to Architect within 24 hours of receipt.
 3. Beginning construction activities of this Section before unacceptable conditions have been corrected is prohibited.
 4. Beginning construction activities of this Section indicated installer's acceptance of conditions.
- C. Verify that glazing has been factory installed.

3.2 INSTALLATION

- A. Install door opening assemblies in accordance with shop drawings, SDI 100, and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.

- B. Installation of door hardware is specified in Section 08 71 00.
- C. Install door hardware in accordance with manufacturer's printed instructions, using through bolts to secure surface applied hardware.
- D. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

3.3 ADJUSTING

- A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

3.4 CLEANING

- A. Clean surfaces of door opening assemblies and sight exposed door hardware in accordance with manufacturer's maintenance instructions.

3.5 PROTECTION OF INSTALLED PRODUCTS

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the access doors as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Frameless recessed panel access doors at drywall ceilings and walls.
 - 2. Framed flush panel access doors at masonry and tile walls.
 - 3. Provide access doors and frames for access from occupied spaces to the following, where indicated or required, and as directed by the trades of Divisions 23 and 26.
 - a. All shutoff or balancing valves.
 - b. Fire dampers, as required.
 - c. Points of duct access.
 - d. Pull boxes.
 - e. Controls of mechanical and electrical items.
 - f. Masonry shafts for pipes and conduits, as required.
 - g. Pipe spaces, if required.
 - h. Inlets of fans.
 - i. Fusible link and splitter damper at filter bank.
 - j. Automatic damper and motor.
 - k. Equipment not otherwise accessible.

1.3 RELATED SECTIONS

- A. Unit Masonry - Section 04 20 00.
- B. Gypsum Drywall - Section 09 29 00.
- C. Ceramic Tiling - Section 09 30 13.
- D. Valves and connections - Division 23.

1.4 QUALITY ASSURANCE

- A. For actual installation of the work of this Section, use only personnel who are thoroughly familiar with the manufacturer's recommended methods of installation and who are completely trained in the skills required.
- B. Fire-Resistance Ratings: Wherever a fire-resistance classification is shown, or for construction where access doors are installed, provide required access door assembly with panel door, frame, hinge and latch from manufacturers listed in Underwriters' Laboratories, Inc. "Classified Building Materials Index" for the rating shown.
 - 1. Provide UL label on each access panel.
 - 2. Provide flush, key operated cylinder lock.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary slightly from sizes shown or scheduled.

1.5 SUBMITTALS

- A. Before any materials of this Section are delivered to the job site, submit complete manufacturer's literature to the Architect. Submit plans and schedules showing size and location of each and every access door for Architect's acceptance prior to installation.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MATERIALS AND FABRICATION

- A. Provide access door assembly manufactured by Milcor Inc., Nystrom Inc., Karp Associates, Inc. or approved equal. Assembly shall be an integral unit complete with all parts and ready for installation.
- B. Fabricate units of continuous welded steel construction. Grind welds smooth and flush with adjacent surfaces. Provide attachment devices and fasteners of the type required to secure access panels to the types of supports shown.
 - 1. In wet locations, provide stainless steel. Confirm with Architect.
- C. Frames for Masonry and Tile Wall Only (Flush Panel Units): Fabricate frame from sixteen (16) gauge steel. Provide frame with exposed flange not less than one (1) inch wide around perimeter of frame for exposed masonry and tile finishes.

1. For installation in masonry construction, provide frames with adjustable metal masonry anchors.
- D. Frameless Units for Drywall Surfaces (Recessed Panel Units): Provide access doors without exposed frames for drywall adhered to recessed panel.
- E. Panels: Fabricate from fourteen (14) gauge steel, with concealed spring hinges set to open to 175 degrees. Provide removable pin type hinges of the quantity required to support the access panel sizes used in the work. Finish with manufacturer's factory applied baked enamel prime coat applied over phosphate protective coating on steel.
- F. Locking Devices
 1. For non-rated access doors, provide flush, screwdriver operated cam locks of number required to hold door in flush, smooth plane when closed.
 2. For fire rated doors, provide locks as described in paragraph 1.4, B. herein.
- G. Inserts and Anchorage: Furnish inserts and anchoring devices which must be built into masonry for the installation of access panels. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where access doors are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 COORDINATION

- A. Coordinate all work with the mechanical trades to insure proper locations and in a timely manner to permit orderly progress of the total work.
- B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.
- D. Remove and replace panels or frames which are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 36 00

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the sectional overhead doors, as shown on the drawings, and/or specified herein, including but not limited to, the following:
 - 1. Aluminum and glass sectional overhead doors.
 - 2. Tracks and hardware.
 - 3. Manual operation.

1.3 RELATED SECTIONS

- A. Glass and glazing - Section 088000.
- B. Finish painting - Section 099000.

1.4 QUALITY ASSURANCE

- A. Provide each sectional overhead door as a complete unit produced by one manufacturer, including frames, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, operators and installation accessories, to suit openings and head room allowable.
- B. Unless otherwise acceptable to Architect, furnish sectional overhead door units by one manufacturer for entire project.
- C. Wind Loading: Design and reinforce sectional overhead doors to withstand a 30 lb. per sq. ft. wind loading pressure with a maximum deflection of 1/120 of opening width.
- D. Minimum Envelope Performance - Glass Overhead Door: U0.77, SHGC 0.4

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead door. Include manufacturer's operating instructions and maintenance data.
- B. Shop drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturer's data.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide the following overhead door assemblies manufactured by Arm-R-Lite Manufacturing Co or equal by Raynor Garage Doors, Overhead Door Co., Crawford Door Co., or approved equal meeting these specifications.

- 1. Aluminum and Glass Overhead Doors: Titan Series by Arm-R-Lite.

2.2 MATERIALS

- A. Aluminum and Glass Doors:

- 1. Rails and Stiles: Aluminum alloy 6063-T6.
 - 2. Door Thickness: 1-3/4 inches nominal.
 - 3. Panels: 0.051 anodized aluminum sheet.
 - 4. Finish: Clear anodized.
 - 5. Glass: 7/16" insulated glass; comply with Section 088000.
 - 6. Bottom Weather Seal: Vinyl astragal.
 - 7. Side Weather Seal: Vinyl perimeter seal.
 - 8. Track: Full Vertical Track, galvanized 3 inch track, mounted as indicated.
 - 9. Hardware: Stamped 14 gage galvanized steel.
 - 10. Rollers: Heavy duty full ball-bearing type with hardened inner race.
 - 11. Counterbalance: Torsion springs, cast aluminum drums, aircraft cable suitable for 100,000 cycles.
 - 12. Locking Device: Interior slide bolt.

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

1. See Concrete and Masonry Sections of these specifications for installation of inserts and anchorage devices.

2.3 TRACKS AND SUPPORTS

- A. Tracks: Provide manufacturer's standard galvanized steel track system, sized for door size and weight, and designed for clearances shown. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of ball bearing roller guides, for required door type and size. Slot vertical sections of track at 2" o.c. for door drop safety device. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.
- B. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members. 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. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling racks) with continuous angle welded to track and supported by laterally-braced attachments to overhead structural members at curve and end of tracks.

2.4 HARDWARE

- A. Provide heavy-duty, rust-resistant hardware, with galvanized fasteners, to suit type of door.
- B. Hinges: Provide heavy steel hinges at each end stile and at each intermediate stile, per manufacturer's recommendations for size of door. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners only where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16'-0" in width, unless otherwise recommended by door manufacturer.
- C. Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide case-hardened roller tires to suit size of track (3" dia. for 3" track; 2" dia. for 2" track).

2.5 COUNTERBALANCING MECHANISMS

- A. Hang door assembly for operation by heavy duty torsion type counterbalance mechanism with oil tempered helical wound springs sprung for size and weight of door. Mechanism shall be capable of a minimum life of 100,000 cycles.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where sectional overhead doors are to be installed and correct any conditions detrimental to the proper and timely completion of the work.

Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install door, track, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions and as herein specified.
- B. Fasten vertical track assembly to framing at not less than 24" o.c. Hang horizontal track from structural overhead framing with angle or channel hangers, welded and bolt-fastened in place. Provide sway bracing, diagonal bracing, and reinforcing as required for rigid installation of track and door operating equipment.
- C. Upon completion of installation, including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION

SECTION 08 36 13

HYDRAULIC BI-FOLD DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the bi-fold doors as shown on the drawings, and/or specified herein, including, but not limited to, the following:
 - 1. Interior bi-fold vertical lift doors.
 - 2. Tracks and hardware.
 - 3. Motor operation.

1.3 RELATED SECTIONS

- A. Electrical - Division 26.

1.4 QUALITY ASSURANCE

- A. Provide each overhead door as a complete unit produced by one manufacturer, including frames, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, operators and installation accessories, to suit openings and head room allowable.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead door. Include manufacturer's operating instructions and maintenance data.
- B. Shop Drawings: Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturer's data.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include, but are not limited to, Crown Doors, LLC.

2.2 MATERIALS

- A. Basis of Design Product: Crown Doors, LLC; SST-II Bi-Fold Hydraulic System.
 - 1. Construct panel/frame sections with structural steel tube framing; ASTM A500 grade minimum.
 - 2. Interior frames shall be constructed of structural steel tubing and other structural steel shapes and designed to the same loading requirements for live and dead loads as the surrounding construction, with a maximum CTC between vertical and horizontal members measuring 60" and 48", respectively.
 - 3. Panel frame shall be designed so that no center cane bolt is required in the floor.
 - 4. Panel frames shall be factory-welded at all joints and connections, with smooth welds not to exceed 1/4" thickness.
 - 5. Panel frames shall be primed with rust-resistant red oxide to provide corrosion resistance, and be prepared for field finishing, if required.
 - 6. Provide factory-supplied neoprene seals/weather stripping, shipped loose for field installation in order to protect against damage during transport.
- B. Bi-fold doors shall be operated by hydraulic cylinders that are mechanically fastened to panel frame.
 - 1. Cylinders shall be located on top half of door only. Cylinders shall be designed to carry required loads during operation, open position and closed position. Internal stops shall be installed so as not to allow over-extension of the cylinders, therefore restricting system from opening or closing beyond its limit.
 - 2. Lift straps or cables, horizontal top and bottom drive shafts, pulleys and strap or cable kick-outs are unacceptable.
 - 3. System shall be locked closed by means of hydraulic cylinders providing a minimum of 1000 lbs. of closing force.
- C. Power Operator: Standard voltage shall be 208-230v single phase.
 - 1. Up/Down push-button or key-switch controls for separate mounting.
 - 2. Power unit to power (2) hydraulic cylinders which open and close the door. Power unit shall be pre-wired and factory-tested.
 - 3. Open/Close control units shall be wired for constant-hold operation.

4. Incoming electrical source to hydraulic power unit shall be supplied by others (manufacturer's standard).

5. Each door operator shall have thermal overload protection for motor.

D. Finishes: Per drawings.

2.3 OPERATION

A. Bi-fold door system shall be extended/retracted in opening using constant-contact push-button or key switch, operating hydraulic cylinders mounted to door frame.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where bi-fold doors are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. Install door, accessories and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions and as herein specified.

B. Upon completion of installation, including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION

SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the aluminum entrances and storefronts as indicated on the drawings and/or specified herein, including the following:
 - 1. Exterior entrance and storefront systems.
 - 2. Interior entrance and storefront systems.

1.3 RELATED SECTIONS

- A. Joint Sealers - Section 07 92 00.
- B. Finish Hardware - Section 08 71 00.
- C. Glass and Glazing - Section 08 80 00.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show interfaces and relationships to work of other trades.
- C. Field Measurements: Take necessary field measurements before preparation of shop drawings and fabrication. Do not delay progress of job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.
- D. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- E. Verification Samples: Submit representative samples of each material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

- F. Calculations: Provide professionally prepared calculations and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied; refer to Article 1.5, para. D for further description.
- G. Test Reports: Provide certified test reports for specified tests.

1.5 QUALITY ASSURANCE

- A. Source: For each material type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of three years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.
- C. Design Criteria: Drawings indicate sizes, member spacings, profiles, and dimensional requirements of work of this Section. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in the Architect's sole judgment, such deviations do not materially detract from the design concept or intended performances.
- D. Engineering: Provide services of a Professional Engineer registered in the State of New York to design and certify that work of this Section meets or exceeds performance requirements specified.

1.6 TESTS AND PERFORMANCE REQUIREMENTS

- A. Manufacturer's Standard Tests: Provide manufacturer's standard test data showing compliance with specified requirements.
- B. Testing and performance data apply to exterior assemblies.
- C. Test Sequence: Test sequence is optional, except that air infiltration tests shall precede water resistance tests.
- D. Air Infiltration Test: Test unit in accordance with ASTM E 283, as follows:
 - 1. Static Air Pressure Difference: 6.24 psf for fixed storefront units, and 1.567 psf for doors.
 - 2. Performance: Maximum air leakage shall not exceed the following:
 - a. Fixed Storefront Units: 0.06 cfm per sq. ft. of window area.
 - b. Door Units: 0.50 cfm per sq. ft. of single doors, 1.00 cfm per sq. ft. for doors hinged in pairs.
- E. Water Leakage Test: Test fixed framing system in accordance with ASTM E 331.
 - 1. Test Pressure: 6.24 psf.
 - 2. Performance: No leakage as defined in test method at specified test pressure.

- F. Uniform Load Deflection Test: Test units in accordance with ASTM E 330, at following static air pressure difference (Design Wind Pressure), or loads prescribed by code for this project site, whichever is greater. Apply pressure first to exterior side (positive) and then interior side (negative).
 - 1. Design Wind Pressure: 30 pounds per square foot minimum.
 - 2. Test Procedure: Procedure A as specified in ASTM E 330.
 - 3. Performance: Deflection in each member measured at locations of greatest deflection shall not exceed $L/175$ at specified Design Wind Pressure.
 - G. Uniform Load Structural Test: Test units in accordance with ASTM E 330 at following static air pressure difference. Apply high pressure load first on one side and then on other side. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms.
 - 1. Static Air Pressure: Minimum 1.5 times the Design Wind Pressure.
 - 2. Permanent Deformation in Any Member: Not to exceed 0.2% of member span.
 - H. Condensation Resistance Factor: Not less than 45 for fixed storefront units, and not less than 48 for doors; per AAMA 1502.7.
 - I. Thermal Movement: Provide storefront systems that allow for expansion and contraction of members throughout an ambient temperature range of 120 degrees F.
 - J. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Store under cover and protect from weather damage.
 - B. Sequence deliveries to avoid delays, but minimize on-site storage.
- 1.8 WARRANTIES
- A. Provide written warranty, signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship. "Defects" is defined to include, but not be limited to, leakage of water, abnormal aging or deterioration, abnormal deterioration or fading of finishes, and failure to perform as required. Include requirement for removal and replacement of covering and connected adjacent work.
 - 1. Warranty Period: Three (3) years from date of Substantial Completion; except finish shall be warranted for a period of fifteen (15) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCTS

- A. Provide storefronts and entrance systems of one of the following manufacturers that meet or exceed requirements of these specifications:
 - 1. Kawneer North America.
 - 2. Oldcastle Building Envelope.
 - 3. Tubelite, Inc.
 - 4. YKK AP America, Inc.
- B. Products:
 - 1. Exterior frame system shall be equal to Trifab 451UT manufactured by Kawneer Company, Inc.; or approved equal manufacturer listed above.
 - 2. Interior frame system shall be equal to Trifab 450 manufactured by Kawneer Company, Inc.; or approved equal manufacturer listed above.
 - 3. Doors shall be "Wide Stile 500" manufactured by Kawneer, or approved equal by one of the manufacturers listed above.

2.2 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Provide 6063-T5 alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish. Comply with ASTM B 221 for extrusions, and ASTM B 209 for sheet/plate. Provide 0.125" thick extrusions for door stiles and storefront framing. Provide 0.050" thick aluminum for glazing moldings.
 - 1. Structural aluminum shapes shall conform to ASTM B 308.
- B. Fasteners: Provide non-magnetic stainless steel fasteners, warranted by manufacturer to be non-corrosive and compatible with aluminum components.
- C. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, or extruded aluminum 0.062" minimum, of an alloy and type selected by manufacturer for compatibility with other components.
- D. Brackets and Reinforcements: Non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- F. Bituminous Coatings: Cold-applied asphalt mastic compounded for 30-mil thickness per coat.

G. Compression Weatherstripping: Manufacturer's standard replaceable stripping of molded neoprene or PVC gaskets complying with ASTM D 2287.

H. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing.

2.3 HARDWARE

A. Provide hardware units as indicated, scheduled, or required for operation of each door. Refer to Section 08 71 00, Finish Hardware for hardware description.

2.4 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on Drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.

1. Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.

2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.

3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

C. Welding: Comply with recommendations of American Welding Society to avoid discoloration; grind exposed welds smooth and restore mechanical finish.

D. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator to prevent corrosion.

E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

F. Fasteners: Conceal fasteners.

G. Provide EPDM/vinyl blade gasket weatherstripping in bottom exterior door rail, adjustable for contact with threshold.

H. Provisions shall be made in the framing for minimum edge clearance, nominal edge cover, and nominal pocket width for the thickness and type of glazing installed, and shall be in accordance with the FGMA Glazing Manual.

I. Pocket glazed framing shall provide:

Insulating Glass

- | | |
|--|-------|
| 1. Nominal edge cover (or bite) framing only | 1/2" |
| 2. Min. nominal edge clearance | 1/4" |
| 3. Min. face clearance | 5/32" |

2.5 STOREFRONT FRAMING

- A. General: Provide inside-outside matched resilient flush glazed system with provisions for glass replacement. Shop fabricate and preassemble frame components where possible.
- B. Thermal-Break Construction: Fabricate exterior aluminum storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members, in manner which eliminates direct metal-to-metal contact. Provide manufacturer's standard construction which has been in use for similar projects for at least three years.
- C. For glass and glazing, refer to Section 08 80 00.

2.6 ALUMINUM DOORS

- A. Aluminum entrance doors shall be wide-stile factory-glazed aluminum doors, manufactured by same manufacturer as storefront framing.
- B. Aluminum entrance doors shall be stile and rail type swing doors. Aluminum shall be extruded aluminum conforming to ASTM B 221, 0.125" thick for door stiles and 0.050" thick for glazing molding.
 - 1. Sections shall be of sizes and profiles indicated; shall present straight, sharply defined lines and arrises; and shall be free from defects impairing strength, durability, and appearance.
 - 2. Fasteners where exposed shall be aluminum, stainless steel, or plated steel conforming to ASTM A 164.
- C. Each door shall be factory glazed set in neoprene glazing gasket, refer to Section 08 80 00 for glass.
- D. Doors shall meet the following resistance to corner racking when tested by the Dual Moment Load Test.
 - 1. Test section shall consist of a standard top door corner assembly. Side rail section shall be 24" long and top rail section shall be 12" long.
 - 2. Anchor top rail positively to test bench so that corner protrudes 3" beyond bench edge.
 - 3. Anchor a lever arm positively to side rail at a point 19" from inside edge of top rail. Attach weight support pad at a point 19" from inner edge of side rail.

4. Test section shall withstand a load of 235 lbs. on the lever arm before reaching the point of failure, which shall be considered a rotation of the lever arm in excess of 45 deg.
- E. Air Infiltration (applies only to single acting offset pivot or butt hung entrances): Air infiltration shall be tested in accordance with ASTM E 283, at a pressure differential of 1.567 psf. A single 3'-0" x 7'-0" entrance door and frame shall not exceed 0.50 cfm per linear foot of perimeter crack. A pair of 6'-0" x 7'-0" entrance doors and frame shall not exceed 1.0 cfm per linear foot of perimeter crack.
- F. For door hardware, refer to Section 08 71 00.
- G. Door bottom rail of exterior doors shall have an EPDM blade gasket sweep strip applied with concealed fasteners.
- H. Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds. Glazing stops shall be hook-in type with EPDM glazing gaskets.
- I. The door weatherstripping on a single acting offset pivot or butt hung exterior door and frame (single or pairs) shall be thermoplastic elastomer weatherstripping on a tubular shape with a semi-rigid polymeric backing.
- J. The door weatherstripping on a double acting, center pivoted door and frame (single or pairs) shall be pile cloth. The door bottom rail shall be weatherstripped with an EPDM blade gasket sweep strip applied with concealed fasteners.
- K. The meeting stiles on pairs of doors shall be equipped with an adjustable astragal.

2.7 FINISH

- A. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: Cleaned with inhibited chemicals; Chemical Finish: Acid-chromate-fluoride-phosphate conversion coating; Organic Coating: As specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 1. Fluoropolymer Three-Coat Coating System: Manufacturer's standard 3-coat, thermo-cured system composed of specially formulated inhibitive primer, intermediate fluoropolymer color coat with suspended metallic flakes and clear top coat, both color coat and top coat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605. Finish shall be equal to PPG Industries' "Duranar XL."
 2. Custom color and gloss as selected by the Architect.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where aluminum entrances and storefronts are to be installed and correct any conditions detrimental to the proper and timely completion of

the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install aluminum entrance doors and storefront framing in openings prepared under other Sections plumb, square, level, in exact alignment with surrounding work, with proper clearances, and securely and positively anchored to building structure, to meet performance requirements specified herein, in accordance with manufacturer's published instructions and approved submittals.
- B. Use only skilled mechanics for erection, under supervision of manufacturer's representative.
- C. Provide protection against galvanic action. Isolate dissimilar materials with bituminous coating or non-absorptive dielectric tape.
- D. Install aluminum entrance doors, storefront frame, and finish hardware. Carefully fit and adjust doors and hardware to frames and weatherstripping. After erection check and adjust operating hardware for smooth and proper operation.
- E. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Section 07 92 00.
- F. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances.
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8" in 12 feet; 1/4" over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16". Where surfaces meet at corners, limit offset from true alignment to 1/32".
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8".

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall engage a qualified independent testing agency to perform testing indicated for storefronts.
- B. Test fixed frames for water infiltration per AAMA 501.2; latest edition. Test within the first 10% of work complete, area to be a minimum of 100 SF of wall and including a perimeter where frames adjoin adjacent construction. Interior finishes must not interfere with observation of test area or be removed from test area. Not appropriate for operable doors.
 - 1. This test (AAMA 501.2) shall be performed infield on new construction.
- C. Repair or remove Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.4 PROTECTION AND CLEANING

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection, and from then until acceptance by Owner.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage. Remove excess sealant, dirt, and other substances. Lubricate hardware and other moving parts.
- C. Replace glass that is broken, cracked or chipped prior to time of final acceptance of Project by Owner.
- D. Clean glass surfaces promptly after installation, exercising care to avoid damage to same.

END OF SECTION

SECTION 08 52 13

ALUMINUM-CLAD WOOD WINDOWS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the aluminum clad wood windows as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Aluminum-clad wood windows, fixed, double-hung and awning type.
 - 2. Glass and glazing for windows.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.
- B. Joint Sealers - Section 07 92 00.
- C. Glass and Glazing - Section 08 80 00.
- D. Painting and Finishing - Section 09 90 00, for field finishing of exposed interior window members.

1.4 SYSTEM DESCRIPTION

- A. Design and Performance Requirements:
 - 1. Window units shall be designed to comply with AAMA/WDMA I.S.2-97, AP-C40 for awning windows and H-HC-40 for double-hung windows.
 - 2. Window Air Leakage, ASTM E 283: Window air leakage when tested at 1.57 psf (25 mph) shall not exceed 0.3 cfm per square foot of frame.
 - 3. Window Water Penetration, ASTM E 547: No water penetration through window when tested under static pressure of 7.5 psf (42 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.
 - 4. Structural Performance: No glass breakage, damage to hardware, or permanent deformation (set) which would cause any malfunction or impair the operation of the unit or residual deflection greater than 0.4 percent of span when tested in accordance with ASTM E 330 at a test pressure of 75 psi.

5. Assembly shall withstand positive or negative uniform static air pressure difference of 60 psf without damage when tested according to ASTM E 330.

6. Forced Entry Performance Level: 10.

B. Take field measurements of existing openings prior to submitting shop drawings and show same on shop drawings for each opening. Note that the Contract Drawings show general locations and sizes of windows, but the Contractor shall remain responsible for all field measurements, quantities, etc.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, standard details and recommendations for each type of wood window unit required.

B. Shop Drawings

1. Window types, sizes, locations, and quantities, keyed to scale elevations. Identify materials, finish and species of woods, glazing types, hardware and anchoring provisions.

2. Details: Full or large scale, keyed to scale elevations. Show frame and sash construction, glazing, weep/vent provisions, hardware, weatherstripping and anchorage.

3. Installation: Clearly show relation to adjoining construction. Give blocking requirements, clearances, and instructions necessary for proper installation.

C. Samples: Submit corner sections, or other samples acceptable to the Architect, of a typical aluminum-clad window section. Samples shall be of sufficient size to show intended quality of workmanship.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver in original packaging and protect from weather.

B. Prime or seal wood surfaces, including surface to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation.

C. Store window units in an upright position in a clean and dry storage area above ground and protect from weather.

1.7 WARRANTY

A. Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date.

B. Insulating glass shall be warranted against visible obstruction thru the glass caused by a failure of the insulating glass air seal for a period of twenty (20) years from the date of original purchase.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

- A. Clad "Lifestyle Series" windows as manufactured by Pella or approved equal made by Marvin Windows and Doors.

2.2 ALUMINUM-CLAD WOOD AWNING WINDOW MATERIALS

- A. Frame: Clear pine or finger jointed core with clear pine veneer, kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication. Water repellent preservative treated in accordance with ANSI/NWWDA I.S.4-94. Frame thickness: 1-3/16 inches. Frame width: 4-9/16 inches. Frame exterior clad with 0.050 inch thick extruded aluminum.
- B. Sash: Clear pine kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication. Water repellent preservative treated in accordance with ANSI/NWWDA I.S.4-94. Composite sash thickness: 1-3/4 inches. Corners slot and tenoned. Sash exterior clad with 0.050 inch thick extruded aluminum.
- C. Finish:
 - 1. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements. Color as selected by the Architect.
 - 2. Interior: Factory painted white.
- D. Hardware: Factory installed operating hardware. Roto-gear with high-pressure die-cast zinc housing and steel base plate. Hardened steel worm drive and gear arms. Thermoplastic resin operator base cover. High-pressure die-cast zinc folding crank handle.
 - 1. Lock: Manual lever.
 - 2. Finish: As selected by the Architect.
- E. Weatherstrip: Weatherstripped at frame perimeter with flexible gaskets. Sash weatherstripped at perimeter with combination bulb and leaf weatherstrip. Color: Beige.

2.3 ALUMINUM-CLAD WOOD DOUBLE-HUNG WINDOW MATERIALS

- A. Frame: Clear pine or finger jointed core with clear pine veneer, kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication. Water repellent preservative treated in accordance with WDMA I.S.4. Frame depth: 5 inches. Frame exterior clad with 0.050 inch thick extruded aluminum.
- B. Sash: Clear pine kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication. Water repellent preservative treated in accordance with WDMA I.S.4. Composite sash thickness: 2-3/32 inches. Corners mortised and tenoned,

glued and secured with metal fasteners. Sash exterior clad with 0.050 inch thick extruded aluminum. Extruded vinyl glazing flange.

C. Finish:

1. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements. Color as selected by the Architect.
2. Interior: Factory painted white.

D. Hardware: Factory installed operating hardware.

1. Balances: Block and tackle, attached to frame and connected to sash with polyester cord.
2. Lock: Self-aligning sash lock; one lock installed on units with frame width less than 37 inches, two locks installed on units with frame width of 37 inches or greater.
3. Finish: As selected by the Architect.

E. Weatherstripping: Weatherstripped at frame perimeter with flexible gaskets. Sash weatherstripped at perimeter with combination bulb and leaf weatherstrip. Color: Beige.

2.4 ALUMINUM-CLAD WOOD FIXED WINDOWS

A. Frame

1. Select woods, water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
2. Interior Exposed Surfaces: Pine.
3. Exterior Surfaces: Clad with aluminum.
4. Overall Frame Depth: 5 inches.

B. Sash

1. Select woods, water water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the sash.
2. Interior Exposed Surfaces: Pine.
3. Exterior Surfaces: Clad with aluminum, lap-jointed at corners.
4. Corners: Mortised and tenoned, glued and secured with metal fasteners.
5. Sash Thickness: 1-13/16 inches.

- C. Finish: Factory paint white, interior; factory-finish painted exterior.

2.5 WINDOW COMPONENTS

- A. Glazing: Select quality complying with ASTM C 1036. Insulating glass SIGMA/ IGCC certified to performance level CBA when tested in accordance with ASTM E 774.
 - 1. Glazing System: 11/16" dual-seal insulating glass, tempered Advanced Low-E with argon.
- B. Insect Screens: Factory installed. Screen mesh, 18 by 16: Charcoal fiberglass. Aluminum Frame Finish: As selected by the Architect.
- C. Simulated Divider Lite Spacers: 7/8".
- D. Jamb Extension: Factory installed jamb extension for wall thickness indicated or required. Finish to match interior frame finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Before installation, verify that openings are plumb, square, and of proper dimension. Report frame defects or unsuitable conditions to the General Contractor before proceeding.
- B. Acceptance of Conditions: Beginning of installation confirms acceptance of existing conditions.

3.2 INSTALLATION

- A. Assemble and install window units according to manufacturer's instructions and reviewed shop drawings.
- B. Install sealant and related backing materials at perimeter of window unit or assembly as specified in Section 07 92 00. Do not use expansive foam sealant.
- C. Install accessory items as required.
- D. Use finish nails to apply wood trim and moldings.

3.3 CLEANING AND PROTECTION

- A. Remove visible labels and adhesive residue according to manufacturer's instructions. Leave windows, doors and glass in a clean condition.
- B. Protect from damage by chemicals, solvents, paint, or construction traffic.

END OF SECTION

SECTION 08 71 00 – DOOR HARDWARE

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:

- 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.
 - b. Sliding doors.
- 2. Electronic access control system components, including:
 - a. Electronic access control devices.
- 3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
- 4. 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. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

- 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 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
- 3. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
- 4. Division 26 sections for connections to electrical power system and for low-voltage wiring.
- 5. Division 28 sections for coordination with other components of electronic access control system.

1.03 REFERENCES

A. UL - Underwriters Laboratories

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. Key Systems and Nomenclature

C. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.04 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.

B. Action Submittals:

1. Product Data: 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: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Quantity, type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 - k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include operational descriptions for: egress, ingress (access), and fire/smoke alarm connections.
 - 1) Submittal Sequence: Submit door hardware schedule 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 that is critical in Project construction schedule.
 5. Key Schedule:
 - a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation 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.
 - 1) 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.
 6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.
- C. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
 2. Product data for electrified door hardware:

- a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Warranty: Special warranty specified in this Section.
- 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. Factory order acknowledgement numbers (for warranty and service)
 - d. Name, address, and phone number of local representative for each manufacturer.
 - e. Parts list for each product.
 - f. Final approved hardware schedule, edited to reflect conditions as-installed.
 - g. Final keying schedule
 - h. Copies of floor plans with keying nomenclature
 - i. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
 - j. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.05 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 4. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
 - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
- B. Architectural Hardware Consultant Qualifications: 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:
1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC).
 2. Can provide installation and technical data to Architect and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
 4. Capable of producing wiring diagrams.
 5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

- C. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- D. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, 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.
- E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
- G. Keying Conference
 - 1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- H. Pre-installation Conference
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Inspect and discuss electrical roughing-in for electrified door hardware.
 - 4. Review sequence of operation for each type of electrified door hardware.
 - 5. Review required testing, inspecting, and certifying procedures.
- I. Coordination Conferences:
 - 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - 2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- 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.

1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. 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.
- D. Protection and Damage:
1. Promptly replace products damaged during shipping.
 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.07 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.
- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.08 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.09 MAINTENANCE

- A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. 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.
- C. 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 ELECTRIC POWER TRANSFER

- A. Manufacturers:
 - a. Scheduled Manufacturer: Von Duprin EPT-10.
- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.03 CYLINDRICAL LOCKS – GRADE 1

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: Schlage ND series.
- B. Requirements:
 - 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
 - 2. Cylinders: Refer to "KEYING" article, herein.
 - 3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
 - 4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 - 5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 - 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: Schlage 06.

2.04 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 98/35A series.

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 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 flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. 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.
9. 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.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. 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.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. 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.
15. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.05 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series.

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.

2.06 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage Everest 29 T.

B. Requirements:

1. Provide cylinders/cores, 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. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Conventional Patented Restricted: cylinder with interchangeable core with patented, restricted keyway.
3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent-protected.
4. Nickel silver bottom pins.
5. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.07 KEYING

- ### A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
 - b. No Master Keying: Cylinders/cores only operated by change (day) keys.
2. Forward bitting 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.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Patent Protection: Keys and blanks protected by one or more utility patent(s)
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. 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.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.08 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee.
2. Acceptable Manufacturers: HPC, Lund.

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.09 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4040XP series.

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 with 5/8 inch (16 mm) diameter double heat-treated pinion journal.
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.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
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.

2.10 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN Senior Swing.

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.
 - b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.

4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.11 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Requirements:

1. Provide kick plates, mop plates, and armor plates 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. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.12 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.

4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.13 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.14 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) 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. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.15 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.

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.

2.16 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage.

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.

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.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying section.
 - 2. Furnish permanent cores to Owner for installation.
- I. Wiring: Coordinate with Division 26, ELECTRICAL 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. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- 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: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 FIELD QUALITY CONTROL

- A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.

1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

- A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. Hardware Sets: 40023 OPT0162519 Version 4


Hardware Group No. 00

Provide each CO door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
EA	CASED OPENING	NO HARDWARE		

Hardware Group No. 01

Provide each SL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA LONG DOOR PULL	9266F 48" O	 630-	IVE
	EA BALANCE OF HARDWARE	BY DOOR SUPPLIER	316	

Hardware Group No. 02







Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224HD		628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
2	EA	DUMMY PUSH BAR	350		626	VON
1	EA	CYLINDER	AS REQUIRED		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630- 316	IVE
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		ANCLR	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T		630	LCN
1	EA	FLUSH MOUNT BOX	8310-867F		689	LCN
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	THRESHOLD	PER DETAIL		A	ZER

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT.











Hardware Group No. 03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224HD		628	IVE
1	EA	PANIC HARDWARE	98-EO		626	VON
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	THRESHOLD	PER DETAIL		A	ZER
1	EA	DOOR CONTACT	7764		628	SCE

Hardware Group No. 04A










Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64		GRY	IVE
			(OMIT IF GASKETING IS BEING PROVIDED)			
1	EA	DOOR CONTACT	679-05HM 12-30 VDC		BLK	SCE

DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.









Hardware Group No. 04B

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	ND80TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64		GRY	IVE
(OMIT IF GASKETING IS BEING PROVIDED)						










Hardware Group No. 04C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64		GRY	IVE
(OMIT IF GASKETING IS BEING PROVIDED)						

Hardware Group No. 05

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F-06		626	VON
1	EA	CYLINDER	AS REQUIRED		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER
1	EA	DOOR CONTACT	679-05HM 12-30 VDC		BLK	SCE









DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

12 August 2021
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The STREAM Center
School of Holy Child








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 NRP		652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-F-06		626	VON
1	EA	CYLINDER	AS REQUIRED		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER











Hardware Group No. 07

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224HD		628	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	THRESHOLD	PER DETAIL		A	ZER










Hardware Group No. 07B

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	CLASSROOM LOCK	ND70TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	MOUNTING PLATE	4040XP-18		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64		GRY	IVE
			(OMIT IF GASKETING IS BEING PROVIDED)			









Hardware Group No. 07C

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	CLASSROOM LOCK	ND70TD RHO		626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64		GRY	IVE
(OMIT IF GASKETING IS BEING PROVIDED)						









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	FIRE EXIT HARDWARE	98-L-BE-F-06		626	VON
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER








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	PASSAGE SET	ND10S RHO		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER

Hardware Group No. 09A

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	ND10S RHO		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER

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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	PRIVACY LOCK	L9040 06A 09-544 L283-722		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER
1	EA	COAT AND HAT HOOK	582		626	IVE

Hardware Group No. CR01










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	WIRELESS ELECTRONIC LOCK	NDE80T RHO BATTERY OPERATED (PROVIDED BY INTEGRATOR)		626	SCE
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	FIRE/LIFE MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)		689	LCN
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64 (OMIT IF GASKETING IS BEING PROVIDED)		GRY	IVE

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM. TIE MAG HOLD OPEN INTO FIRE ALARM SYSTEM.

Hardware Group No. CR01A










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	WIRELESS ELECTRONIC LOCK	NDE80T RHO BATTERY OPERATED (PROVIDED BY INTEGRATOR)		626	SCE
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	FIRE/LIFE CLOSER	4040SE WMS 24V AC/DC		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64 (OMIT IF GASKETING IS BEING PROVIDED)		GRY	IVE

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.TIE MAG HOLD OPEN INTO FIRE ALARM SYSTEM. TIE FIRE/LIFE CLOSER INTO FIRE ALARM SYSTEM

Hardware Group No. CR01B










Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80T RHO BATTERY OPERATED (PROVIDED BY INTEGRATOR)		626	SCE
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	FIRE/LIFE MAG	SEM7850 AS REQ (12/24/120V AC/DC TRI-VOLT)		689	LCN
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64 (OMIT IF GASKETING IS BEING PROVIDED)		GRY	IVE

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.TIE MAG HOLD OPEN INTO FIRE ALARM SYSTEM.

Hardware Group No. CR02









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	WIRELESS ELECTRONIC LOCK	NDE80T RHO BATTERY OPERATED (PROVIDED BY INTEGRATOR)		626	SCE
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	THRESHOLD	PER DETAIL		A	ZER
3	EA	SILENCER	SR64 (OMIT IF GASKETING IS BEING PROVIDED)		GRY	IVE

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR02A




















Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDE80T RHO BATTERY OPERATED (PROVIDED BY INTEGRATOR)		626	SCE
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR03












Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224HD EPT		628	IVE
2	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-98-EO-CON 24 VDC		626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-98-NL-OP-110MD- CON 24 VDC		626	VON
2	EA	CYLINDER	AS REQUIRED		626	SCH
2	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630- 316	IVE
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		ANCLR	LCN
1	EA	WEATHER RING	8310-801		PLA	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T		630	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-855		630	LCN
2	EA	FLUSH MOUNT BOX	8310-867F		689	LCN
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	THRESHOLD	PER DETAIL		A	ZER
2	EA	WIRE HARNESS	CON-LENGTH TO SUIT			SCH
2	EA	WIRE HARNESS	CON-6W			SCH
1	EA	CONTROLLER	CTE-MT15-485-B 12/24 VDC/POE		B	SCE
2	EA	DOOR CONTACT	7764		628	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240 VAC			VON

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. EXIT DEVICES CAN BE ELECTRICALLY DOGGED DOWN FOR DOOR TO OPERATE AS PUSH/PULL. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. ACCESS CONTROL SYSTEM TO TEMPRARILY RETRACT EXIT DEVICE LATCHBOLT AND ENABLE EXTERIOR AUTOMATIC OPERATOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO SIGNAL EXIT DEVICE TO RETRACT LATCHBOLT AND AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. REQUEST TO EXIT AND DOOR CONTACT CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR04











Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224HD EPT		628	IVE
1	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU RHO RX CON		626	SCH
			12V/24V DC			
1	EA	FSIC CORE	23-030 CKC EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	RAIN DRIP	142AA		AA	ZER
1	EA	DOOR SWEEP	8198AA		AA	ZER
1	EA	THRESHOLD	PER DETAIL		A	ZER
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT			SCH
1	EA	WIRE HARNESS	CON-6W			SCH
1	EA	CONTROLLER	CTE-MT15-485-B 12/24 VDC/POE		B	SCE
1	EA	DOOR CONTACT	679-05HM 12-30 VDC		BLK	SCE
1	EA	POWER SUPPLY	PS902 120/240 VAC		LGR	SCE

NOTE: COORDINATE AND VERIFY POWER SUPPLY REQUIREMENTS PRIOR TO ORDERING.
OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL UNLOCK LOCKSET AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

Hardware Group No. CR05

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224HD EPT		628	IVE
1	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD-CON		626	VON
			24 VDC			
1	EA	90 DEG OFFSET PULL	8190EZHD 12" O		630-316	IVE
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SEALS	BY DOOR SUPPLIER			BYO
1	EA	THRESHOLD	PER DETAIL		A	ZER
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT			SCH
1	EA	WIRE HARNESS	CON-6W			SCH
1	EA	CONTROLLER	CTE-MT15-485-B 12/24 VDC/POE		B	SCE
1	EA	DOOR CONTACT	7764		628	SCE
1	EA	POWER SUPPLY	PS902 900-2RS 900-BBK 120/240			VON
			VAC			

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. ACCESS BY KEY OR BY CARD READER. CARD READER WILL RETRACT LATCHBOLT AND ALLOW ACCESS. REQUEST TO EXIT AND DOOR POSITION SWITCH CONNECTED TO BUILDING'S SECURITY SYSTEM.

END OF SECTION

SECTION 08 80 00

GLASS AND GLAZING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the glass and glazing as shown on the drawings and/or specified herein, including, but not limited to, glazing of the following:
 - 1. Windows.
 - 2. Doors.
 - 3. Curtain walls.
 - 4. Entrances.
 - 5. Storefront framing.
 - 6. Interior borrowed lites.
 - 7. Interior framed mirrors.
 - 8. 1" tempered glass shelves.
 - 9. Security glass.
 - 10. 3M distraction decal on windows per drawings.

1.3 RELATED SECTIONS

- A. Steel Doors and Frames - Section 08 11 13.
- B. Aluminum Entrances and Storefronts - Section 08 41 13.
- C. Aluminum-Clad Wood Windows - Section 08 52 13.
- D. Framed bathroom mirrors - Section 10 28 13.

1.4 REFERENCES

- A. Comply with the recommendations of the following references unless more stringent requirements are indicated herein.

1. FGMA Publications: FGMA Glazing Manual.
2. AAMA Publications: AAMA TIR-A7 Sloped Glazing Guidelines and Glass Design for Sloped Glazing.
3. LSGA Publications: LSGA Design Guide.
4. SIGMA Publications: TM-3000 Vertical Glazing Guidelines and TB-3001 Sloped Glazing Guidelines.
5. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201, Safety Standards for Architectural Glazing, Sealed Insulating Glass Manufacturing Association.
6. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
7. Fire-Resistive Glazing Products for Window Assemblies: Products identical to those tested per ASTM E 163, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
8. ASTM C 920, Standard Specification for Elastomeric Joint Sealants.
9. Insulating Glass Criteria: IGCC International Glass Certification Council.

1.5 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 on drawings and/or specified herein are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: 30 psf or greater if required by Code.
 2. Probability of Breakage for Vertical Glazing:
 - a. 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - b. 1 lite per 1000 for lites installed 15 degrees from the vertical and under wind action.
 - c. Load Duration: 60 seconds or less.

3. Maximum Lateral Deflection: For glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/100 times the short side length or 1/2", whichever is less.
 4. 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.
 - a. Temperature Change (Range): 120 deg. F ambient; 180 deg F, material surfaces.
 5. Thermal Solar Performance: See Article 2.2 herein.
- C. Glass units shall be annealed, heat strengthened, fully tempered or laminated where required to meet wind load and safety glazing requirements, as shown, specified, or recommended by the glass fabricator, and as required by the prevailing Building Code.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements, including performance requirements.
- B. Submit compatibility and adhesion test reports from sealant manufacturer indicating materials were tested for compatibility and adhesion with glazing sealant, as well as other glazing materials including insulation units.
- C. Initial Selection Samples: Submit samples of each glass and glazing material showing complete range of colors, textures, and finishes available for each material used.
 1. Submit complete range of samples of standard colors and patterns for ceramic frits at insulating glass.
 2. Submit complete range of samples of sandblasted glass showing variations of grits and opacity achieved.
- D. Verification Samples: Submit representative samples of each glass and glazing material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide glass samples having minimum size of 144 sq. in. and 6 in. long samples of sealants and glazing materials; all samples shall bear the name of the manufacturer, brand name, thickness, and quality.
- E. Calculations: Provide wind load charts, calculations, thermal stress analysis, and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied. Document shall be signed and sealed by a Professional Engineer licensed in the State of New York.

- F. Test Reports: Provide certified reports for specified tests.
- G. Warranties: Provide written warranties as specified herein.

1.7 QUALITY ASSURANCE

- A. Source: For each glass and glazing type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of five years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials; and with a successful record of in-service installations similar in size and scope to this Project.
- C. Glass Thickness: Glass thicknesses shown on drawings and/or specified herein are minimum thicknesses. Determine and provide size and thickness of glass products that are certified to meet or exceed performance requirements specified in this Section.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.
 - 1. GANA Publications: GANA's "Glazing Manual" and "Laminated Glass Design Guide."
 - 2. IGMA Publications: IGMA TM-3000, "Vertical Glazing Guidelines for Sealed Insulating Glass Units."
- E. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- F. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and 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 257.
- G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

H. Insulating Glass Certification Program: Permanently marked on spacers with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.
3. Insulating Glass Manufacturers Alliance.

I. Manufacturer shall be ISO 9001-2000 Certified.

1.8 TESTS

A. Preconstruction Sealant Test: Submit samples of materials to be used to glazing sealant manufacturer to determine sealant compatibility. Include samples of glass, gaskets, glazing materials, framing members, and other components and accessories of glazing work. Test in accordance with ASTM C 794 to verify what type of primers (if any) are required to ensure sealant adhesion to substrates.

1. Submit minimum of nine pieces of each type and finish of framing member, and nine pieces of each type, class, kind, condition, and form of glass, including monolithic, laminated, and insulating glass for adhesion tests.
2. Provide manufacturer's written report and recommendations regarding proper installation.

1.9 PROJECT CONDITIONS

- A. Weather: Perform work of this Section only when existing or forecasted weather conditions are within limits established by manufacturers of materials and products used.
- B. Temperature Limits: Install sealants only when temperatures are within limits recommended by sealant manufacturer, except, never install sealants when temperatures are below 40 deg. F.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations and GANA Manual.
1. Protect materials from moisture, sunlight, excess heat, sparks and flame.
 2. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 WARRANTIES

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Manufacturer's Special Project Warranty on Coated Glass Products: Provide written warranty signed by manufacturer of coated glass agreeing to furnish f.o.b. point of

manufacture, within specified warranty period indicated below, replacements for those coated glass units which develop manufacturing defects. Manufacturing defects are defined as peeling, cracking or deterioration in metallic coating due to normal conditions and not due to handling or installation or cleaning practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard but not less than five (5) years after date of substantial completion.
- C. Manufacturer's Special Project Warranty on Insulating Glass: Provide written warranty signed by manufacturer of insulating glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated below, replacements for those insulating glass units developing manufacturing defects. Manufacturing defects are defined as failure or hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.
1. Warranty Period: Manufacturer's standard but not less than ten (10) years after date of substantial completion.
- D. Manufacturer's Special Project Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated glass manufacturer agreeing to replace laminated glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty period five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. All glass and glazing used at the exterior of the Project shall be manufactured by the same manufacturer. The same manufacturer and the same furnace shall be used for all tempered and heat strengthened glass used throughout the project. Acceptable manufacturers include, but are not limited to, the following:
1. Vitro Architectural Glass.
 2. Guardian Industries.
 3. Pilkington.
 4. AFG.
 5. JE Berkowitz, LP.
 6. Viracon.

2.2 GLASS MATERIALS AND PRODUCTS

- A. Ultra-Clear (Low-Iron) Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.
 - 1. Low Iron Tempered Glass: Provide "Starphire" by Vitro Architectural Glass, or approved equal, tempered in accordance ASTM C 1048, thicknesses as indicated.
- B. Clear Float Glass: ASTM C 1036, Type I (transparent, flat), Class 1 (clear), Quality q3, minimum 1/4" thick.
- C. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated), Type I (transparent, flat), Class 1 (clear), Quality q3, Kind FT, minimum 1/4" thick. Tempered glass must be certified by SGCC to meet applicable standards.
 - 1. Performance Requirements for Tempered Glass
 - a. Length and Width: For 2.9 mm to 6.0 mm; +/-1.6 mm.
 - b. Diagonal: +/- 3.0 mm.
 - c. Edgework: Belt seaming or diamond wheels. 1.5 mm seam of upper and lower glass edges. No sharp edges.
 - d. Corners: No more than 3.0 mm from square.
 - e. Float Glass Defects: Must meet the requirements of ASTM C 1036. The most common defects are scratches, stones gaseous bubbles and edge chips. Tables in the glass standards have limits for size/quantity of defects.
 - f. Tempered glass shall have a minimum surface compression of 10,000 psi.
 - g. Tempered glass to be heat-treated by horizontal (roller hearth) process with inherent roller-wave distortion parallel to the bottom edge of the glass when installed.
 - h. Flatness Tolerances
 - 1). Roller-Wave or Ripple: The deviation from flatness at any peak shall be targeted not exceed 0.003" as measured per peak to valley for 1/4" (6mm) thick glass.
 - 2). Bow and Warp: The bow and warp tolerances shall not exceed 1/32" per linear foot.
 - 3). Fully tempered glass shall be heat soaked to EN 14179-1:2005-European Heat Soaking Standard.
- D. Laminated Safety Glass: Provide two glass panes of equal thickness, laminated together with a polyvinyl butyl interlayer, conforming to ASTM C 1172 and as follows:
 - 1. Interlayer Color: Clear.
 - 2. Interlayer Material: Provide Eastman Chemical "Saflex" or "Vanceva," or DuPont "Butacite," 0.030" thick at vertical applications, and 0.060" thick at sloped or horizontal applications.
 - 3. Minimum thickness of 1/4".

- E. Patterned Glass: Provide ceramic frit patterned glass in custom colors and patterns as selected by the Architect, minimum thickness of 1/4". Ceramic frit glass shall meet requirements specified herein for ceramic frit spandrel glass.
- F. Ceramic Frit Spandrel Glass
 - 1. Heat-treated glass with ceramic coating complying with ASTM C 1048, Condition B (spandrel glass, one surface ceramic-coated) Type 1 (Transparent, Flat), Quality Q3 (Glazing Select), with other requirements as specified.
 - 2. GANA/GTA 66-9-20, Specification for Heat-Strengthened or Fully Tempered Ceramic Enamel Spandrel Glass Used for Building Window/Curtain Walls.
 - 3. Custom color selected by the Architect.
- G. Insulating Glass: Insulating glass unit shall consist of 1/4" clear exterior lite of float (or tempered, where required) glass with Low E coating on No. 2 face, 1/2" interspace and 1/4" clear interior lite of float (or tempered, where required) glass. Provide factory assembled units of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space, complying with ASTM E 2190, and as follows:
 - 1. Sealing System: Dual Seal.
 - 2. Primary Sealant: Polyisobutylene.
 - 3. Secondary Sealant: Silicone, General Electric IGS 3204 or IGS 3100, or Dow Corning 982.
 - a. For structurally glazed IG units, secondary seal shall conform to ASTM C 1249.
 - b. Primary and secondary seals shall not contain voids and must be continuously bonded to the glass structure.
 - 4. Spacer: Clear finish aluminum with welded, soldered, or bent corners, hollow tube types, filled with low nitrogen absorption desiccant.
 - 5. Desiccant: Molecular sieve, silica gel, or blend of both.
 - 6. Interspace Content: Argon.
 - 7. Glass Thickness: 1/4" minimum.
 - 8. Low 'E' Coating (Storefront Framing and Doors): Provide high-performance, clear, metallic coating, "Solarban 70XL" as manufactured by Vitro Architectural Glass. Provide low 'E' coating having the following performance characteristics when applied to the No. 2 surface of 1" insulating units, both lites 1/4" clear:
 - a. Visible Light Transmittance: 64%.
 - b. Shading Coefficient: 0.32.
 - c. Solar Energy Transmittance: 25%.
 - d. Solar Heat Gain Coefficient (SHGC): 0.27.
 - e. U-Value: 0.29 winter, 0.27 summer.

9. Low 'E' Coating (Aluminum-Clad Wood Windows): See Section 08 52 13.
10. Units shall be certified for compliance with seal classification "CBA" by the Insulating Glass Certification Council (IGCC) or by IGMA, and tested in accordance with the above ASTM Test Methods.
11. Insulating glass shall conform to the following tolerances:
 - a. Length and Width: + 3.0 mm/ -2.0 mm.
 - b. Diagonal: +/- 3.0 mm.
 - c. Thickness: As agreed +/- 1.0 mm.
 - d. Edge-Deletion of Coating: Minimum 8 mm wide. Width of deletion must be more than the width of the secondary seal. Silver layer(s) must be completely removed. Appearance must be uniform.
 - e. Primary PIB Seal: Must be complete with no breaks. Appearance must be uniform. PIB bead must overlap coating. No visible bright line when glass is viewed in transmission. The width of the PIB bead shall be 4.0 mm + 3.0/ - 1.5 mm.
 - f. Secondary Seal: Nominal 6 mm + 3.0/ - 1.5 mm. The minimum width of the secondary silicone seal for IG units that are glazed structurally must be determined according to ASTM C 1249. The secondary seal must be uniformly applied without bubbles, cavities or gaps. Avoid excess sealant that will need to be trimmed off later.
12. Additional requirements and properties for primary and secondary insulating glass seals and spacers:
 - a. All glass units shall comply with IGMA Guidelines which limits the dimension of the visible edge seal encroachment into the vision area to be no greater than the sightline infringement of 3mm (0.12").
 - b. Insulating glass unit hermetic seal to consist of butyl primary and silicone secondary seals with bent, welded, or soldered interpane spacer corners; keyed corners are not acceptable unless also soldered or welded. Spacers shall be aluminum or stainless steel. Locate spacer joint at the top or sides of the units, but in no instances at the sill. Design units to minimize the number of spacer joints. Provide solid keys, embedded in butyl sealant on all four sides, at spacer joints.
 - c. Hermetic seals must be continuous and intimately bonded to both lites of glass. Provide primary seal of uniform depth with a nominal width of 1/8" to 3/16". Hermetic seals shall not be contaminated with debris, fingerprints, or other foreign matter and shall not contain voids or air pockets that decrease the width of the seal below the minimum widths listed in these Specifications, or that breach the seal. The width of the primary seal shall not be less than 1/16", and the total cumulative length of the primary seal between 1/16" and 1/8" shall be less than 12" in any one insulating glass unit. The primary seal shall not have a reduced thickness at the corners. An increased thickness of the primary seal at the corners is acceptable.
 - d. Provide secondary seal of uniform depth with a nominal width of 1/4". Provide a total width of the primary and secondary seal of 1/2". Units shall carry CBA

rating as established by ASTM E 774 and shall meet SIGMA 65-7-2, latest edition. Units shall not contain breather or capillary tubes or similar penetrations.

- H. Fire-Rated Glazing Material: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; complying with 16 CFR 1201, Category II; not to exceed 100 square inches; and as follows:
 - 1. Fire Protection Rating: As required by Code for the fire rated opening in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Product: "FireLite Plus" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
- I. Glass for Framed Mirrors: 1/4" thick, Quality q2, clear float glass with silver, copper, and organic coating, edges uniformly ground and polished.
 - 1. Mirror Frame: Stainless steel.
- J. Security Glass (Shooter Attack Glass): Provide "School Security Glass" as manufactured by Armoured One, or approved equal, consisting of two glass panes of equal thickness, laminated together with manufacturer's proprietary interlayer and with security film on exterior face of glass.
 - 1. Provide manufacturer's insulating and/or fire-rated shooter attack glass options where required.
 - 2. Minimum Performance Requirements
 - a. Comply with ASTM F1233 Class 1.3.
 - b. Forced Entry Sequentially Testing: Time to Failure: Minimum 6 minutes.
- K. 3M Distraction Decal on Windows
 - 1. Provide decal image as shown on the drawings.
 - 2. Image will be 3-1/2" to 4" high and repeated every 24" on center.
 - 3. Color: Opaque White.

2.3 GLAZING MATERIALS AND PRODUCTS

- A. General: Provide sealants and gaskets with performance characteristics suitable for applications indicated. Ensure compatibility of glazing sealants with insulating glass sealants, with laminated glass interlayers, and with any other surfaces in contact.
- B. General Glazing and Cap Bead Sealant: Provide sealant with maximum Shore A hardness of 50. Provide one of the following:
 - 1. Dow Corning 795.

2. General Electric Silglaze N 2500 or Contractors SCS-1000.
3. Tremco Spectrem 2.
- C. Weather Seal Sealant: Provide non-acid curing sealant with movement range $\pm 50\%$, ASTM C 719. Provide one of the following:
 1. Dow Corning 795.
 2. General Electric Silpruf.
 3. Tremco Spectrem 2.
- D. Backer Rod: Closed cell non-gassing polyethylene rod with rod diameter 25% wider than joint width.
- E. Dense Elastomeric Compression Seal Gaskets: Provide molded or extruded neoprene or EPDM gaskets, Shore A hardness of 75 ± 5 for hollow profile, and 60 ± 5 for solid profiles, ASTM C 864.
- F. Cellular, Elastomeric Preformed Gaskets: Provide extruded or molded closed cell, integral-skinned neoprene, Shore A 40 ± 5 , and 20% to 35% compression, ASTM C 509; Type II.
- G. Preformed Glazing Tape: Provide solvent-free butyl-polyisobutylene rubber with 100% solids content complying with ASTM C 1281 AAMA A 800 with integral continuous EPDM shim. Provide preformed glazing tape in extruded tape form. Provide Tremco "Polyshim II" or approved equal.
- H. Setting Blocks: Provide 100% silicone blocks with Shore A hardness of 80-90. Provide products certified by manufacturer to be compatible with silicone sealants. Length to be not less than 4". Width for setting blocks to be 1/16" more than glass thickness and high enough to provide the lite recommended by glass manufacturer. When thickness of setting block exceeds 3/4" the glass manufacturer must be consulted for sizes and configuration. In a vented system, setting block shall be designed so as to not restrict the flow of water within the glazing rabbet to the weep holes.
 1. Shims: For shims used with setting blocks, provide same materials, hardness, length and width as setting blocks.
 2. Structural Silicone Glazing: Provide silicone setting blocks where structural silicone occurs at sills and at insulating units with silicone edge seals.
- I. Edge Blocks: Provide neoprene or silicone as required for compatibility with glazing sealants. Provide blocks with Shore A hardness of 55 ± 5 .
- J. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place.
- K. Miscellaneous Glazing Materials: Provide sealant backer rods, primers, cleaners, and sealers of type recommended by glass and sealant manufacturers.

- L. Mirror Adhesive: Palmer's "Mirro-Mastic," or approved equal. Mastic must be compatible with mirror backing.

- 1. Clips: No. 4 finish Type 304 stainless steel.

2.4 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and polish exposed glass edges.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GENERAL GLAZING STANDARDS

- A. Install products using the recommendations from the manufacturer of glass, sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those in the GANA "Glazing Manual."
- B. Verify that Insulating Glass Unit (IGU) secondary seal is compatible with glazing sealants.
- C. Install glass in prepared glazing channels and other framing members.
- D. Install setting blocks in rabbets as recommended by referenced glazing standards in GANA's "Glazing Manual" and IGMA's "Glazing Guidelines."

- E. Provide bite on glass, minimum edge and face clearances and glazing material tolerances recommended by GANA's "Glazing Manual."
- F. Provide weep system as recommended by GANA's "Glazing Manual."
- G. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
- H. Distribute the weight of glass unit along the edge rather than the corner.
- I. Comply with manufacturers and referenced industry standards on expansion joint and anchors; accommodating thermal movement; glass openings; use of setting blocks, edge, face, and bite clearances; use of glass spacers; edge blocks and installation of weep systems.
- J. Protect glass edge damage during handling and installation.
- K. Prevent glass from contact with contaminating substances that result from construction operations, such as weld spatter, fireproofing or plaster.
- L. Remove and replace glass that is broken, chipped cracked or damaged in any way.

3.4 GLAZING

- A. Glazing channel dimensions, as indicated on Shop Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead. Install setting blocks at the one greater points of each lite along the horizontal mullion.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- K. Flush Glazing
1. If the butt joint in the metal framing is in the vertical direction, the glazier shall run the tape initially on the head and sill members going directly over this joint. Should the butt joint in the metal framing run horizontally, tapes must first be applied to the jambs so that it crosses over the joint.
 2. Each tape section shall butt the adjoining tape and be united with a tool to eliminate any opening.
 3. Do not overlap the adjoining length of tape or rubber shim as this will prevent full contact around the perimeter of glass.
- L. Off-Set Glazing
1. Where the glazing legs are off-set, the difference in the rabbet width shall be compensated by employing different glazing tapes with different diameter shims. The difference in shim shall be equal to the size of the off-set. The thinner tape shall be positioned first on the glazing leg closest to the interior. The thicker tape shall be cut to the exact length of the dimension between the applied tapes, and installed on the outermost glazing leg.
 2. Immediately prior to setting glass, paper backing shall be removed. Apply a toe bead of sealant 6" in each direction, from each corner.
 3. Locate setting blocks in the sill member at quarter points, or if necessary to within 6" of each corner. Setting blocks must be set equal distance from center line of the glass and high enough to provide the recommended bite and edge clearances.
 4. Set edge block according to glass manufacturer's recommendations.
 5. Set Glass: The glass shall be pressed firmly against the tape to achieve full contact.

6. In a vented system, apply a heel bead (air seal) of sealant around the perimeter of glass, between the sole of the I.G. unit and the base of the rabbet of the metal framing developing a positive bond to the unit and to the metal framing. The bead of the sealant shall be deep enough so that it will partially fill the channel to a depth of 1/4" between the glass edge and the base of the metal framing rabbet.
7. Interior stops shall be set, and glazing tape spline for the appropriate face clearance shall be rolled into place, compressing the glass to the shim within the glazing tape.

3.5 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant as recommended by glass manufacturer or glass frame manufacturer.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape where noted on approved shop drawings.

3.6 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- D. Install gaskets so they protrude past face of glazing stops.

3.7 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.
 - 1. Exterior glazing gasket shall be set a minimum of 1/8" below exterior glazing stop to create a channel for sealant installation.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 FRAMELESS MIRRORS

- A. Apply mastic to back of mirror "pats" spaced 4 pats/sq. ft.; adjust mirror so that it is plumb and in place to avoid distortion of reflecting images. Allow 1/8" space between back of mirror and wall surface.
 - 1. Apply "pats" using Palmer Electric Applicator.
- B. Apply stainless steel clips at mirror top and bottom; securely clip to substrate using non-corrosive anchors. At drywall back-up anchors must be secured to studs or steel wallplate spanning from stud to stud.

3.9 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.

F. Glass to be cleaned according to:

1. GANA Glass Informational Bulletin GANA 01-0300 – "Proper Procedure for Cleaning Architectural Glass Products."
2. GANA Glass Informational Bulletin GANA TD-02-0402 – "Heat Treated Glass Surfaces are Different."

G. Do not use razor blades, scrapers or metal tools to clean glass.

END OF SECTION

SECTION 09 29 00

GYPSUM DRYWALL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the gypsum drywall as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Gypsum board work for partitions, ceilings, column enclosures, furring, and elsewhere where gypsum drywall work is shown on drawings.
 - 2. Metal supports for gypsum drywall construction.
 - 3. Acoustical insulation for gypsum drywall work.
 - 4. Sealant for gypsum drywall work.
 - 5. Concealed metal reinforcing for attachment of railings, toilet partitions and other items supported on drywall partitions and walls.
 - 6. Taping and finishing of drywall joints.
 - 7. Installing rings and frames in drywall surfaces for grilles, registers and lighting fixtures.
 - 8. Gypsum shaft wall construction.
 - 9. Bracing and connections.

1.3 RELATED SECTIONS

- A. Thermal Insulation - Section 07 21 00.
- B. Hollow metal door frames - Section 08 11 13.
- C. Access Doors - Section 08 31 13.
- D. Painting and Finishing - Section 09 90 00.
- E. Rings for grilles, registers and light fixtures - Division 23 and 26.

1.4 QUALITY ASSURANCE

- A. The following standards, as well as other standards which may be referred to in this Section, shall apply to the work of this Section:
1. The Gypsum Construction Handbook, latest edition, USG.
 2. Construction Guide, latest edition, National Gypsum.
 3. ASTM A 568 "Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for"
 4. ASTM C 475 "Standard Specification for Joint Treatment Materials for Gypsum Wallboard Construction"
 5. ASTM C 645 "Standard Specification for Non-Structural Steel Framing Members"
 6. ASTM C 754 "Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products"
 7. ASTM C 840 "Standard Specification for Application and Finishing of Gypsum Board"
 8. ASTM C 919 "Standard Specification for Use of Sealants in Acoustical Applications"
 9. ASTM C 954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs From 0.033 in. to 0.112 in. in Thickness"
 10. ASTM C 1002 "Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Board"
 11. ASTM C 1177 "Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing"
 12. ASTM C 1178 "Standard Specification for Glass Mat Water Resistant Gypsum Backing Board"
 13. ASTM C 1278 "Standard Specification for Fiber-Reinforced Gypsum Panel"
 14. ASTM C 1396 "Standard Specification for Gypsum Board"
 15. ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"
- B. Allowable Tolerances: 1/32" offsets between planes of board faces, and 1/16" in 8'-0" for plumb, level, warp and bow.

C. System Design Load

1. Provide standard drywall wall assemblies designed and tested by manufacturer to withstand a lateral load of 5 lbs. per sq. ft. for the maximum wall height required, and with deflection limited to L/240 of partition height.
 - a. Drywall assemblies with tile finish shall have a deflection limit of L/360.
2. Provide drywall ceiling assemblies designed, fabricated and installed to have a deflection not to exceed L/360.

- D. Fire-Resistance Rating: Where gypsum drywall with fire resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories, or to design designations in UL "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction, and compliant with UL Test #2079; criteria for cycle movement for all field height wall sections requiring allowance for vertical deflection within framing details.
- E. Installer: Firm with not less than 5 years of successful experience in the installation of specified materials.

1.5 SUBMITTALS

- A. Submit shop drawing for each drywall partition, furring and ceiling system showing size and gauges of framing members, hanger and anchorage devices, wallboard types, insulation, sealant, methods of assembly and fastening, control joints indicating column lines, corner details, joint finishing and relationship of drywall work to adjacent work.
- B. Samples: Each material specified herein, 12" x 12", or 12" long, or in manufacturer's container, as applicable for type of material submitted.
- C. Manufacturer's Literature: Submit technical and installation instructions for each drywall partition, furring and ceiling system specified herein, and for each fire-rated and sound-rated gypsum board assembly. Submit other data as required to show compliance with these specifications, including data for mold resistant joint compound.
- D. Test Reports: This Contractor shall submit test report, obtained by drywall manufacturer, indicating conformance of drywall assemblies to required fire ratings and sound ratings.

1.6 PRODUCT HANDLING AND PROTECTION

- A. Deliver, store and handle drywall work materials to prevent damage. Deliver materials in their original, unopened containers or bundles, and store where protected from moisture, damage and from exposure to the elements. Store wallboard in flat stacks.
- B. Protect wallboard from becoming wet.
- C. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice."

1.7 ENVIRONMENTAL CONDITIONS

- A. Provide and maintain minimum temperature of fifty-five (55) degrees F. and adequate ventilation to eliminate excessive moisture within the building in the area of the drywall work for at least twenty-four (24) hours, prior to, during and after installation of drywall work. Installation shall not start until windows are glazed and doors are installed, unless openings are temporarily closed. Space above suspended ceilings shall be vented sufficiently to prevent temperature and pressure build up.

1.8 JOB MOCK-UP

- A. At a suitable location, where directed by the Architect, lay up a portion of a finished wall and ceiling demonstrating the quality of work, including finishing, to be obtained under this Section. Omit drywall boards in locations as directed by the Architect to show stud spacing and attachments; after acceptance, complete assembly.
- B. Adjust the finishing techniques as required to achieve the finish required by the Architect as described in this Section of these specifications.
- C. Upon approval of the mock-up, the mock-up may be left in place as a portion of the finished work of this Section.
- D. All drywall work shall be equal in quality to approved mock-up.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers for Gypsum Drywall Panels and Accessories: U.S. Gypsum Co., Georgia Pacific, CertainTeed Corporation, Continental Building Products, or National Gypsum Co. meeting specification requirements are acceptable.
 - 1. All drywall products must be manufactured in North America.
- B. Acceptable Manufacturers for Metal Supports of Drywall Assemblies: Unless otherwise noted, provide products manufactured by ClarkDietrich, Super Stud Building Products, Marino/Ware, or approved equal.

2.2 METAL SUPPORTS

- A. Metal Floor and Ceiling Runners
 - 1. Drywall Track: Formed from 0.0312 inch (20 U.S. Std. gauge) (unless otherwise noted) cold formed steel, width to suit shaped metal studs. Use 20 ga. top runners with 1-1/4" minimum flanges.
 - 2. Deflection track or head of wall connections at rated partitions shall conform to UL #2079 for cycle movement. Provide positive mechanical connection of framing to structure, allowing for vertical movement within connections. Minimum of 0.0312 (20 ga.) cold formed steel for clips, 25 ga. cold formed steel for deflection track.

- a. Product: "BlazeFrame DSL" or "MaxTrak Slotted Deflection Track" as manufactured by ClarkDietrich, "VertiClip" or "VertiTrack" as manufactured by the Steel Network or equal made by Metal-Lite Inc.
 - b. FireTrak (including stud clips) by FireTrak Corp. or equal made by Metal-Lite Inc.
 3. Shaft Wall "J" Type Runner: Formed from 0.0329" (20 U.S. Std. gauge) galvanized steel, 1" x 2-1/2" or 4" wide (to suit detail) x 2-1/4" (for shaft wall).
- B. Metal Studs, Framing and Furring
1. C-Shaped Studs: Channel type with holes for passage of conduit formed from minimum 0.0312 inch (20 U.S. Std. gauge) (unless heavier gauge is required to meet deflection limits) cold formed steel, width as shown on drawings.
 2. Furring Channels: Hat shaped, formed from galvanized steel, 25 U.S. Std. gauge.
 - a. Product: ClarkDietrich; Furring Channel, or comparable product.
 3. "C-H," "CT," or "I" Type Stud: 1-1/2" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
 - a. Product: ClarkDietrich; CT Stud, or a comparable product.
 4. Double "E" Type Stud or "J" Track with Holding Tabs: 1" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
 - a. Product: ClarkDietrich; J-Tabbed Track, or a comparable product.
 5. Continuous 16 gauge x 8" wide steel wall plate screwed to studs as required for support of railings, toilet partitions and other items supported on drywall partitions and walls.
- C. Suspended Ceiling and Fascia Supports
1. Main Runners: 1-1/2" steel channels, cold rolled at 0.475 lbs. per ft., rust-inhibitive paint finish.
 2. Furring Members: Screw-type hat-shaped furring channels of 25 ga. zinc-coated steel; comply with ASTM C 645.
 3. Hangers: Galvanized, 1" x 3/16" flat steel slats capable of supporting 5x calculated load supported.
 4. Hanger Anchorages: Provide inserts, clips, bolts, screws and other devices applicable to the required method of structural anchorage for ceiling hangers. Size devices for 5x calculated load supported.

5. Furring Anchorages: 16 ga. galvanized wire ties, manufacturer's standard clips, bolts or screws as recommended by furring manufacturer.

- D. Protective Coating: All cold-formed steel members shall have coating conforming to AISI S220; ASTM A 653, G60 or coating with equivalent corrosion resistance of ASTM A653/A653M, G60. Galvannealed products are not acceptable

2.3 GYPSUM WALLBOARD TYPES

- A. Gypsum Wallboard: 5/8" thick "Sheetrock" by USG, "Gold Bond" by National Gypsum, or "Regular Gypsum" by CertainTeed Corp., 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- B. Gypsum Ceiling Board: 5/8" thick, sag-resistant, long edges tapered.
- C. Fire-Rated Gypsum Wallboard: 5/8" thick "Sheetrock Firecode C" by USG, "Firecheck Type C" by Lafarge/Continental, "Gold Bond Fireshield" by National Gypsum, or "Type C" by CertainTeed Corp., 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- D. Cement Board Backing for Tile Finish: 5/8" thick "Durock Tile Backer Board" by USG, "Wonder Board Lite" by Custom Building Products or approved equal.
- E. Moisture/Mold-Resistant Gypsum Wallboard (at all exterior walls and wet areas): 5/8" thick "Mold Tough," "Mold Tough FR," by U.S. Gypsum, "DensArmor Plus" by Georgia Pacific, Lafarge "Mold Defense" and/or Lafarge "Mold Defense Type X," or "Gold Bond EXP Interior Extreme Gypsum Board" by National Gypsum, 48" wide, in maximum lengths available to minimize end-to-end butt joints.
 1. Board must have a rating of 10 per ASTM D 3273 with a core that meets ASTM C 1396, Section 6 or ASTM C 1658.
- F. Mold-Resistant Shaft Wall Liner: Solid gypsum board liner for shaft wall construction, 1" thick, 24" wide, as required to suit condition, by standard lengths as required, beveled edges. Provide "Mold Tough Liner Panel" by USG, "DensGlass Ultra Shaft Guard" by Georgia Pacific, Lafarge "Mold Defense Shaftliner Type X" and/or Lafarge "Weather Defense Shaftliner Type X", "Gold Bond Brand Fireshield Shaft Liner XP" by National Gypsum or "Gold Bond Brand EXP Extended Exposure Shaft Liner" by National Gypsum.
 1. Liner board must have a rating 10 per ASTM D 3273 with a core that meets ASTM C 1396 Section 6.
- G. Abuse-Resistant Wallboard: 5/8" thick "Sheetrock Brand Mold Tough AR" by USG, "Dens Armor Plus Abuse Resistant Panels" by Georgia-Pacific, "EXP Interior Extreme AR" or "Gold Bond Brand Hi-Abuse XP" by National Gypsum, "Protecta AR100" or "Protecta HIR 300" by Lafarge/Continental, or "AirRenew Extreme Abuse" by CertainTeed Corp., 48" wide, in maximum lengths available to minimize end-to-end butt joints.
 1. Board must achieve a Level 1 rating per ASTM C 1629.

2.4 ACCESSORIES

- A. Acoustical Insulation: Paper-less, non-combustible, semi-rigid mineral fiber mat, 2" thick, in walls (unless otherwise indicated), 3 lb./cu. ft. maximum density; Thermafiber LLC "Thermafiber," or approved equal.
- B. Fasteners for Wallboard: USG Brand Screws; Type S Bugle Head for fastening wallboard to lighter gauge interior metal framing (up to 20 ga.). Type S-12 Bugle Head for fastening wallboard to heavier gauge interior metal framing (20 ga. to 12 ga.); Type S and Type S-12 Pan Head for attaching metal studs to door frames and runners; and Type G Bugle Head for fastening wallboard to wallboard. Lengths specified below under "Part 3 - Execution" Articles and as recommended by drywall manufacturer.
- C. Laminating Adhesive: "Sheetrock Brand Joint Compound."
- D. Metal Trim - Corner Beads: For 90 degree External Corners - ClarkDietrich; 103 Deluxe Cornerbead or "Dur-A-Bead" No. 103, 26 U.S. Std. ga. galvanized steel, 1-1/4" x 1-1/4", for 90 degree external corners.
- E. Metal Trim - Edge Beads: "Sheetrock Brand Paper Faced Metal Bead and Trim."
- F. Partition/Concrete Ceiling Trim: Trim-Tex Super Seal Tear Away or approved equal.
- G. Metal Trim Treatment Materials and Joint Treatment Materials for Gypsum Drywall Boards: Paper tape for joint reinforcing; Setting Type (Durabond 90) or Lightweight Setting Type Joint Compound for taping and topping; and Ready Mix Compound for finishing.
 - 1. For mold-resistant drywall, water-resistant drywall and tile backer board, use glass mesh tape with setting joint compound that is rated 10 when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274. Acceptable joint compound is "Rapid Set One Pass" made by CTS Cement Manufacturing Corp. or "Rapid Joint" manufactured by Lafarge North America or approved equal meeting standards noted herein.
- H. Control Joints: ClarkDietrich; #093 Control Joint or No. 0.093, USG.
- I. Acoustical Sealant: USG "Acoustical Sealant" or "Tremco Acoustical Caulking" of Tremco Mfg. Co., Masterseal NP520 by BASF or approved equal.
- J. Neoprene Gaskets: Conform to ASTM D 1056.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where gypsum drywall is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. General

1. Install drywall work in accordance with drywall manufacturer's printed instructions and as indicated on drawings and specified herein.
2. All metal framing for drywall partitions shall extend from floor to underside of structural deck above. Provide for vertical deflection with positive mechanical connections of framing members to structure.
3. Provide concealed reinforcement, 16 ga. thick by eight (8) inches wide or as detailed or as recommended by manufacturer, for attachment of railings, toilet partitions, and other items to be supported on the partitions which cannot be attached to the metal framing members. Concealed reinforcement shall span between metal studs and be attached thereto using two (2) self-tapping pan head screws at each stud.
 - a. Back of drywall shall be scored or notched to prevent bulging out where reinforcement plate occurs.

B. Fire-Rated Assemblies: Install fire-rated assemblies in accordance with requirements of authorities having jurisdiction, Underwriters' Laboratories and test results obtained and published by the drywall manufacturer, for the fire-rated drywall assembly types indicated on the drawings.

C. Acoustical Assemblies: Install acoustically-rated assemblies to achieve a minimum STC as noted on drawings, in accordance with test results obtained and published by the drywall manufacturer, for the drywall assembly type indicated on the drawings.

D. Sealant

1. Install continuous acoustical sealant bead at top and bottom edges of wallboard where indicated or required for sound rating as wallboard is installed, and between metal trim edge beads and abutting construction.
2. Install acoustical sealant in 1/8" wide vertical control joints within the length of the wall or partitions, and in all other joints, specified below under "Control Joints." Install bead of acoustical sealant around electric switch and outlet boxes, piping, ducts, and around any other penetration in the wallboard; place sealant bead between penetrations and edge of wallboard.
3. Where sealant is exposed to view, protect adjacent surfaces from damage and from sealant material, and tool sealant flush with and in same plane as wallboard surface. Sealant beads shall be 1/4" to 3/8" diameter.

E. Wallboard Application

1. Do not install wallboard panels until steel door frames are in place; coordinate work with Section 08 11 13, "Steel Doors and Frames."

2. See drawings for all board types. Use fire-rated wallboard for fire-rated assemblies. Use sag-resistant board for ceilings. Use water-resistant wallboard where indicated on drawings and where wallboard would be subject to moisture. Install water-resistant wallboard in full, large sheets (no scraps) to limit number of butt joints.
3. Apply wallboard with long dimension parallel to stud framing members, and with abutting edges occurring over stud flanges.
4. Install wallboard for partitions from floor to underside of structure above and secure rigidly in place by screw attachment, unless otherwise indicated.
5. Provide "Thermafiber" safing insulation meeting standards of Section 07 84 13 at flutes of metal deck where partitions carry up to bottom of metal deck.
6. Neatly cut wallboard to fit around outlets, switch boxes, framed openings, piping, ducts, and other items which penetrate wallboard; fill gaps with acoustic sealant.
7. Where wallboard is to be applied to curved surfaces, dampen wallboard on back side as required to obtain required curve. Finish surface shall present smooth, even curve without fluting or other imperfections.
8. Screw fasten wallboard with power-driven electric screw driver, screw heads to slightly depress surface of wallboard without cutting paper, screws not closer than 3/8" from ends and edges of wallboard.
9. Where studs are doubled-up, screw fasten wallboard to both studs in a staggered pattern.

F. Cementitious Backer Board

1. General: Furnish cementitious backer board in maximum available lengths. Install horizontally, with end joints over framing members.
2. Fastening: Secure cementitious backer board to each framing member with screws spaced not more than 12 inches on center and not closer than 1/2" from the edge. Install screws with a conventional screw gun so that the screw heads are flush with the surface of the board.
3. Joint Treatment: Fill space between edge of backer and receptor with dry-set Portland cement or latex-Portland cement mortar. Fill all horizontal and vertical joints and corners with dry-set Portland cement or latex-Portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.

G. Metal Trim: Install and mechanically secure in accordance with manufacturer's instructions; and finish with three (3) coats of joint compound, feathered and finish sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions.

1. Corner Beads: Install specified corner beads in single lengths at all external corners, unless corner lengths exceed standard stock lengths.

2. Edge Beads: Install specified edge beads in single lengths at all terminating edges of wallboard exposed to view, where edges abut dissimilar materials, where edges would be exposed to view, and elsewhere where shown on drawings. Where indicated on drawings, seal joint between metal edge bead and adjoining surface with specified gasket, 1/8" wide minimum and set back 1/8" from face of wallboard, unless other size and profile indicated on drawings.
 3. Casing beads shall be set in long lengths, neatly butted at joints. Provide casing beads at juncture of board and vertical surfaces and at exposed perimeters.
- H. Control Joint Locations: Gypsum board surfaces shall be isolated with control joints where:
1. Ceiling abuts a structural element, dissimilar wall or other vertical penetration.
 2. Construction changes within the plane of the partition or ceiling.
 3. Shown on approved shop drawings.
 4. Ceiling dimensions exceed thirty (30) feet in either direction.
 5. Wings of "L," "U," and "T" shaped ceiling areas are joined.
 6. Expansion or control joints occur in the structural elements of the building.
 7. Shaft wall runs exceed 30' without interruption.
 8. Partition or furring abuts a structural element or dissimilar wall or ceiling.
 9. Partition or furring runs exceed 30' without interruption.
 10. Where control joints are required, ceiling height door frames may be used as control joints. Less than ceiling height frames shall have control joints extending to the ceiling from both corners.
- I. Joint Treatment and Spackling
1. Joints between face wallboards in the same plane, joints at internal corners of intersecting partitions and joints at internal corners of intersections between ceilings and walls or partitions shall be filled with joint compound.
 2. Screw heads and other depressions shall be filled with joint compound. Joint compound shall be applied in three (3) coats, feathered and finish surface sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions. Treatment of joints and screw heads with joint compound is also required where wallboard will be covered by finish materials which require a smooth surface, such as vinyl wall coverings.

3.3 FURRED WALLS AND PARTITIONS

- A. Use specified metal furring channels. Run metal furring channel framing members vertically, space sixteen (16) inches o.c. maximum. Fasten furring channels to

concrete or masonry surfaces with power-driven fasteners or concrete stub nails spaced sixteen (16) inches o.c. maximum through alternate wing flanges (staggered) of furring channel. Furring channels shall be shimmed as necessary to provide a plumb and level backing for wallboard. At inside of exterior walls, an asphalt felt protection strip shall be installed between each furring channel and the wall. Furring channel and splices shall be provided by nesting channels at least eight (8) inches and securely anchoring to concrete or masonry with two (2) fasteners in each wing.

- B. Wallboard Installation: Same as specified under Article 3.4 - "Metal Stud Partitions."

3.4 METAL STUD PARTITIONS

- A. Unless otherwise noted, steel framing members shall be installed in accordance with ASTM C 754.
- B. Runner Installation: Use channel type. Align accurately at floor according to partition layout. Anchor runners securely sixteen (16) inches o.c. maximum with power-driven anchors to floor slab, with power-driven anchors to structural slab above. See "Stud Installation" below for runners over heads of metal door frames. Where required, carefully remove sprayed-on fireproofing to allow partition to be properly installed.
- C. Stud Installation
1. Use channel type, positioned vertically in runners, spaced as noted on drawings, but not more than sixteen (16) inches o.c.
 2. Anchor studs to floor runners with screw fasteners. Provide snap-in or slotted hole slip joint bolt connections of studs to ceiling runners leaving space for movement. Anchor studs at partition intersections, partition corners and where partition abuts other construction to floor and ceiling runners with sheet metal screws through each stud flange and runner flange.
 3. Connection at ceiling runner for non-rated partitions shall be snap-in or slotted hole slip joint bolt connection that shall allow for movement. Seal studs abutting other construction with 1/8" thick neoprene gasket continuously between stud and abutting construction.
 4. Connections for fire rated partitions at ceiling runners shall conform to UL Design #2079.
 5. Install metal stud horizontal bracing wherever vertical studs are cut or wallboard is cut for passage of pipes, ducts or other penetrations, and anchor horizontal bracing to vertical studs with sheet metal screws.
 6. At jambs of door frames and borrowed light frames, install doubled-up studs (not back to back) from floor to underside of structural deck, and securely anchor studs to jamb anchors of frames and to runners with screws. Provide cross braces from hollow metal frames to underside of slab.
 7. Over heads of door frames, install cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs, and securely

anchor runner to adjacent vertical studs with sheet metal screws. Install cut-to-length vertical studs from runner (over heads of door frame) to ceiling runner sixteen (16) inches maximum o.c. and at vertical joints of wallboard, and securely anchor studs to runners with sheet metal screws.

8. At control joints, in field of partition, install double-up studs (back to back) from floor to ceiling runner, with 1/4" thick continuous compressible gasket between studs. When necessary, splice studs with eight (8) inches minimum nested laps and attach flanges together with two (2) sheet metal screws in each flange. All screws shall be self-tapping sheet metal screws.
- D. Runners and Studs at Chase Wall: As specified above for "Runners" and "Studs" and as specified herein. Chase walls shall have either a single or double row of floor and ceiling runners with metal studs sixteen (16) inches o.c. maximum and positioned vertically in the runners so that the studs are opposite each other in pairs with the flanges pointing in the same direction. Anchor all studs to runner flanges with sheet metal screws through each stud flange and runner flange following requirements of paragraph 3.4, B. Provide cross bracing between the rows of studs by attaching runner channels or studs set full width of chase attached to vertical studs with one self-tapping screw at each end. Space cross bracing not over thirty-six (36) inches o.c. vertically.
- E. Wallboard Installation - Single Layer Application (Screw Attached)
1. Install wallboard with long dimension parallel to framing member and with abutting edge joints over web of framing member. Install wallboard with long dimension perpendicular to framing members above and below openings in drywall extending to second stud at each side of opening. Joints on opposite sides of wall shall be arranged so as to occur on different studs.
 2. Boards shall be fastened securely to metal studs with screws as specified. Where a free end occurs between studs, back blocking shall be required. Center abutting ends over studs. Correct work as necessary so that faces of boards are flush, smooth, true.
 3. Wallboard screws shall be applied with an electric screw gun. Screws shall be driven not less than 3/8" from ends or edges of board to provide uniform dimple not over 1/32" deep. Screws shall be spaced twelve (12) inches o.c. in the field of the board and 8" o.c. staggered along the abutting edges.
 4. All ends and edges of wallboard shall occur over screwing members (studs or furring channels). Boards shall be brought into contact but shall not be forced into place. Where ends or edges abut, they shall be staggered. Joints on opposite sides of a partition shall be so arranged as to occur on different studs.
 5. At locations where piping receptacles, conduit, switches, etc., penetrate drywall partitions, provide non-drying sealant and an approved sealant stop at cut board locations inside partition.
- F. Wallboard Installation - Double-Layer Application

1. General: See drawings for wallboard partition types required.
 2. First Layer (Screw Attached): Install as described above for single layer application.
 3. Second Layer (Screw Attached): Screw attach second layer, unless laminating method of attachment indicated on drawings or necessary to obtain required sound rating or fire rating. Install wallboard vertically with vertical joints offset thirty-two (32) inches from first layer joints and staggered on opposite sides of wall. Attach wallboard with 1-5/8" screws sixteen (16) inches o.c. along vertical joints and sixteen (16) inches o.c. in the field of the wallboard. Screw through first layer into metal framing members.
 4. Second Layer (Laminated): Install wallboard vertically. Stagger joints of second layer from first layer joints. Laminate second layer with specified laminating adhesive in beads or strips running continuously from floor to ceiling in accordance with manufacturer's instructions. After laminating, screw wallboard to framing members with 1-5/8" screws, spaced twelve (12) inches o.c. around perimeter of wallboard.
- G. Wallboard Installation - Laminated Application: Where laminated wallboard is indicated, use specified laminating adhesive, install wallboard vertically and maintain tolerances as specified for screw attached wallboard.
- H. Insulation Installation: Install where indicated on drawings. Place blanket tightly between studs.
- I. Deflection of Structure Above: To allow for possible deflection of structure above partitions, provide top runners for non-rated partitions with 1-1/4" minimum flanges and do not screw studs or drywall to top runner. Where positive anchorage of studs to top runner is required, anchorage device shall be by means of slotted hole (in clip connection with screw attachment to web of steel through bushings located in slots of clips), or other anchorage device approved by Architect.
- J. Control Joints
1. Leave a 1/2" continuous opening between gypsum boards for insertion of surface mounted joint.
 2. Back by double framing members.
 3. Attach control joint to face layer with 9/16" galvanized staples six (6) inches o.c. at both flanges along entire length of joint.
 4. Provide two (2) inch wide gypsum panel strip or other adequate seal behind control joint in fire rated partitions and partitions with safing insulation.

3.5 DRYWALL FASCIAS AND CEILINGS

- A. Furnish and install inserts, hanger clips and similar devices in coordination with other work.

- B. Secure hangers to inserts and clips. Clamp or bolt hangers to main runners.
- C. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
- D. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
- E. Metal Furring Channels: Space sixteen (16) inches o.c. maximum. Attach to 1-1/2" main runner channels with furring channel clips (on alternate sides of main runner channels). Furring channels shall not be let into or come in contact with abutting masonry walls. End splices shall be provided by nesting furring channels no less than eight (8) inches and securely wire tying. At any openings that interrupt the furring channels, install additional cross reinforcing to restore lateral stability.
- F. Mechanical accessories, hangers, splices, runner channels and other members used in suspension system shall be of metal, zinc coated, or coated with rust inhibitive paint, of suitable design and of adequate strength to support units securely without sagging, and such as to bring unit faces to finished indicated lines and levels.
 - 1. Provide special furring where ducts are over two (2) feet wide.
- G. Apply board with its long dimension at right angles to channels. Locate board butt joints over center of furring channels. Attach board with one (1) inch self-drilling drywall screws twelve (12) inches o.c. in field of board at each furring channel; eight (8) inches o.c. at butt joints located not less than 3/8" from edges.

3.6 SHAFT WALLS

- A. Runner Installation: Use "J" metal runners at floor and ceiling, with the short leg toward finish side of wall. Securely attach runners to structural supports with power-driven fasteners at both ends and twenty-four (24) inches o.c.
- B. Shaft Wall Liner: Cut shaft wall liner panels one (1) inch less from floor to ceiling height and erect vertically between J-runners.
- C. C-H Studs: Cut metal studs 3/8" to not more than 1/2" less than floor to ceiling height and install between shaft wall liner panels so that panels are fitted snugly into the one (1) inch wide "H," "T," or "I" portion of the stud. Space studs twenty-four (24) inches o.c., unless otherwise indicated on drawings. Install full-length steel E-Studs or J-runners vertically at T-intersections, corners, door jambs, and columns. Install full length E-Studs or J-runners over shaft wall liner both sides of closure panels. Frame openings cut within a liner panel with J-Runner around perimeter. For openings, frame with vertical E-Stud or J-runner at edges, horizontal runner at head and sill, and reinforcing as shown on the drawings. Suitably frame all openings to maintain structural support for wall. Over metal doors, install a cut to length section of runner and attach to strut-studs with clip angles and 3/8" Type S Screws space twelve (12) inches o.c.
- D. Wallboard Installation - Double Layer Installation: Erect gypsum wallboard base layer vertically or horizontally to meet fire rating on one side of studs with end joints

staggered. Fasten base layer panels to studs with one (1) inch Type S screws twenty-four (24) inches o.c. Caulk perimeter of base layer panels. Apply gypsum wallboard face layer vertically over base layer with joints staggered and attached with 1-5/8" Type S screws staggered from those in base, spaced eight (8) inches o.c. and driven into studs.

- E. Wallboard Installation (Where Both Sides of Shaft Wall are Finished): Apply gypsum wallboard face layers vertically both sides of studs. Stagger joints on opposite partition sides. Fasten panels with one (1) inch or two (2) inches Type S screws spaced eight (8) inches o.c. in field and along edges into studs.
- F. Where handrails are indicated for direct attachment to drywall shaft system, provide not less than a sixteen (16) ga. x eight (8) inches wide galvanized steel reinforcement strip, accurately positioned and secured to studs and concealed behind not less than one 1/2" thick course of gypsum board in the system.
- G. Integrate stair hanger rods with drywall shaft system by locating cavity of system as required to enclose rods.

3.7 ERECTION AT COLUMN ENCLOSURES

- A. Metal furring supports shall be provided under work of this Section, and shall be cut to lengths as necessary for tight fit such that spacing is not more than sixteen (16) inches o.c.
- B. Board shall be fastened securely to supports with screws as specified. Place boards in position with minimum number of joints. Where free ends occur between supports, back-blocking or furring shall be required. Center abutting ends over supports. Correct work as necessary so that faces of boards are flush, smooth and true. Provide clips or cross furring for attachment as required.
- C. All layers shall be screw attached to furring.
- D. When column finish called for on drawings to be in the same plane as drywall finish layer, maintain even, level plane.

3.8 FINISHING

- A. Taping: A thin, uniform layer of compound shall be applied to all joints and angles to be reinforced. Reinforcing tape shall be applied immediately, centered over the joint, seated into the compound. A skim coat shall follow immediately but shall not function as a fill or second coat. Tape shall be properly folded and embedded in all angles to provide a true angle.
- B. Filling: After initial coat of compound has hardened, additional compound shall be applied, filling the board taper flush with the surface. The fill coat shall cover the tape and feather out slightly beyond the tape. On joints with no taper, the fill coat shall cover the tape and feather out at least four (4) inches on either side of the tape. No fill coat is necessary on interior angles.

- C. After compound has hardened, a finishing coat of compound shall be spread evenly over and extending slightly beyond the fill coat on all joints and feathered to a smooth, uniform finish. Over tapered edges, the finished joint shall not protrude beyond the plane of the surface. All taped angles shall receive a finish coat to cover the tape and taping compound and provide a true angle. Where necessary, sanding shall be done between coats and following the final application of compound to provide a smooth surface, ready for painting.
- D. Fastener Depressions: Compound shall be applied to all fastener depressions followed, when hardened by at least two (2) coats of compound, leaving all depressions level with the plane of the surface.
- E. Finishing Beads and Trim: Compound shall be applied to all bead and trim and shall be feathered out from the ground to the plane of the surface. When hardened, this shall be followed by two (2) coats of compound each extending slightly beyond the previous coat. The finish coat shall be feathered from the ground to the plane of the surface and sanded as necessary to provide a flat, smooth surface ready for decoration.
- F. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840.
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are a substrate for tile, and where indicated.
 - 3. Level 4: Level of finish for surfaces exposed to view shall conform to Level 4 of ASTM C 840 and GA-214 of the Gypsum Association.
- G. Drywall construction with defects of such character which will mar appearance of finished work, or which is otherwise defective, will be rejected and shall be removed and replaced at no expense to the Owner.

3.9 CLEANING AND ADJUSTMENT

- A. At the completion of installation of the work, all rubbish shall be removed from the building leaving floors broom clean. Excess material, scaffolding, tools and other equipment shall be removed from the building.
- B. Work shall be left in clean condition ready for painting or wall covering. All work shall be as approved by Architect.
- C. Cutting and Repairing: Include all cutting, fitting and repairing of the work included herein in connection with all mechanical trades and all other trades which come in conjunction with any part of the work and leave all work complete and perfect after all trades have completed their work.

3.10 PROTECTION OF WORK

- A. Installer shall advise Contractor of required procedures for protecting drywall work from damage and deterioration during remainder of construction period.

END OF SECTION

SECTION 09 30 13

CERAMIC TILING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the ceramic tiling work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Porcelain floor tile.
 - 2. Porcelain and ceramic wall tile and base.
 - 3. Slate saddles.
 - 4. Setting beds, grout and sealant.
 - 5. Waterproofing membrane.

1.3 RELATED SECTIONS

- A. Cast-in-Place Concrete - Section 03 30 00.
- B. Gypsum Drywall - Section 09 29 00.

1.4 REFERENCES

- A. ANSI A 108 Series/A118 Series - American National Standards for Installation of Ceramic Tile.
- B. ANSI A 136.1 - American National Standards for Organic Adhesives for Installation of Ceramic Tile.
- C. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
- D. ASTM C 150 - Standard Specification for Portland Cement.
- E. TCNA - Handbook for Ceramic, Glass and Stone Tile Installation; Tile Council of North America.
- F. ISO 13007 - International Standards Organization; Classification for Grout and Adhesives.
- G. Large Format Tile (LFT): Tile 15" or larger in any direction and/or 144 sq. in. in size.

1.5 QUALITY ASSURANCE

- A. Qualifications of Installers: For cutting, installing and grouting of ceramic tile, use only thoroughly trained and experienced journeyman tile setters who are completely familiar with the requirements of this work, and the recommendations contained in the referenced standards, and the installers are Certified Ceramic Tile Installer (CTI) through the Ceramic Tile Education Foundation (CTEF) or Tile Installer Thin Set Standards (ITS) verification through the University of Ceramic Tile and Stone.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the following:
 - 1. Manufacture all ceramic tile in accordance with Standard Grade Requirements of ANSI A-137.1.
 - 2. Install all ceramic tile in accordance with the recommendations contained in "Tile Council of North America Handbook for Ceramic, Glass, and Stone Tile Installation (TCNA)," latest edition.
- C. All surfaces shall have a minimum wet DCOF AcuTest value of 0.42 and tested per ANSI A326.3 Dynamic Coefficient of Friction of Hard Surface Flooring Materials.

1.6 SUBMITTALS

- A. Samples
 - 1. Before any ceramic tile is delivered to the job site, submit to the Architect sample panels, approx. 12" x 12", mounted on hardboard back-up with selected grout color for each color and pattern of ceramic tile and grout specified.
 - 2. Submit 6" length of stone saddles.
 - 3. Submit 12" x 12" samples of waterproofing membrane.
- B. Master Grade Certificates: Prior to opening ceramic tile containers, submit to the Architect a Master Grade Certificate, signed by an officer of the firm manufacturing the ceramic tile used, and issued when the shipment is made, stating the grade, kind of tile, identification marks for tile containers, and the name and location of the project.
- C. Mock-Ups
 - 1. At an area on the site where approved by the Architect, provide a mock-up ceramic tile installation.
 - a. Make the mock-up approximately 36" x 36" in dimension.
 - b. Provide one mock-up for each type, class, and color of installation required under this Section.
 - c. The mock-ups may be used as part of the Work, and may be included in the finished Work when so approved by the Architect.
 - d. Revise as necessary to secure the Architect's approval.

2. The mock-ups, when approved by the Architect, will be used as datum for comparison with the remainder of the work of this Section for the purposes of acceptance or rejection.
3. If the mock-up panels are not permitted to be part of the finished Work, completely demolish and remove them from the job site upon completion and acceptance of the work of this Section.

1.7 PRODUCT HANDLING

A. Delivery and Storage

1. Deliver all materials of this Section to the job site in their original unopened containers with all labels intact and legible at time of use.
2. Store all materials under cover in a manner to prevent damage and contamination; store only the specified materials at the job site.

B. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at not less than 50 deg. F. in tiled areas during installation and for 7 days after completion.

PART 2 PRODUCTS

2.1 TILE

A. PT1 - Corridors/Creative Commons

1. Manufacturer: Garden State Tile
2. Style: Terminus
3. Color: Page, Natural rectified, SKU#GSPUBO21224NAT, matte finish
4. Format: 12" x 24", 9mm thick

B. PT2 - Toilet Rooms

1. Manufacturer: Garden State Tile

2. Style: Alfalux, Tabula
3. Color: Teak
4. Format: 8" x 48", 10.5mm thick

C. PTB - Corridor Cove Base

1. Manufacturer: Garden State Tile/Crossville
2. Style: Retro Active 2.0
3. Color: TBD
4. Format: 6" x 12", 10mm thick

D. CT1 - Toilet Room General Wall Tile

1. Manufacturer: American Olean
2. Style: Urban Canvas
3. Color: Ice White #0025
4. Format: 4-1/4" x 12-3/4" x 5/16"
5. Installation: Subway

E. CT2 - Toilet Room Bullnose Cap

1. Manufacturer: American Olean
2. Style: Urban Canvas
3. Color: Ice White #0025
4. Format: 4-1/4" x 12-3/4" x 5/16"

F. CTB - Toilet Room Base

1. Manufacturer: American Olean
2. Style: Urban Canvas
3. Color: Light Smoke #0042
4. Format: 4-1/4" x 12-3/4" x 5/16"

2.2 TRIM AND SPECIAL SHAPES

- A. Provide external and internal corners, trim shapes at openings, and all other trim and special shapes to match the tile specified herein, as required by field conditions and drawing details.

- B. Anodized Aluminum Edge Trim: JOLLY by Schlüter, or approved equal; finish as selected by the Architect.

2.3 STONE SADDLES

- A. Provide sound slate saddle, color as selected by Architect, minimum 3/4" thick, with an abrasive hardness of not less than 10.0, when tested in accordance with ASTM C 241. Cut saddle to fit jamb profile, honed finish.

2.4 SETTING BEDS AND GROUT

- A. Portland Cement: ASTM C 150, Type 1.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Sand: ASTM C 144, clean and graded natural sand.
- D. Reinforcing for Mud Set Systems: 2" x 2" x 16/16 ga. welded wire mesh.
- E. Latex Admixture for Mortar Bed
 - 1. MAPEI, Planicrete AC, blended with a 3:1 site mix.
 - 2. Laticrete 333.
 - 3. Pro Spec; Acrylic Additive.
 - 4. Custom Building Products; Custom Crete Thin Set Additive.
- F. Latex-Portland Cement Bond Coat, complying with ANSI A118.4 and ISO 13007, C2ES2P2 with minimum compressive strength of 400 psi.
 - 1. MAPEI, Keralastic System thin set mortar, consisting of Kerabond dry-set mortar and Keralastic latex admixture.
 - 2. Laticrete; 211 dry-set mortar and 4237 latex admixture.
 - 3. Pro Spec; Permalastic System consisting of Permalastic Dryset Mortar and Permalastic Admixture
 - 4. Custom Building Products; Pro-Lite.
- G. Improved Modified Cement Mortars: For use with LFT, complying with ANSI 118.15 and ISO 13007, CSES2PS.
 - 1. Custom Building Products; Mega-Lite Crack Prevention Mortar (650-725 psi).
 - 2. Laticrete; 220 Marble Granite Mortar (500-540 psi).
 - 3. Mapei; Kerabond T Keralastic (400-600 psi).
 - 4. Pro Spec; StayFlex 590 (460 psi).

H. Wall and Base Tile

1. Over cement board, use a Latex Portland cement mortar bond coat, MAPEI, Kerabond/Keralastic System, Custom Mega Flex or equal by Laticrete or Pro Spec, conforming to ANSI A118.4, ISO 13007-C2ES2P2, and TCA Detail W-244; coat back of board with waterproof membrane as specified below.
2. Over glass mat water resistant gypsum backer board, use a Latex Portland cement mortar bond coat, MAPEI, Kerabond/Keralastic System, conforming to ANSI A118.4, ISO 13007-C2ES2P2, and TCA Detail W-245.

I. Floor Tile and Stone Saddle - Mud Set: Set floor tile and stone saddle using Portland Cement mortar setting bed conforming to ANSI A108.1A and latex modified Portland cement bond coat. Basis of Design: Mapei, Kerabond/Keralastic System, conforming to ANSI A118.4, ISO 13007-C2ES2P2, and TCA Detail F-112.

1. For installation of LFT, Improved Modified Cement Mortars and medium bed; Basis of Design: Custom Building Products, MegaLite Crack Prevention Medium Bed Mortar conforming to ANSI 118.15, ISO 13007-C2ES2P2.

J. Floor Tile and Stone Saddle - Thin Set: Set floor tile and stone saddle using latex modified Portland Cement mortar, Basis of Design, Mapei, Kerabond/Keralastic System, conforming to ANSI A118.4, ISO 13007-C2ES2P2, and TCA Detail F-113.

1. For installation of LFT and Stone Tile, Improved Modified Cement Mortars and medium bed; Basis of Design: Custom Building Products, MegaLite Crack Prevention Medium Bed Mortar conforming to ANSI 118.15, ISO 13007-C2ES2P2.

K. Floor Tile and Stone Saddle - Thin Set over Waterproof Setting Bed: Set floor tile and stone saddle using thin set latex Portland cement bond coat, Basis of Design: Mapei, Kerabond/Keralastic System, conforming to ANSI A118.4, ISO 13007-C2ES2P2, and waterproofing membrane conforming to TCA Detail F-122/122A.

1. For installation of LFT, Improved Modified Cement Mortars and medium bed; Basis of Design: Custom Building Products, MegaLite Crack Prevention Medium Bed Mortar conforming to ANSI 118.15, ISO 13007-C2ES2P2.

L. Waterproofing Membrane: Complying with ANSI A118.10 and ANSI A118.12; and having IAPMO certification as a shower pan liner; provide "Mapelastic AquaDefense" by Mapei with factory blended "Bio-Block" antimicrobial protection, "Laticrete 9235 with Microban" made by Laticrete International, ProSpec "B6000," Custom Building Products' "9240," or approved equal.

1. Reinforce membrane with polyester fabric.

M. Water: Clean, fresh and suitable for drinking.

N. Grout: Complying with A118.3; for grouting ceramic tile, provide a two-component, 100% solids epoxy grout equal to "Kerapoxy" made by Mapei, "Spectralock Pro" made by Laticrete, or approved equal; color as selected by the Architect. Add latex additive to grout made by same manufacturer as grout.

- O. Physical Properties: The setting beds and grouts must meet the following physical requirements:
 - 1. Compressive Strength: 3000 psi min.
 - 2. Shear Bond Strength: 500 psi min.
 - 3. Water Absorption: 4.0% max.
 - 4. Service Rating (ASTM C 627): Extra Heavy Duty.
- P. Sealer: Seal all grout joints and all unglazed tile using "Sealer's Choice 15 Gold" as manufactured by Aqua Mix Inc., or approved equal.
- Q. Temporary Protective Coating: Either product indicated below that is applied in the tile manufacturer's factory and formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax, applied hot, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg. F. per ASTM D87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- R. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.5 SEALANT

- A. Joint Backing: Preformed, compressible, resilient, non-extruding, non-staining strips of foam neoprene, foam polyethylene, or other material recommended by sealant manufacturer.
- B. Bond Breaker: Polyethylene tape, 3 mils thick, or other material recommended by sealant manufacturer.
- C. Sealant Primer: Colorless, non-staining, or type to suit substrate surface, as recommended by sealant manufacturer.
- D. Sealant: One-part silicone based sanitary sealant, conforming to ASTM C 920, Type S, Grade NS, Class 25. Sealant hardness upon full cure shall be between 20-30 Shore "A" Durometer. Color of sealant to blend with or match adjacent materials, and as selected by the Architect. Sealant shall be equivalent to 1700 Sanitary Sealant made by General Electric or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ceramic tile is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 CONDITION OF SURFACES

- A. Allowable Variations in Substrate Levels in Floors: + 1/8" in 10'-0" distance and 1/4" total max. variation from levels shown.
- B. Grind or fill concrete and masonry substrates as required to comply with allowable variations.
- C. Concrete substrates must meet ANSI A108.01 tolerances and surface textures in preparation for tile work. Coordinate with concrete trades.

3.3 PREPARATION

- A. Coordinate the following with Section 033000:
 - 1. Steel trowel and fine broom finish concrete slabs that are to receive ceramic tile. Cure concrete slabs that are to receive tile before tile application. Do not use liquid curing compounds or other coatings that may prevent bonding of tile setting materials to slabs. Slab shall be dry at time of tile installation.
 - 2. Tile floors with floor drains must have a slope to direction of 1/4" per foot; coordinate this with concrete trades.
- B. Etch concrete substrate as may be required to remove curing compounds or other substances that would interfere with proper bond of setting bed. Rinse with water to remove all traces of treatment.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at project site before installing.
- D. Field Applied Temporary Protective Coating: Pre-coat tile with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.4 JOINTS IN TILE WORK

- A. Joint Widths: 1/16" wide in ceramic tile.
- B. Alignment: Wall, base and floor joints shall align through the field and trim. Direction and location of all joints as directed by Architect.
- C. Movement Joints: Conform to TCA Detail EJ171. Locate where movement joints are in back-up material. Provide movement joint at joints between mop receptors and

ceramic tile. Provide movement joint at all vertical internal joints of wall tile. Movement joints 1/8" wide in ceramic tile. Fill all movement joints with specified backing and sealant. Use bond breaker where sufficient space for joint backing does not exist.

1. Provide sealant between ceramic tile and plumbing fixtures, mirrors, pipes, countertops and other dissimilar materials penetrating or adjacent to ceramic tile.

3.5 INSTALLATION

A. Comply with the following installation standards:

1. Wall tile over cement board or glass mat backer board using dry set mortar with latex additive - ANSI A118.4 and ISO 13007, C2ES2P2.
2. Floor tile using full mud set mortar - ANSI A118.4, A228.15, and ISO 13007, C2ES2P2.
3. Floor tile using dry set mortar with latex additive - ANSI A118.4, A118.15, and ISO 13007, C2ES2P2.
4. Floor tile over waterproofing membrane - ANSI A118.4, 118.5, and ISO 13007, C2ES2P2.

B. Backs of tile must be cleaned before installation.

C. All setting beds and/or adhesives shall provide for an average contact area of not less than 95% coverage.

D. Allowable Variations in Finished Work: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignments shown.

1. Floors: 1/8" in 10'-0" run, any direction; +/- 1/8" at any location; 1/32" offset at any location.
2. Walls: 1/8" in 8'-0" run, any direction; 1/8" at any location; offset at any location, 1/32".
3. Joints: +/- 1/32" joint width variation of any location; 1/16" in 3'-0" run deviation from plumb and true.

E. Waterproofing Membrane

1. Install the membrane in strict accordance with manufacturer's written recommendations.
2. Upon completion of work, test horizontal membrane for leaks by flood testing per ASTM D 5957. Inspect for leakage. Make necessary adjustments to stop all leakage and retest until watertight. If membrane is not immediately covered by another surface, provide protection until membrane is covered.

F. Handle, store, mix and apply setting and grouting materials in compliance with the manufacturer's instructions.

- G. Extend tile work into recesses and under equipment and fixtures, to form a complete covering without interruptions. Terminate work neatly at obstructions, edges and corners without disruption of pattern or joint alignment.
- H. 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 and fixtures so that plates, collars, or covers overlap tile.
- I. Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are the same size. Lay out tile work and center tile fields both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths.

3.6 INSTALLATION OF STONE SADDLES

- A. Install stone saddles cut to profiles and sizes shown, accurately fitted to jambs, coped at stops, set in full bed of mortar herein specified, and with grouted edge joints as specified for floor tile.

3.7 CLEANING AND PROTECTION OF CERAMIC TILE

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use cleaners only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning to insure removal of all cleaning material.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. Apply coat of sealer to all grout joints and all unglazed tile.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings from tile surfaces.
- E. Leave finished installation clean and free of cracked, chipped, broken, unbonded or otherwise defective tile work.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the acoustical panel ceilings as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Acoustical panel units.
 - 2. Exposed "T" suspension system, including hangers and inserts.
 - 3. Provisions for the installation of lighting fixtures, diffusers, grilles and similar items provided under other Sections.
 - 4. Cutting, drilling, scribing and fitting as required for electro-mechanical penetrations.
 - 5. Perimeter and column moldings, trim and accessories for acoustical ceilings.

1.3 RELATED SECTIONS

- A. Drywall ceilings - Section 09 29 00.
- B. Diffusers, grilles and related frames - Division 23.
- C. Lighting fixtures - Division 26.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations published by the Ceilings and Interior Systems Construction Association (CISCA).
- B. Qualifications of Installers
 - 1. The suspended ceiling subcontractor shall have a record of successful installation of similar ceilings acceptable to Architect and shall be currently approved by the manufacturer of the ceiling suspension system.

2. For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

C. The work is subject to the following standards:

1. ASTM C 635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings," American Society for Testing and Materials.
2. ASTM C 636 "Standard Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels," American Society for Testing and Materials.

- D. In addition to suspension system specified, provide seismic struts and seismic clips to meet seismic standards as required by prevailing Codes and Ordinances.

1.5 SUBMITTALS

A. Shop Drawings: Submit completely dimensioned ceiling layouts for all areas where acoustical ceilings are required, showing:

1. Any deviations from Architect's reflected ceiling plan layouts, especially lighting fixture and dimensions. Also indicate if any light fixtures will not fit into Architect's ceiling layout due to dimensional restrictions or field conditions.
2. Direction and spacing of suspension members and location of hangers for carrying suspension members.
3. Direction, sizes and types of acoustical units, showing suspension grid members, and starting point for each individual ceiling area.
4. Moldings at perimeter of ceiling, at columns and elsewhere as required due to penetrations or exposure at edge of ceiling tiles.
5. Location and direction of lights, air diffusers, air slots, and similar items in the ceiling plane.
6. Details of construction and installation at all conditions.
7. Materials, gauges, thickness and finishes.

B. Samples and Product Literature: Submit the following samples and related manufacturer's descriptive literature.

1. Twelve (12) inch long components of suspension systems, including moldings.
2. Acoustical units — full size.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Do not install acoustical ceilings until wet-work in space is completed and nominally dry, work above ceilings has been completed, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire suppression system components, and partition system.

1.9 EXTRA STOCK

- A. Extra Stock: Deliver stock of maintenance material to Owner. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.
 - 1. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% of amount installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

- A. ACT1
 - 1. Manufacturer: Armstrong
 - 2. Style: Ultima High NRC, No. 1941
 - 3. Size: 24" x 24" x 7/8"
 - 4. Edge Profile: Beveled Tegalur
- B. ACT2
 - 1. Manufacturer: Armstrong
 - 2. Style: Optima Tegalur, No. 3256
 - 3. Size: 48" x 48" x 1"
 - 4. Edge Profile: Square Tegalur

2.2 SUSPENSION SYSTEM

- A. The suspension system shall support the ceiling assembly shown on the drawings and specified herein, with a maximum deflection of $1/360$ of the span, in accordance with ASTM C 635.
 - 1. Suspension System for ACT1: 15/16" Prelude
 - 2. Suspension System for ACT2: 9/16" Suprafine
- B. Provide min. 12 ga. galvanized wire hangers, soft annealed steel conforming to ASTM A 641, prestretched, Class 1 zinc coating, soft temper, size so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire.
- C. Provide ceiling clips and inserts to receive hangers, type as recommended by suspension system manufacturer, sizes for pull-out resistance of not less than five (5) times the hanger design load, as indicated in ASTM C 635.
- D. Suspension systems shall conform to ASTM C 635, intermediate duty.
- E. Provide manufacturer's standard wall moldings with off-white baked enamel finish to match suspension systems. For circular penetrations of ceilings, provide edge moldings fabricated to diameter required to fit penetration exactly.
- F. Edge Trim: "Axiom Classic Trim" as manufactured by Armstrong World Industries, Inc.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas where acoustical panel ceilings are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected to permit proper installation of the layout.

3.2 PREPARATION

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

- A. Codes and Standards: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations and industry standards.

- B. Install suspension systems to comply with ASTM C 636, with wire hangers supported only from building structural members. Locate hangers not more than 6" from each end and spaced 4'-0" along direct-hung runner, leveling to tolerance of 1/8" in 12'-0".
- C. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
- D. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, reinforcing, countersplaying or other equally effective means.
- E. Install edge moldings at edges of each acoustical ceiling area, and at locations where edge of acoustical units would otherwise be exposed after completion of the work.
 - 1. Secure moldings to building construction by fastening through vertical leg. Space holes not more than 3" from each end and not more than sixteen (16) inches o.c. between end holes. Fasten tight against vertical surfaces.
 - 2. Level moldings with ceiling suspension system, to a level tolerance of 1/8" in 12'-0".
- F. Install acoustical units in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
- G. Install hold-down clips in toilet areas, and in areas where required by governing regulations; space 2'-0" o.c. on all cross tees.
- H. Light fixtures or other ceiling apparatus shall not be supported from main beams or cross tees if their weight causes the total load to exceed the deflection capability of the ceiling suspension system. In such cases the load shall be supported by supplemental hangers furnished and installed by this Section of work.
- I. Where fixture or ceiling apparatus installation causes eccentric loading on runners, provide stabilizer bars to prevent rotation.

3.4 ADJUST AND CLEAN

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge molding, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 51 53

DIRECT APPLIED ACOUSTICAL CEILINGS (ALTERNATE)

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the direct applied acoustical ceilings as shown on the drawings and/or specified herein including, but not limited to, the following:
 - 1. Direct-applied acoustical ceiling panels.
 - 2. Provisions for the installation of lighting fixtures, diffusers, grilles and similar items provided under other Sections.
 - 3. Cutting, drilling, scribing and fitting as required for electro-mechanical penetrations.
 - 4. Accessories for acoustical ceilings.

1.3 RELATED SECTIONS

- A. Diffusers, grilles and related frames - Division 23.
- B. Lighting fixtures - Division 26.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations published by the Ceilings and Interior Systems Contractor's Association.
- B. Qualifications of Installers
 - 1. The ceiling subcontractor shall have a record of successful installation of similar ceilings acceptable to Architect and shall be currently approved by the manufacturer of the ceiling panels.
 - 2. For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 SUBMITTALS

- A. Shop Drawings: Submit completely dimensioned ceiling layouts for all areas where acoustical ceilings are required, showing:
 1. Any deviations from Architect's reflected ceiling plan layouts, especially lighting fixture and dimensions. Also indicate if any light fixtures will not fit into Architect's ceiling layout due to dimensional restrictions of field conditions.
 2. Direction, sizes and types of acoustical units, showing grid and starting point for each individual ceiling area.
 3. Location and direction of lights, air diffusers, air slots, and similar items in the ceiling plane.
 4. Details of construction and installation at all conditions.
 5. Materials, gauges, thickness and finishes.
- B. Samples and Product Literature: Submit the following samples and related manufacturer's descriptive literature.
 1. Acoustical units — full size.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Do not install acoustical ceilings until wet-work in space is completed and nominally dry, work above ceilings has been completed, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical ceiling units with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire suppression system components, and partition system.

1.9 EXTRA STOCK

- A. Extra Stock: Deliver stock of maintenance material to Owner. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.
 - 1. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% of amount installed.

PART 2 PRODUCTS

2.1 CEILING PANELS

- A. Direct-Applied Wood Fiber Ceiling Panels: "Tectum Finale" as manufactured by Armstrong World Industries, Inc.
 - 1. Installation Method: Direct attached
 - 2. Color: Natural.
 - 3. Sizes: Cut in factory to custom sizes indicated.
 - 4. Thickness: 1"
 - 5. Edge Profile: Long edge beveled, short edge square.
 - 6. Noise Reduction Coefficient (NRC): 0.85
 - 7. Flame Spread: ASTM E 1264; Class A
 - 8. Screws: Painted to match color of panel.
 - 9. Provide touch up paint as required for field cuts.
- B. Provide custom millwork; 1x2 pine batten strips attached at 24" on center perpendicular to beams and trusses.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas where direct-applied acoustical ceilings are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected to permit proper installation of the layout.

3.2 PREPARATION

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans.

- C. Scribe and cut panels to fit accurately at borders and at penetrations.

3.3 INSTALLATION

- A. Mechanically attach ceiling panels to approved substrate in accordance with manufacturer's installation instructions.

3.4 ADJUST AND CLEAN

- A. Clean exposed surfaces of acoustical ceilings, including accessories; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 54 23

LINEAR METAL CEILINGS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the linear metal ceilings as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Acoustic metal panels.
 - 2. Concealed suspension system, including hangers and inserts.
 - 3. Provisions for the installation of lighting fixtures, diffusers, grilles and similar items provided under other Sections.
 - 4. Cutting, drilling, scribing and fitting as required, including for all electro/mechanical penetrations.
 - 5. Perimeter and column moldings, trim and accessories for acoustical ceilings.

1.3 RELATED SECTIONS

- A. Concrete deck - Section 033000.
- B. Metal deck - Section 053100.
- C. Drywall ceilings - Section 092900.
- D. Diffusers, grilles and related frames - Division 23.
- E. Lighting - Division 26.

1.4 QUALITY ASSURANCE

- A. Qualifications of Installers
 - 1. The suspended ceiling subcontractor shall have a record of successful installations of similar ceilings acceptable to the Architect and shall be currently approved by the manufacturer of the ceiling suspension system.

2. For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations published by the Ceilings and Interior Systems Construction Association (CISCA).
- C. The work is subject to applicable portions of the following standards:
 1. ASTM C635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings", American Society for Testing and Materials.
 2. ASTM C636 "Standard Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels", American Society for Testing and Materials.

1.5 SUBMITTALS

- A. Shop Drawings: Submit completely dimensioned ceiling layouts for all areas where metal acoustical tile ceilings are required, showing:
 1. Any deviations from Architect's reflected ceiling plan layouts, especially lighting fixture and dimensions. Also indicate if any light fixtures will not fit into Architect's ceiling layout due to dimensional restrictions of field conditions.
 2. Direction and spacing of suspension members and location of hangers for carrying suspension members.
 3. Direction, sizes and types of metal acoustical units, showing suspension grid members, and starting point for each individual ceiling area.
 4. Moldings at perimeter of ceiling, at columns and elsewhere as required due to penetrations or exposure at edge of ceiling tiles.
 5. Location and direction of lights, air diffusers, air slots, and similar items in the ceiling plane.
 6. Details of construction and installation at all conditions.
 7. Materials, gauges, thickness and finishes.
- B. Samples: Submit samples, including manufacturer's descriptive literature for:
 1. All components of suspension systems, including moldings.
 2. Metal acoustical tile - full size.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

- B. Handle metal acoustical ceiling units carefully to avoid damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire suppression system components, and partition system.

PART 2 PRODUCTS

2.1 METAL CEILING PANELS

- A. Acoustical Metal Panels: Linear Metal Ceiling System; Planar PlanarPlus Linear Ceilings by Rockfon with the following characteristics:
 - 1. Surface: Smooth
 - 2. Composition: Metal
 - 3. Material: 0.024" aluminum
 - 4. Edges: Square SQE
 - 5. Color: Maple 650R finish .
 - 6. Perimeter Trim: Rockfon Infinity
 - 7. Filler: Manufacturer's standard acoustical batt insulation.
 - 8. Flame Spread: ASTM E 1264; Class A

2.2 SUSPENSION SYSTEM

- A. Carrier Suspension System: Manufacturer's standard complying with requirements in ASTM C635 for applications indicated; complete with carriers, splice sections, stabilizing components, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.
- B. Symmetrical Carrier
 - 1. Manufactured to an inverted "U" shape from 0.040" aluminum. Coated with black polyester enamel.

2. Slotted at appropriate intervals to receive stabilizing components as described below.
- C. Stabilizer Bars: Manufactured from 0.025" thick aluminum. Coated with black polyester enamel.
- D. Retainer clips.
- E. Radius Carrier: Manufactured to an inverted "U" shape from 0.040" thick aluminum with integral carrier tabs, painted black.
- F. Hanger for suspension system shall be 1" x 3/16", galvanized steel flats or 1/4" diameter galvanized pencil rods spaced 4'-0" o.c.
- G. Main carrying channels, to which suspension systems shall be fastened, shall be 1-1/2" cold rolled galvanized steel channel; spaced 4'-0" o.c..

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas where metal acoustic ceilings are to be installed and correct any of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Measure each ceiling area and establish layout of metal acoustic units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

- A. Codes and Standards: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations and industry standards.
- B. Install suspension systems to comply with ASTM C636, as applicable, with hangers supported only from building structural members. Locate hangers not less than 6" from each end and spaced 4'-0" along direct-hung runner, leveling to tolerance of 1/8" in 12'-0".
- C. Secure hangers by anchoring either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset

resulting horizontal force by bracing, reinforcing, countersplaying or other equally effective means.

- D. Install edge moldings at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - 1. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.
- E. Scribe and cut metal acoustical units for accurate fit at borders and at interruptions and penetrations by other work through the ceilings. Stiffen edges of cut units as required to eliminate evidence of oil-canning or buckling.
- F. Install snap-in acoustical units, complete with acoustical pads, in coordination with suspension system and exposed moldings.
 - 1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions.
 - 2. Fit adjoining tile to form flush, tight joints. Scribe and cut for accurate fit at borders and around work which penetrates ceiling.
- G. Light fixtures or other ceiling apparatus shall not be supported from main beams or cross tees if their weight causes the total load to exceed the deflection capability of the ceiling suspension system. In such cases the load shall be supported by supplementary hangers furnished and installed by this Section of work.

3.4 CLEANING AND PROTECTION

- A. Clean exposed surfaces of metal acoustical units, and of trim, edge moldings and suspension members; comply with manufacturers' instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the resilient accessories, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Rubber base.
 - 2. Rubber stair treads and risers.
 - 3. Accessories.

1.3 RELATED SECTIONS

- A. Steel Pan Stairs - Section 05 51 13.
- B. Gypsum Drywall - Section 09 29 00.
- C. Resilient Tile Flooring - Section 09 65 19.

1.4 QUALITY ASSURANCE

- A. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

1.5 SUBMITTALS

- A. Manufacturer's Data: For information only, submit manufacturer's technical information and installation instructions for type of resilient base.
- B. Samples
 - 1. Submit six (6) inch long samples of base.
 - 2. Submit full-size sample of stair tread.

1.6 DELIVERY AND STORAGE

- A. Deliver materials to the project site in the manufacturer's original unopened containers, clearly marked to indicate pattern, gauge, lot number and sequence of materials.
- B. Carefully handle all materials and store in original containers at not less than seventy (70) degrees F. for at least forty-eight (48) hours before start of installation.

1.7 JOB CONDITIONS

- A. Continuously heat spaces to receive base to a temperature of seventy (70) degrees F. for at least forty-eight (48) hours prior to installation, whenever project conditions are such that heating is required. Maintain seventy (70) degrees F. temperature continuously during and after installation as recommended by the manufacturer, but for not less than forty-eight (48) hours. Maintain a temperature of not less than fifty-five (55) degrees F. in areas where work is completed.

PART 2 PRODUCTS

2.1 RUBBER BASE

- A. Provide 4" high by 1/8" thick, continuous vulcanized SBR rubber, top set cove base with pre-formed internal and external corner pieces. Base shall conform to ASTM F 1861, Type TS, Group 1 (solid); provide "Traditional Wall base" rubber base as manufactured by Johnsonite, or equivalent of Burke Mercer, Marley Flexco, or Roppe.

- 1. Color: Johnsonite; Cement #121

2.2 RUBBER STAIR TREADS AND RISERS

- A. Treads and Risers: Provide one-piece rubber stair tread and integrated riser with matching rubber tile at landing as manufactured by Mannington, or equal by Johnsonite, Nora Systems, Inc., Armstrong, Roppe, or approved equal. Treads shall be in lengths and depth to fit tread of stair. Nosings shall be square, adjustable to fit angle of stair nosing, 2" height. Treads shall conform to ASTM F 2169. Integral risers shall be smooth, flat, coved-toe, height of stair riser by length matching treads, and tapered.

- 1. Colors: As selected by Architect from manufacturer's full line. Tread shall include contrasting insert.

2.3 ACCESSORIES

- A. Adhesives: Waterproof, stabilized type, as recommended by the manufacturer for the type of service indicated.
- B. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- C. Concrete Slab Primer: Non-staining type recommended by the tile manufacturer.

- D. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. DSP-520 made by H.B. Fuller or No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where resilient base is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Bases: In all spaces where base is indicated, install bases tight to walls, partitions, columns, built-in cabinets, etc., without gaps at top or bulges at bottom, with tight joints and flush edges, with molded corner pieces at internal and external corners. Provide end stops adjacent to flush type door frames and where base does not terminate against an adjacent surface. Keep base in full contact with walls until adhesive sets.
- B. Stair Treads
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

3.3 CLEANING AND PROTECTION

- A. Remove any excess adhesive or other surface blemishes from base using neutral type cleaners as recommended by the manufacturer.

END OF SECTION

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the resilient tile flooring, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Luxury vinyl tile.
 - 2. Transition strips.
 - 3. Accessories.

1.3 RELATED SECTIONS

- A. Cast-in-Place Concrete - Section 03 30 00.
- B. Resilient Base and Accessories - Section 09 65 13.

1.4 QUALITY ASSURANCE

- A. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.
- B. 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 watts per square centimeter.

1.5 SUBMITTALS

- A. Manufacturer's Data: For information only, submit manufacturer's technical information and installation instructions for type of resilient tile.
- B. Samples
 - 1. Submit full-size sample tiles for each type and color required, representative of the expected range of color and pattern variation. Sample submittals will be reviewed

for color, texture and pattern only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

2. Submit six (6) inch long samples of transition strips.

C. Submit manufacturer's warranty as noted herein.

1.6 DELIVERY AND STORAGE

A. Deliver materials to the project site in the manufacturer's original unopened containers, clearly marked to indicate pattern, gauge, lot number and sequence of materials.

B. Carefully handle all materials and store in original containers at not less than seventy (70) degrees F. for at least forty-eight (48) hours before start of installation.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F. or more than 95 deg F., in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.

2. During installation.

3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F. or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

1.8 WARRANTY

A. Provide manufacturers 5-year limited warranty.

PART 2 PRODUCTS

2.1 LUXURY VINYL TILE (LVT)

A. LVT1 - 1st Floor Classrooms, 2nd Floor Corridor, Stairs

1. Manufacturer: Mohawk Group

2. Style: Matuto Plus Stone

3. Color: 926A Agreeable Grey Stone

4. Size: 12" x 24"

B. LVT2 - 2nd Floor Classrooms

1. Manufacturer: Mohawk Group
2. Style: Hot and Heavy
3. Color: Secoya C0009, 152

Arrowhead Creek

4. Size: 9" x 59"

2.2 ACCESSORIES

- A. Adhesives: Waterproof, stabilized type, as recommended by the tile manufacturer for the type of service indicated.
- B. Concrete Slab Primer: Non-staining type recommended by the tile manufacturer.
- C. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. DSP-520 made by H.B. Fuller or No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, or approved equal.
- D. Edging Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color as selected by the Architect from manufacturer's standards.
- E. Finish for Vinyl Tile
 1. Cleaner shall be equal to "Super Shine All" made by Hillyard Chemical Co., or approved equal.
 2. Wax shall be equal to "Super Hil-Brite" made by Hillyard Chemical Co., or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where resilient tile flooring is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 CONDITION OF SURFACES

- A. Allowable Variations in Substrate Levels (Floors): $\pm 1/8"$ in 10'-0" distance and 1/4" total maximum variation from levels shown.
- B. Grind or fill concrete substrates as required to comply with allowable variation.

3.3 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum **75** percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.4 INSTALLATION

- A. Install tile only after all finishing operations, including painting, have been completed and permanent heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by tile manufacturer.
- B. Place tile units with adhesive cement in strict compliance with the manufacturer's recommendations. Butt tile units tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce neat joints, laid tight, even and in

straight, parallel lines. Extend tile units into toe spaces, door reveals, and into closet and similar openings.

- C. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the finish tile as marked in the subfloor. Use chalk or other non-permanent marking devices.
- D. Lay tile from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
- E. Match tiles for color and pattern by using tile from cartons in the same sequence as manufactured and packaged. Cut tile neatly to and around all fixtures. Broken, cracked, chipped or deformed tile is not acceptable.
- F. Tightly cement tile to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks through tile, or other surface imperfections.
- G. Lay tile with grain in all tile running in the same direction.
- H. Place resilient edge strips tightly butted to tile and secure with adhesive. Provide edging strips at all unprotected edges of tile, unless otherwise shown.

3.5 CLEANING AND PROTECTION

- A. Remove any excess adhesive or other surface blemishes from tile, using neutral type cleaners as recommended by the tile manufacturer. Protect installed flooring from damage by use of heavy Kraft paper or other covering.
- B. Finishing for Vinyl Tile: After completion of the project and just prior to the final inspection of the work, thoroughly clean tile floors and accessories. Apply two (2) coats of wax and buff using materials as specified herein.

END OF SECTION

SECTION 09 68 13

CARPET TILE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor materials, equipment and services necessary to complete the carpet tile as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Carpet tile.
 - 2. Adhesive.

1.3 RELATED SECTIONS

- A. Concrete sub-floor - Section 03 30 00.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with not less than five (5) years of experience in installation of commercial carpeting of type, quantity and installation methods similar to work of this Section.
- B. General Terminology/ Information Standard: Refer to current edition of "Carpet Specifier's Handbook" by The Carpet and Rug Institute; for definitions of terminology not otherwise defined herein, and for general recommendations and information.
- C. Carpet used on Project must be from same dye lot for each carpet type.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical product data for each type of carpet, cushion and accessory item required.
- B. Samples: Submit full size samples of carpet tile and six (6) inches long samples of each type exposed edge stripping.
- C. Certification: Submit manufacturer's certification stating that carpet materials furnished comply with specified requirements.
 - 1. Include listing of mill register numbers for carpet furnished.

2. Include supporting certified laboratory test data indicating that carpet meets or exceeds specified test requirements.

- D. Maintenance Data: Submit manufacturer's printed maintenance recommendations, including methods and frequency recommended for maintaining carpet in optimum conditions under anticipated traffic and use conditions.

1.6 EXTRA STOCK

- A. Produce and deliver to project at least five (5) percent overrun on calculated yardage. Provide required overrun exclusive of carpet needed for proper installation, waste and usable scraps.

1.7 PRODUCT DELIVERY AND STORAGE

- A. Deliver carpeting materials in original mill protective wrapping with mill register numbers and tags attached. Store inside, in well ventilated area, protected from weather, moisture and soiling.

1.8 WARRANTY

- A. Provide special project warranty, signed by Contractor and Manufacturer (Carpet Mill), agreeing to repair or replace defective materials and workmanship of carpeting work during two (2) year warranty period following substantial completion. Attach copies of product warranty.

PART 2 PRODUCTS

2.1 CARPET TILE

- A. CPT-1
 1. Manufacturer: Mannington Commercial
 2. Style: Align
 3. Color: Acute (34584)
 4. Size: 24" x 24"
 5. Installation Pattern: Horizontal Brick Ashlar

2.2 ACCESSORIES

- A. Adhesive for Carpet Tile: Provide release type adhesive as recommended by the carpet tile manufacturer for use with carpet tile specified. Provide adhesive which complies with flame spread rating required for the carpet installation.
- B. Miscellaneous Materials: Provide the types of adhesives and tape, and other accessory items recommended by the carpet manufacturer and Installer for the conditions of installation and use.

- C. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. DSP-520 made by H.B. Fuller or No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where carpet tile is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PRE-INSTALLATION REQUIREMENTS

- A. Floor shall be clean and free of cracks and protrusions. Any gaps or cracks more than 1/16" wide to be filled in with latex leveling compound. Protrusions must be sanded down smooth, the floor cleanly swept and vacuumed if necessary to remove all dust and grit.
- B. Floor temperature shall be 65 deg., at least 24 hrs. prior to installation; and 48 hrs. after carpet is installed.
- C. Conduct a moisture test. The presence of moisture in the concrete floor will interfere with the curing and subsequent performance of the adhesive. Conduct the test as follows:
 - 1. Drive a concrete nail a half inch into the floor. Then remove the nail.
 - 2. Place a small amount of anhydrous calcium chloride or calcium sulphate crystals over the hole.
 - 3. Cover the crystals and the hole with a piece of flat glass and seal the edges with waterproof tape or putty. Since concrete pourings vary, repeat the test every 1500 sq. ft.
 - 4. Leave in place 72 hrs. Any color change in the crystals indicates the presence of moisture. Do not apply carpet until slab is free of moisture and meets with approval of carpet adhesive manufacturer.
- D. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's instructions and recommendations. Maintain direction of pattern and texture, including lay of pile.
- B. Adhere all tiles with a full spread of adhesive. Dry-fit cut tiles and apply adhesive to tile back after tile has been cut.

- C. Tiles shall be installed in a monolithic corner to corner manner following arrows printed on back of each tile indicating pile direction. Tiles shall be installed in horizontal brick ashlar pattern.
- D. Vinyl reducer strips shall be used along any necessary open edges so as to maintain the fixed perimeter.

3.4 CLEANING UP

- A. Upon completion of the carpeting installation in each area, visually inspect all carpet installed in that area and immediately remove all dirt, soil, and foreign substance from the exposed face; inspect all adjacent surfaces and remove all marks and stains caused by the carpet installation: remove all packaging materials, carpet scraps, and other debris from the carpet installation to the area of the job site set aside for its storage.

3.5 PROTECTION

- A. In all areas, provide a temporary non-staining paper pathway in the direction of traffic.

END OF SECTION

SECTION 09 90 00

PAINTING AND FINISHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Prime painting unprimed surfaces to be painted under this Section.
 - 2. Painting all items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
 - 3. Painting all ferrous metal (except stainless steel) exposed to view.
 - 4. Painting all galvanized ferrous metals exposed to view.
 - 5. Painting gypsum drywall exposed to view.
 - 6. Finishing of Glu Lams.
 - 7. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
 - 8. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
 - 9. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers, lighting fixtures, and the like, which are exposed to view through these items.
 - 10. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
 - 11. Painting of any surface not specifically mentioned to be painted herein or on drawings, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, shall be included as though specified.

1.3 RELATED SECTIONS

- A. Shop priming is required on some, but not all of the items scheduled to be field painted. Refer to other Sections of work for complete description.

- B. Shop Coat on Machinery and Equipment: Refer to the Sections under which various items of manufactured equipment with factory applied shop prime coats are furnished, including, but not necessarily limited to, the following Sections. All items of equipment furnished with prime coat finish shall be finish painted under this Section.

- 1. Plumbing - Division 22.
- 2. Heating, Ventilation and Air Conditioning - Division 23.

- C. Color Coding of Mechanical Piping and Electrical Conduits – Divisions 22 and 26.

- 1. This Color Coding consists of an adhesive tape system and is in addition to painting of piping and conduits under this Section, as specified above.

1.4 MATERIALS AND EQUIPMENT NOT TO BE PAINTED

- A. Items of equipment furnished with complete factory finish, except for items specified to be given a finish coat under this Section.
- B. Factory-finished toilet partitions.
- C. Factory-finished acoustical tile.
- D. Non-ferrous metals, except for items specified and/or indicated to be painted.
- E. Finished hardware, excepting hardware that is factory primed.
- F. Surfaces not to be painted shall be left completely free of droppings and accidentally applied materials resulting from the work of this Section.

1.5 QUALITY ASSURANCE

- A. Job Mock-Up
 - 1. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 10 feet wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the Architect. Paint mock-ups to include door and frame assembly.
 - 2. These applications when approved will establish the quality and workmanship for the work of this Section.
 - 3. Repaint individual areas which are not approved, as determined by the Architect, until approval is received. Assume at least two paint mock-ups of each color and gloss for approval.
- B. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces.
- C. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of

the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Architect in writing of any anticipated problems using the coating systems as specified with substrates primed by others.

- D. All paints must conform to the Volatile Organic Compounds (VOC) standards of prevailing codes and ordinances.

1.6 SUBMITTALS

- A. Materials List: Before any paint materials are delivered to the job site, submit to the Architect a complete list of all materials proposed to be furnished and installed under this portion of the work. This shall in no way be construed as permitting substitution of materials for those specified or accepted for this work by the Architect.
- B. Samples
 - 1. Accompanying the materials list, submit to the Architect copies of the full range of colors available in each of the proposed products.
 - 2. Upon direction of the Architect, prepare and deliver to the Architect two (2) identical sets of Samples of each of the selected colors and glosses painted onto 8-1/2" x 11" x 1/4" thick material; whenever possible, the material for Samples shall be the same material as that on which the coating will be applied in the work.
- C. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable alternate in this Section of these specifications, submit for the Architect's review the current recommended method of application published by the manufacturer of the proposed material.
- D. Closeout Submittal
 - 1. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual such as Sherwin Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, MSDS, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.7 PRODUCT HANDLING

- A. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.
- B. Protection
 - 1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
 - 2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.

3. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of all other trades.

- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.8 EXTRA STOCK

- A. Upon completion of this portion of the Work, deliver to the Owner an extra stock of paint equaling approximately ten (10) percent of each color and gloss used and each coating material used, with all such extra stock tightly sealed in clearly labeled containers.

1.9 JOB CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds eighty-five (85) percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 PAINT MANUFACTURERS

- A. Except as otherwise noted, provide the painting products listed for all required painting made by one of the manufacturers listed in the paint schedule (Article 2.4). These companies are Benjamin Moore, PPG Paint (Glidden Professional), and Sherwin Williams (S-W). Comply with number of coats and required minimum mil thicknesses as specified herein.

2.2 MATERIALS

- A. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only to recommended limits.
- B. Colors and Glosses: All colors and glosses shall be as selected by the Architect. Certain colors will require paint manufacturer to prepare special factory mixes to match colors selected by the Architect. Color schedule (with gloss) shall be furnished by the Architect.
 1. Provide 6 base colors plus black and white.

- C. Coloring Pigment: Products of or furnished by the manufacturer of the paint or enamel approved for the work.
- D. Linseed Oil: Raw or boiled, as required, of approved manufacture, per ASTM D 234 and D 260, respectively.
- E. Turpentine: Pure distilled gum spirits of turpentine, per ASTM D 13.
- F. Shellac: Pure gum shellac (white or orange) cut in pure denatured alcohol using not less than four (4) lbs. of gum per gallon of alcohol.
- G. Driers, Putty, Spackling Compound, Patching Plaster, etc.: Best quality, of approved manufacture.
- H. Heat-Resistant Paint: Where required, use heat resistant paint when applying paint to heating lines and equipment.

2.3 GENERAL STANDARDS

- A. The various surfaces shall be painted or finished as specified below in Article 2.4. However, the Architect reserves the right to change the finishes within the range of flat, semi-gloss or gloss, without additional cost to the Owner.
- B. All paints, varnishes, enamels, lacquers, stains and similar materials must be delivered in the original containers with the seals unbroken and label intact and with the manufacturer's instructions printed thereon.
- C. All painting materials shall bear identifying labels on the containers with the manufacturer's instructions printed thereon.
- D. Paint shall not be badly settled, caked or thickened in the container, shall be readily dispersed with a paddle to a smooth consistency and shall have excellent application properties.
- E. Paint shall arrive on the job color-mixed except for tinting of under-coats and possible thinning.
- F. All thinning and tinting materials shall be as recommended by the manufacturer for the particular material thinned or tinted.
- G. It shall be the responsibility of the Contractor to see that all mixed colors match the color selection made by the Architect prior to application of the coating.

2.4 SCHEDULE OF FINISHES

- A. High Performance Coating on Exterior Galvanized Ferrous Metals

First Coat: "PittGuard Rapid Coat Epoxy 95-245 Series by PPG, "Series 27WB Typoxy" by Tnemec; "Epoxy Mastic Coating V 160" by Benjamin Moore Corotech or "Recoatable Epoxy Primer 867-45" by Sherwin Williams.

Second Coat: "Pittthane Ultra 95-812 (Gloss)" or "High Build 95-8800 (Semi-Gloss)" by PPG; "Series 1080 (gloss) Endura-Shield WB" or "Series 1081 (semi-gloss) Endura-Shield WB" by Tnemec; "Acrylic Aliphatic Urethane

V 500 (Gloss)" or "V 510 (Semi-Gloss)" by Benjamin Moore Corotech or "Hi-Solids Urethane B65-300/350" by Sherwin Williams.

B. High Performance Coating on Exterior Non-Galvanized Ferrous Metals

Prime Coat: "Amercoat 68HS Epoxy Zinc-Rich Primer" by PPG; "Series 94-H₂O Hydro-Zinc" by Tnemec; "Organic Zinc Rich Primer V 170" by Benjamin Moore Corotech or "Zinc Clad II Plus Inorganic Zinc Rich Coating B69V212" by Sherwin Williams.

Second Coat: "Pitt Guard Rapid Coat Epoxy 95-245" by PPG; "Series 27WB Typoxy" by Tnemec; "Epoxy Mastic Coating V 160" by Benjamin Moore Corotech or "Macropoxy 646 Fast Cure Epoxy B58-600" by Sherwin Williams.

Third Coat: "Pitthane Ultra 95-812 (Gloss)" or "High Build 95-8800 (Semi-Gloss)" by PPG; "Series 1070V (gloss) Fluoronar" or "Series 1071V (semi-gloss) Fluoronar" by Tnemec; "Acrylic Aliphatic Urethane V 500 (Gloss)" or "V 510 (Semi-Gloss)" by Benjamin Moore Corotech or "Hi-Solids Polyurethane B65-300/350" by Sherwin Williams.

C. Interior Ferrous Metal

Satin Finish/Latex

Primer: Benj. Moore Ultra Spec HP Acrylic Metal Primer (HP04)
PPG Pitt Tech Plus DTM Acrylic Primer 4020
S-W Pro Industrial Pro-Cryl Universal Primer B66 3100 Series

First Coat: Benj. Moore Ultra Spec-HP DTM Acrylic Low Luster (HP25)
PPG Pitt Glaze WB1 Pre-Catalyzed Eggshell Epoxy 16-310
S-W Pro Industrial Acrylic Eg-Shel, B66-660 Series

Second Coat: Benj. Moore Ultra Spec-HP DTM Acrylic Low Luster (HP25)
PPG Pitt Glaze WB1 Pre-Catalyzed Eggshell Epoxy 16-310
S-W Pro Industrial Acrylic Eg-Shel, B66-660 Series

a. Total DFT not less than: 3.9 mils

Semi-Gloss Finish/Latex

Primer: Benj. Moore Ultra Spec-HP Acrylic Metal Primer (HP04)
PPG Devflex 4020 PF DTM Primer/Flat Finish
S-W Pro Industrial Pro-Cryl Universal Primer B66-3100 Series

First Coat: Benj. Moore Ultra Spec HP DTM Acrylic Semi-Gloss (HP29)
PPG Pitt Glaze WB1 Pre-Catalyzed Semi-Gloss Epoxy 16-510
S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series

Second Coat: Benj. Moore Ultra Spec HP DTM Acrylic Semi-Gloss (HP29)
PPG Pitt Glaze WB1 Pre-Catalyzed Semi-Gloss Epoxy 16-510
S-W Pro Industrial Acrylic Semi-Gloss, B66-650 Series

a. Total DFT not less than: 4.0 mils

D. Interior Drywall

Flat Finish/Vinyl Acrylic Latex

Primer: Benj. Moore Ultra Spec 500 Interior Latex Primer (N534)
PPG Speedhide Zero Interior Latex Primer 6-4900XI
S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600

First Coat: Benj. Moore Ultra Spec 500 Latex Flat (N536)
PPG Speedhide Zero Interior Latex Flat 6-4110XI
S-W ProMar 200 Zero VOC Interior Latex Flat, B30-2600 Series
Second Coat: Benj. Moore Ultra Spec 500 Latex Flat (N536)
PPG Speedhide Zero Interior Latex Flat 6-4110XI
S-W ProMar 200 Zero VOC Interior Latex Flat, B30-2600 Series
a. Total DFT not less than: 3.6 mils

Eggshell Finish/Vinyl Acrylic Latex

Primer: Benj. Moore Ultra Spec 500 Interior Latex Primer (N534)
PPG Speedhide Zero Interior Latex Primer 6-4900XI
S-W ProMar 200 Zero VOC Interior Latex Primer, B28-2600
First Coat: Benj. Moore Ultra Spec 500 Interior Latex Eggshell (N538)
PPG Speedhide Zero Interior Latex Eggshell 6-4310XI
S-W ProMar 200 Zero VOC Interior Latex Eg-Shell, B20-1900 Series
Second Coat: Benj. Moore Ultra Spec 500 Interior Latex Eggshell (N538)
PPG Speedhide Zero Interior Latex Eggshell 6-4310XI
S-W ProMar 200 Zero VOC Interior Latex Eg-Shell B20-1900 Series
a. Total DFT not less than: 3.8 mils

E. Interior Drywall to Receive Wallcovering

Primer: "Shield Z Mold and Mildew Proof Commercial Wallcovering Primer"
made by Zinsser
Moore One Prep Wallpaper Primer WP-3001 by Insl-X
Multi-Purpose Interior/Exterior B51-450 by Sherwin Williams

F. Interior Painted Wood

Satin Finish/Latex

Primer: Benj. Moore Advance Waterborne Int. Alkyd Primer (790)
PPG Seal Grip Interior Primer/Finish 17-951
S-W Multi-Purpose Latex Primer/Sealer B51 Series
First Coat: Benj. Moore Advance Waterborne Int. Alkyd Satin (792)
PPG Speedhide Zero Interior Latex Satin, 6-4410XI
S-W ProMar 200 Zero VOC Interior Latex Eg-Shel, B20-1900 Series
Second Coat: Benj. Moore Advance Waterborne Int. Alkyd Satin (792)
PPG Speedhide Zero Interior Latex Satin, 6-4410XI
S-W ProMar 200 Zero VOC Interior Latex Eg-Shel, B20-1900 Series
a. Total DFT not less than: 4.0 mils

Semi-Gloss Finish/Latex

Primer: Benj. Moore Advance Waterborne Int. Alkyd Primer (790)
PPG Seal Grip Interior Primer/Finish 17-951
S-W Multi-Purpose Latex Primer/Sealer B51 Series
First Coat: Benj. Moore Advance Waterborne Int. Alkyd (793)
PPG Speedhide Zero Interior Semi-Gloss Latex, 6-4510XI
S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series
Second Coat: Benj. Moore Advance Waterborne Int. Alkyd (793)
PPG Speedhide Zero Interior Semi-Gloss Latex, 6-4510XI
S-W ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series

a. Total DFT not less than: 3.8 mils

- G. Finishing of Glu Lams: Three (3) clear coat finish Sansin by Precision Coat as selected by Architect.

2.5 PIPING AND MECHANICAL EQUIPMENT EXPOSED TO VIEW

- A. Paint all exposed piping, conduits, ductwork and mechanical and electrical equipment. Use heat resisting paint when applied to heating lines and equipment. The Contractor is cautioned not to paint or otherwise disturb moving parts in the mechanical systems. Mask or otherwise protect all parts as required to prevent damage.
- B. Exposed Uncovered Ductwork, Piping, Hangers and Equipment: Latex Enamel Undercoater and one (1) coat Acrylic Latex Flat.
- C. Exposed Covered Piping, Duct Work and Equipment: Primer/Sealer and one (1) coat Acrylic Latex Flat.
- D. Panel Boards, Grilles and Exposed Surfaces of Electrical Equipment: Latex Enamel Undercoater and two (2) coats Latex Semi-Gloss.
- E. Equipment or Apparatus with Factory-Applied Paint: Refinish any damaged surfaces to match original finish. Do not paint over name plates and labels.
- F. All surfaces of insulation and all other work to be painted shall be wiped or washed clean before any painting is started.
- G. All conduit, boxes, distribution boxes, light and power panels, hangers, clamps, etc., are included where painting is required.
- H. All items of Mechanical and Electrical trades which are furnished painted under their respective Contracts shall be carefully coordinated with the work of this Section so as to leave no doubt as to what items are scheduled to be painted under this Section.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL WORKMANSHIP REQUIREMENTS

- A. Only skilled mechanics shall be employed. Application may be by brush or roller. Spray application only upon acceptance from the Architect in writing.
- B. The Contractor shall furnish the Architect a schedule showing when he expects to have completed the respective coats of paint for the various areas and surfaces. This schedule shall be kept current as the job progresses.

- C. The Contractor shall protect his work at all times and shall protect all adjacent work and materials by suitable covering or other method during progress of his work. Upon completion of the work, he shall remove all paint and varnish spots from floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and shall leave his part of the work in clean, orderly and acceptable condition.
- D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide ample in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.
- E. Remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- F. All materials shall be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- G. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Owner.
- H. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.
- I. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.3 PREPARATION OF SURFACES

A. General

- 1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be perfectly dry, clean and smooth.
- 2. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- 3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

B. Metal Surfaces

1. Weld Fluxes: Remove weld fluxes, splatters, and alkali contaminants from metal surfaces in an approved manner and leave surface ready to receive painting.
2. Bare Metal: Thoroughly clean off all foreign matter such as grease, rust, scale and dirt before priming coat is applied. Clean surfaces, where solder flux has been used, with benzene. Clean surfaces by flushing with mineral spirits. For aluminum surfaces, wipe down with an oil free solvent prior to application of any pre-treatment.
 - a. Bare metal to receive high performance coating specified herein must be blast cleaned SSPC SP-6 prior to application if field applied primer; coordinate with steel trades furnishing ferrous metals to receive this coating to insure that this cleaning method is followed.
3. Shop Primed Metal: Clean off foreign matter as specified for "Bare Metal." Prime bare, rusted, abraded and marred surfaces with approved primer after proper cleaning of surfaces. Sandpaper all rough surfaces smooth.
4. Galvanized Metal: Prepare surface as per the requirements of ASTM D 6386.
5. Metal Filler: Fill dents, cracks, hollow places, open joints and other irregularities in metal work to be painted with an approved metal filler suitable for the purpose and meeting the requirements of the related Section of work; after setting, sand to a smooth, hard finish, flush with adjoining surface.

C. Gypsum Drywall Surfaces: Scrape off all projections and splatters, spackles all holes or depressions, including taped and spackled joints, sand smooth. Conform to standards established in Section 09 29 00, "Gypsum Drywall."

D. Wood Surfaces: Sand to remove all roughness, loose edges, splinters, or splinters and then brush to remove dust. Wash off grease or dirt with an approved cleaner. Fill all cracks, splits, nail holes, screw holes, and surface defects with putty after the priming coat has been applied. Putty shall be brought up flush with the surface and sanded smooth and touched-up with primer when dry.

E. Touch-Up: Prime paint all patched portions in addition to all other specified coats.

3.4 MATERIALS PREPARATION

- A. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.

- D. Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Tint undercoats to match the color of the finish coat; provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

- A. General: Apply paint by brush or roller in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required.
 - 1. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel or varnish coat application with fine sandpaper or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.
 - 2. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
 - 3. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - a. "Exposed surfaces" is defined as those areas visible when permanent or built-in fixtures, convactor covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.
 - 4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint, before final installation of equipment.
 - 5. Paint the back sides of access panels, removable or hinged covers to match the exposed surfaces.
 - 6. Finish doors on tops, bottoms, and side edges the same as the faces, unless otherwise indicated.
 - 7. Enamel finish applied to wood or metal shall be sanded with fine sandpaper and then cleaned between coats to produce an even surface.
 - 8. Paste wood filler applied on open grained wood after beginning to flatten, shall be wiped across the grain of the wood, then with a circular motion, to secure a smooth, filled, clean surface with filler remaining in open grain only. After overnight dry, sand surface with the grain until smooth before applying specified coat.

B. Scheduling Painting

1. Apply the first coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Prime Coats: Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

D. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.

E. Touching-Up of Factory Finishes: Unless otherwise specified or shown, materials with a factory finish shall not be painted at the project site. To touch up, the Contractor shall use the factory finished material manufacturer's recommended paint materials to repair abraded, chipped, or otherwise defective surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by the painting and finishing work. Leave all such work undamaged. Correct any damages by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.
- B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.7 CLEAN UP

- A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY SURFACES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the visual display surfaces as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Porcelain-on-metal marker boards.
 - 2. Back painted glass magnetic whiteboard.
 - 3. Frames and trim.

1.3 RELATED SECTIONS

- A. Gypsum Drywall - Section 09 29 00.

1.4 QUALITY ASSURANCE

- A. Qualifications of Installers: For installation of visual display surfaces, use only personnel who are thoroughly trained and experienced in the skills involved and who are completely familiar with the manufacturer's recommended methods of installation.
- B. Installation Methods: The recommended installation methods of the manufacturer shall become the basis for acceptance or rejection of actual installation methods used in the work.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with requirements.
- B. Shop Drawings: Submit for each type of visual display surface. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, and installation details.
- C. Samples: Submit full range of color samples for each type of visual display surface, trim and accessory required. Provide 12" square samples of sheet materials and 12" lengths of trim members for color verification after selections have been made.

1.6 SPECIAL PROJECT WARRANTY

- A. Warranty on Porcelain Enamel Marker Boards: Provide written warranty, signed by manufacturer, agreeing to replace, within warranty period of twenty-five (25) years porcelain enamel marker boards that do not retain original writing and erasing qualities, defined to include surfaces which become slick and shiny, or exhibit crazing, cracking or flaking; provide manufacturer's instructions for handling, installing, protecting and maintaining marker boards have been adhered to during the warranty period. Replacement is limited to material replacement only and does not include labor for removal and reinstallation.

1.7 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MARKER BOARDS

- A. Provide a3 CeramicSteel Workwall by Polyvision.
 - 1. Color: As selected by the Architect.
- B. Provide clips, anchors and fasteners required for complete installation.

2.2 GLASS WHITEBOARDS

- A. Provide back painted glass magnetic whiteboards.
 - 1. Product: As selected by the Architect.
 - 2. Color: As selected by the Architect.
- B. Provide clips, anchors and fasteners required for complete installation.

2.3 FABRICATION

- A. Assembly: Provide factory-assembled visual display device units unless field-assembled units are indicated.
- B. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
 - 1. Provide manufacturer's standard vertical joint system between abutting sections of marker board.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where visual display surfaces are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Deliver factory-built visual display units completely assembled in one piece without joints, whenever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit at factory, disassembled for delivery, and make final joints at site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and mounting heights as shown on drawings and in accordance with manufacturer's instructions, keeping perimeter lines straight, plumb and level. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories for complete installation.
- C. Coordinate job-assembled units with grounds, trim and accessories. Join all parts with neat, precision fit.

3.3 ADJUST AND CLEAN

- A. Verify accessories required for each unit properly installed and operating units properly functioning.
- B. Clean units in accordance with manufacturer's instructions, breaking in only as recommended.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the signage as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Room identification signs.
 - 2. Interior directional and door signage.
 - 3. Fire egress, floor, and other signs required by Code.
 - 4. Donor plaques.

1.3 RELATED SECTIONS

- A. Exit signs - Division 26.

1.4 QUALITY ASSURANCE

- A. For actual installation of the identifying devices, use only personnel who are thoroughly familiar with the manufacturer's recommended methods of installation and who are completely trained in the required skills.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of identifying device required.
- B. Samples: Submit samples of each identifying device showing finishes, colors, surface textures and qualities of manufacture and design of each sign component including graphics.
- C. Shop Drawings: Submit shop drawings for fabrication and erection of identifying devices. Include plans, elevations, and large scale details of sign wording and lettering layout. Show anchorage and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 PANEL SIGNS

- A. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16" measured diagonally from corner to corner, manufactured from aluminum, unframed. Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, of letters, numbers, and other graphic devices.
- C. Tactile Characters: Characters and Grade 2 Braille raised 1/32" above surfaces, in contrasting color.
- D. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures, or other characteristics related to appearance, provide colors and surface textures as selected by the Architect.

2.2 CAST PLAQUES FOR DONOR SIGNAGE

- A. Casting shall be free from pits, scale, sand holes, or other defects. Comply with requirements specified for material, border style, background texture, and finish and with requirements shown for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce the manufacturer's standard satin polished finish.
 - 1. Plaque Material: Bronze castings, statuary finish.
 - 2. Provide plaque of design indicated on drawings.
 - 3. Mounting: 10-32 Pin Mount and Silicone.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where signs are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed

with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install units and components at the locations directed by the Architect, securely mounted with concealed theft-resistant fasteners. Attach to substrates in accordance with the manufacturer's instructions.
- B. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units to finish surfaces. Repair or replace damaged units as directed by the Architect.

3.3 SIGNAGE SCHEDULE

- A. See Drawing A 530.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the toilet accessories as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Gypsum Drywall - Section 09 29 00.
- B. Ceramic Tiling - Section 09 30 13.

1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to ensure proper operation and servicing of accessory units. Accessories shall be installed at heights in compliance with prevailing Handicapped Code.
- C. Products: Unless otherwise noted, provide products of same manufacturer for each type of unit and for units exposed in same areas.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, catalog cuts and installation instructions for each toilet accessory.
- B. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices in other work
- C. Submit schedule of accessories indicating quantity and location of each item.

1.6 PRODUCT HANDLING

- A. Deliver accessories to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type or material, manufacturer's name and brand name. Delivered materials shall be identical to approved samples.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Galvanized Steel Sheet: ASTM A 653, G60.
- D. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- E. Mirrors: ASTM C 1503, mirror glazing quality, clear glass mirrors, nominal 1/4" thick.

2.2 FASTENING DEVICES

- A. Exposed Fasteners: Theft-proof type, chrome plated, or stainless steel; match finishes on which they are being used.
- B. Concealed Fasteners: Galvanized (ASTM A 123) or cadmium plated.
- C. No exposed fastening devices permitted on exposed frames.
- D. For metal stud drywall partitions, provide ten (10) gauge galvanized sheet concealed anchor plates for securing surface mounted accessories.

2.3 FABRICATION

- A. General: Stamped names or labels on exposed faces of toilet accessory units are not permitted. Unobtrusive labels on surfaces not exposed to view are acceptable. Where locks are required for a particular type of toilet accessory, provide same keying throughout project. Furnish two keys for each lock.
- B. Surface-Mounted Toilet Accessories, General: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage.
- C. Recessed Toilet Accessories, General: Fabricate units of all welded construction, without mitered corners. Hang doors of access panels with full-length stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.

2.4 ACCESSORY SCHEDULE

- A. Owner Supplied Contractor installed along with blocking:
 - 1. Toilet paper dispenser.
 - 2. Soap dispenser.
 - 3. Blocking for Owner-supplied touch-free paper towel dispensers.

- B. Grab bars.
- C. Mirrors.
- D. Hand Dryers: Airblade V by Dyson or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where toilet accessories are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Accessories that are to be partition mounted shall be closely coordinated with other trades, so that the necessary reinforcing is provided to receive the accessories.
- B. Furnish templates and setting drawings and anchor plates required for the proper installation of the accessories at gypsum drywall and masonry partitions. Coordinate the work to ensure that base plates and anchoring frames are in the proper position to secure the accessories.
- C. Verify by measurements taken at the job site those dimensions affecting the work. Bring field dimensions that are at variance with those on the approved shop drawings to the attention of the Architect. Obtain decision regarding corrective measures before the start of fabrication of items affected.
- D. Cooperate in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay job progress.

3.3 INSTALLATION

- A. Install accessories at locations indicated on the drawings, using skilled mechanics, in a plumb, level and secure manner.
- B. Concealed anchor assemblies for gypsum drywall partitions shall be securely anchored to metal studs to accommodate accessories. Assemblies shall consist of plates and/or angles tack welded to studs.
- C. Secure accessories in place, at their designated locations by means of theft-proof concealed set screws, so as to render removing of the accessory with a screwdriver impossible.
- D. Unless otherwise indicated, accessories shall conform to heights from the finished floor as shown on the drawings. Where locations are not indicated, such locations shall be as directed by the Architect.
- E. Installed accessories shall operate quietly and smoothly for use intended. Doors and operating hardware shall function without binding or unnecessary friction. Dispenser

type accessories shall be keyed alike. Prior to final acceptance, master key and one duplicate key shall be given to Owner's authorized agent.

- F. The Architect shall be the sole judge of workmanship. Workmanship shall be of the highest quality. Open joints, weld marks, poor connections, etc., will not be permitted. The Architect has the right to reject any accessory if he feels the workmanship is below the standards of this project.
- G. Grab bars shall be installed so that they can support a three hundred (300) lb. load for five minutes per ASTM F 446.

3.4 CLEANING AND PROTECTION

- A. Upon completion of the installation, clean accessories of dirt, paint and foreign matter.
- B. During the installation of accessories and until finally installed and accepted, protect accessories with gummed canvas or other means in order to maintain the accessories in acceptable condition.
- C. Replace and/or repair, to the Owner's satisfaction, and at no additional cost to the Owner, installed work that is damaged or defective.

END OF SECTION

SECTION 10 53 00

PREFABRICATED CUPOLA

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the prefabricated cupola as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Sheet metal roofing - Section 07 41 13.

1.4 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. 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.
- C. Installer: 3 years successful experience in installation of systems similar to those required by project and acceptable to system manufacturer.
- D. 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.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.

C. Submit:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
3. Manufacturer's recommended installation procedures.

D. Structural Design Drawings: Submit drawings shown the location and magnitude of cupola reactions on supporting structure under all design loading conditions, Submit calculations for design of manufacturers component design.

1. All submittals and calculations shall be prepared, signed and sealed by a Professional Structural Engineer registered in the state of New York.
2. Engineer shall also submit certification that the cupola design meets loading requirements of the 2010 New York State Building Code.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.7 WARRANTY

- A. Cupola Finish: 15year warranty for coil coating; 5 year warranty for extrusion applications against cracking, peeling and color fade. The following fade and chalking limitations:
 1. Color retention: No color change in excess of an average of 5 NBS Units when measured in accordance with the procedure set forth in ASTM D2244.
 2. Chalking: Minimum of 8 rating when tested in accordance with ASTM D4212.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Provide prefabricated cupola of design indicated on the drawings as manufactured by Campbellsville Industries, Series CU-2147, Style Cu210 to size as indicated on drawings or approved by Munn's Manufacturing or approved equal.

2.2 MATERIALS

- A. Use structural steel products according to ASTM specifications.

- B. Use structural aluminum products according to the Construction Manual of the Aluminum Association, Inc. Aluminum shall be alloy 606-T6 or structural steel conforming to ASTM A36.
- C. Cladding: Provide cladding fabricated from 0.032" aluminum sheet 3003-H14 alloy, with custom paint finish as selected by Architect.

2.3 ACCESSORIES

- A. Fabricate cross, finial, weathervane and/or topping ornament true to dimensions, with welded or soldered joints, ground smooth.
- B. Provide lightning protection spire to grounded connection.
- C. Form louver blades and firmly secure and rivet to frames, and back with 18 x 18 aluminum or copper screen.
- D. Form cornices, moldings, and ornaments in accordance with approved drawings.
- E. Fabricate window framing from extruded aluminum tubing alloy 6061-T5, and glaze in Krinklglas of suitable thickness, using stock colors.
- F. Cast, stamp, form, and/or spin special ornaments in accordance with good and acceptable practices, and in accordance with approved drawings.

2.4 FABRICATION

- A. Fabricate structural steel framing to conform to AWS standards.
- B. Fabricate structural aluminum framing with cold driven aluminum rivets, limiting welding to secondary architectural members. Steel framing to be welded, bolted or riveted in accordance with current steel fabricating practices.
- C. Internal structures to be designed to withstand local wind codes.
- D. Form all exterior cladding with good and acceptable sheet metal practices, and lock form all seams inasmuch as possible.
- E. Fabricate finial and topping ornament true to dimensions, with welded to soldered joints, ground smooth. Coordinate with lightning protection specified in Division 26.
- F. Form cornices, moldings and ornaments in accordance with approved drawings.
- G. Cast, stamp, form and or spin special ornaments in accordance with approved drawings.
- H. Conceal all exterior fasteners.

2.5 FINISHES

- A. Exposed Aluminum: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC; "Trinar" nu AKZO; "Duranar by PPG;

"Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils or coatings meet or exceed the requirements of ASCA 96.

1. Color: As selected by Architect from paint manufacturer's complete specified line.
 2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations Refer to Quality Assurance in Part 1.
- B. Clean all copper to weather naturally.
- C. Paint all aluminum surfaces in contact with steel with on heavy coat of zinc primer, and paint all steel surfaces with 2 heavy coats re lead or zinc chromate, followed by one coat of aluminized bituminous paint.

2.6 SEALANTS

- A. Clean and dry all surfaces to be sealed.
- B. Apply with caulking gun, using nozzle of proper size to fit the joint width.
- C. Use silicone sealant; see section 07 92 00.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where prefabricated cupola is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

END OF SECTION

SECTION 10 56 17

ADJUSTABLE WALL-MOUNTED STANDARDS AND BRACKETS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the adjustable wall-mounted standards and brackets as indicated on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Gypsum drywall - Section 092900.

1.4 QUALITY ASSURANCE

- A. Products shall be standard best quality for the particular kind of material required.

1.5 SUBMITTALS

- A. Product Data
 - 1. Manufacturer's catalogue and specifications.
 - 2. Recommended installation procedures.
- B. Shop Drawings
 - 1. Elevations and sections.
 - 2. Method of anchoring and connecting to surrounding construction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver storage shelving in ample time to facilitate the work of this Section.
- B. Take care to protect components during handling and storage.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide wall standards Series 82 and adjustable brackets Series 182 as manufactured by Knape & Vogt or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where wall mounted shelving and brackets are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Manufacturers' installation procedures shall govern.
- B. Install storage shelves square, level and true anchoring firmly to walls. Provide all blocking.
- C. Install required accessories as recommended by the manufacturer.

3.3 ADJUST AND CLEAN

- A. Clean and leave free from blemishes, defects and dirt. Use only cleaning agents recommended by the manufacturer.
- B. Adjust hardware and accessories for maximum efficiency.

END OF SECTION

SECTION 11 31 00

RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the appliances as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Sinks and related plumbing fixtures - Division 22.
- B. Electrical - Division 26.

1.4 SUBMITTALS

- A. Submit catalog cuts, product information and technical data for each appliance.

1.5 QUALITY ASSURANCE

- A. 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.

1.6 DELIVERY AND STORAGE

- A. Deliver products to project site in manufacturer's undamaged protective containers.
- B. Delay delivery until spaces to receive them have been fully enclosed and utility rough-ins are complete.

PART 2 PRODUCTS

2.1 APPLIANCES

- A. Refrigerator: GE GTS17DTNRWW with optional IM4D icemaker kit.
- B. Dishwasher: Miele, G4993 SCVI AM , ADA dishwasher
- C. Summit # FF61WBIADA 32.25"h x23.63"wx23"d
- D. Ice maker: Scotsman Model CU50.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where appliances are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. Upon completion of installation and hookup to utilities, put each operating component of each appliance through at least five (5) complete operating cycles, adjusting as needed to secure optimum operation level.
- D. Touch up scratches and abrasions to be completely invisible to the unaided eye from a distance of five (5) feet.
- E. Promptly remove from the job site all cartons and packing material associated with the work of this Section.

END OF SECTION

SECTION 11 45 80

DISAPPEARING STAIRWAY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the disappearing stairway as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. Folding disappearing stairway, frame and door.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product information for disappearing stairway, showing all parts, material thicknesses, finishes, etc.
- B. Shop Drawings: Submit detailed drawings showing coordination with adjacent construction, installation details, certified loading characteristics, and all other pertinent data.

1.5 QUALITY ASSURANCE

- A. 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.

1.6 DELIVERY AND STORAGE

- A. Deliver products to project site in manufacturer's undamaged protective containers.
- B. Delay delivery until spaces to receive them have been fully enclosed and utility rough-ins are complete.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Provide 30" x 54" rough opening "LMS Komfort" by Fakro USA or approved equal.

2.2 MATERIALS

A. Hatch

- 1. Insulated sandwich type.

B. Stairway

1. Stringers

- a. 6005-T5 Extruded aluminum channel 5" x 1" x 1/8".
- b. Tri-fold design.
- c. Steel blade type hinges.
- d. Adjustable foot with plastic Mar-guard.
- e. Pitch 63 degrees, unless otherwise shown.

2. Treads

- a. 6005-T5 Extruded aluminum channel 5-3/16" x 1-1/4" x 1/8".
- b. Depth 5-3/16".
- c. Width 21-1/4" minimum, unless otherwise noted.
- d. Deeply serrated top surface.
- e. 9-1/2" riser height, unless otherwise noted.
- f. 500 lbs load rating.

C. Metal Handrail: LXH.

D. Box Extension: LXN.

E. Upper Hatch: LXW.

F. Frame: Pinewood.

G. Hardware

- 1. Steel blade type hinge connecting stringer sections, zinc-plated and chromate-sealed, bolted to stringers.
- 2. Steel operating arms, both sides, zinc-plated and chromate-sealed.
- 3. Double-acting steel springs and spring cables, both sides.
- 4. Rivets rating at 1100# shear.

H. Safety

- 1. Steel bar handrail riveted to stringers, upper section, right side standard.

2. Steel section alignment clips at stringer section joints.
3. Molded rubber guards at corners of aluminum door panel.

I. Accessories

1. Steel pole to aid opening and closing stairways. The pole is equipped with a hook on one end to engage the eyebolt in door panel.
2. Keyed lock for door.
3. Acoustical seal: Zero International, Krieger Specialty Products, Pemko Manufacturing Co. or approved equal.

J. Finishes

1. Mill finish on aluminum stairway components.
2. Prime coat on frame.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where disappearing stairway is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Coordinate as required with other trades to ensure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, pertinent requirements of the Owner, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
- C. Upon completion of installation, put each operating component of each appliance through at least 5 complete operating cycles, adjusting as needed to secure optimum operation level.
- D. Promptly remove from the job site all cartons and packing material associated with the work of this Section.

END OF SECTION

SECTION 11 53 13

FUME HOODS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 DESCRIPTION

- A. Furnish and install all fume hoods as specified herein complete and ready for intended use.

1.3 RELATED SECTIONS

- A. Mechanical connections – Division 23.
- B. Electrical connections – Division 26.

1.4 REFERENCES

- A. Scientific Equipment and Furniture Association, SEFA 1-2005 Laboratory Fume Hoods
- B. Scientific Equipment and Furniture Association, SEFA 8-1999 Laboratory Furniture, Casework, Shelving and Tables
- C. Scientific Equipment and Furniture Association, SEFA 2.3-1997 Installation of Scientific Laboratory Furniture and Equipment
- D. Underwriters Laboratories, UL 1805 Laboratory Hoods and Cabinets E
- E. American Society of Heating, Refrigeration and Air-conditioning Engineers, ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods
- F. National Fire Protection Association NFPA 45 Flammable and Combustible Liquids Code 2000 Edition

1.5 SUBMITTALS

- A. Product Data: Submit complete catalogue data, including a chart of manufacturer's standard finishes for all materials, equipment and products for work in this section.
- B. Drawings: Submit complete shop fabrication and installation drawings, including scaled plans, elevations, sections, details and schedules. Show relationship to adjoining materials and construction. Shop drawings shall not exceed 11 inches x 17 inches in size.

- C. Test Reports: Submit complete reports verifying conformance to performance standards outlined in this specification when tested to the ASHRAE 110 Standard in the "As Manufactured" environment.
- D. Operation & Maintenance Manuals: Provide complete written instruction manuals outlining safe operating procedures, safety guidelines, and proper maintenance procedures.
- E. Operator Training Guide: Provide a VHS tape, CD-ROM or DVD-ROM with a training presentation, highlighting the proper operating practices of the laboratory fume hood.

1.6 PRODUCT HANDLING

- A. Protection: Take necessary precautions to protect the work of this section before, during and after installation.
- B. Coordination: Coordinate delivery and installation of laboratory fume hoods with that of the casework, plumbing and electrical work.
- C. Project Conditions: Delivery shall take place when site conditions meet the guidelines outlined in SEFA 2.3-1997 Installation of Scientific Laboratory Furniture and Equipment, or most current published edition.

1.7 QUALITY ASSURANCE

- A. Contractor for work in this section shall have an established organization and production facilities including all tools, equipment and special machinery necessary for specializing in the fabrication and installation of the type of products specified with skilled personnel, factory trained workmen and an experienced engineering department. Each shall have the demonstrated knowledge, ability and proven capability to produce the specified equipment of the required quality and the proven capacity to complete an installation of the size and scope of this project within the required time limits. A minimum of 10 years experience in the manufacture of laboratory fume hoods is required. A minimum of 5 years experience in the manufacture of high performance fume hoods is required. Manufacturer must have an installed population of at least 1000 high performance fume hoods installed and operating in the United States.
- B. Source Limitations: Obtain laboratory fume hoods and the laboratory casework below the fume hoods through one source from a single manufacturer.
- C. Product Standard (General): Comply with SEFA 1-2005, Laboratory Fume Hoods, or most current published edition.
- D. Product Standard (Construction): All laboratory fume hood shall be Classified by Underwriters Laboratories under UL Standard 1805.
- E. Product Standard (Performance): Achieve a performance rating of 4.0 AM 0.01 or better for all tracer gas tests conducted on all of the fume hood designs per the ASHRAE 110-1995 test, or the most current published edition.

1.8 WARRANTY

- A. Manufacturer must offer a minimum three-year warranty on parts and labor to fix defects in materials and workmanship for fume hoods and casework.

PART 2 – PRODUCTS

2.1 LABORATORY FUME HOODS

- A. Provide Sheldon 92244-ADA Air Foil Fume Hood: Double-sided, 4-ft. width, Teacher Demo, Pass-thru (EH-211-48)

1. Dual access, Air foil type fume hood: Features shall include a 45-degree angle around the fascia openings, flush-mount radiused air foils across the bottom, upper front panels with louvered air bypass grille for constant volume with vertical sliding sashes, all resulting in minimized turbulence and increased performance for removal of exhaust fumes, vapors, and particulate matter within the enclosure. Provide double-sided hood with access from both sides to allow for Classroom teacher demonstration or Prep Room pass-thru setting.
2. Superstructure: Provide full frame construction, 16" and 18" gauge steel, rigid, self-supporting assembly with 5" wide, double walls and front posts. Walls consist of a sheet steel outer shell and a corrosion resistant full inner liner, and houses electrical services and remote operating service fixtures. Access to fixture valves is provided by four (4) removable panels with a PVC gasket. Top of the hood contains a 10" round, 20-gauge stainless steel exhaust duct collar. Hood shall be UL 1805 Classified.
3. Sash frame: Steel frames includes a 16-gauge, 1-1/2" bottom sash rail with a full width pull closing on rubber bumper stops, and 7/32" thick laminated safety glass housed into sash frame and set into PVC glazing channels. Provide sash interlock that allows only one (1) of the two (2) sashes to be opened at any time.
 - a. Powder-coated sash frames are raised and lowered with a counter balance system consisting of weight, 2" pulleys, and cable that prevents sash tilting by means of a shaft driven mechanism. This permits one-finger operation at any point along full width of pull. Sash cable is 7 x 7 steel, 1/8" diameter, coated to 5/32" diameter.
 - b. The powder-coated, flush-mount, bottom horizontal air foils shall provide a 1" bypass to ensure a clean sweep of air to minimize eddies along the work surface when sash is in the closed position.
4. Features of the hood:
 - a. Black powder coat finish, white 3/16" Poly Resin liner, two (2) T-8 rapid start fluorescent light fixtures with single lamps, 1-1/4" thick, black Shelresin, molded, dished, epoxy resin work surface, remote controlled services, and base cabinet.
 - b. Superstructure shall be pre-wired and pre-piped by manufacturer.
 - c. Provide a metal enclosure panel from top of hood to ceiling.

- d. SEFA 1-2010 hood design shall be ADA Compliant with work surface height, kneespace clearance, and access to services.
- 5. Hood Exhaust Ratings:
 - a. 100 FPM recommended face velocity. 833 CFM exhaust with .33-inch static pressure loss through hood.
- 6. Source Quality Control Testing of Fume Hoods:
 - a. Evaluation of a manufacturer's proposed product shall take place in their own test facility with no cost to the Owner. Provide third party, independent test reports to Architect for approval.
 - b. Fume Hood shall be tested as described in SEFA 1-2010 in accordance with latest edition of ASHRAE 110 method of testing performance of laboratory fume hoods, As Manufactured (AM). Hoods shall achieve a rating of 4.0 AM 0.05 ppm or less.
- 7. Standard services and accessories:
 - a. (1) Remote control CW downspout, ADA handle, and powder coat finish.
 - b. Remote control Gas outlet, ADA handle, and powder coat finish.
 - c. 85101 GFI duplex electrical outlets.
 - d. (1) 85106 Light switch.
 - e. (1) 85106 Exhaust blower switch.
 - f. (1) TS04 Epoxy resin cup sink.
 - g. (1) AFA 500 Air Monitor Alarm

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation:

- 1. Install fume hoods and equipment in accordance with manufacturer's instructions.
- 2. Install equipment plumb, square, and straight with no distortion and securely anchored as required.
- 3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.

B. Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations.

3.2 ADJUSTING

- A. Repair or remove and replace defective work, as directed by the Owner's Representative upon completion of installation.
- B. Adjust sash, fixtures, accessories and other moving or operating parts to function smoothly.

3.3 CLEANING

- A. Clean equipment, touch up as required.

3.4 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent damage to equipment from exposure to other construction activity.
- B. Advise Contractor of procedures and precautions for protection of material and installed fume hoods from damage by work of other trades.

3.5 FIELD PERFORMANCE TESTING

- A. Manufacturer must have all fume hoods installed tested to current ASHRAE 110 Standard. Field test reports must be performed and prepared by an independent third party organization having no affiliation with the manufacturer. Results must indicate tracer gas performance ratings of 4.0 AI 0.05 or better for all tests. Manufacturer must have a representative on-site for all tests and must assist in trouble-shooting and correcting all non-conforming hoods.
- B. Person-as-Mannequin Test - This test is intended to simulate real-world laboratory conditions in which a real person manipulates real objects in the hood. This test is performed with the investigator standing in front of the ejector while repeatedly moving five objects from one side of the ejector to the other, then rotating the body away from the hood with the elbows next to the body and the arms horizontal in front. This series of movements is repeated for the duration of the tracer gas test. The air sampling is performed with a sampling probe at the same height as the breathing zone of the mannequin. Results must indicate tracer gas performance ratings of 4.0 AI 0.10 or better for all tests.
- C. Testing Contractor to provide a complete report of the results of the testing program including an executive summary, an outline of the test procedures and equipment used, a table of the results of each test conducted on each hood and a conclusion and recommendation section discussing the results and (if necessary) recommendations to improve fume hood performance.

3.6 TRAINING

- A. Upon completion of the installation of the fume hoods, Manufacturer must conduct a training seminar for the Owner's users at the job site discussing proper operation of the fume hood, fume hood features and best use practices. Training session must be at least one hour in length, not including a question and answer session. Training session must be scheduled within 30 days on completion of the installation.

END OF SECTION

SECTION 11 56 13

LABORATORY STORAGE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the laboratory storage as indicated on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Gypsum drywall - Section 092900.

1.4 QUALITY ASSURANCE

- A. Products shall be standard best quality for the particular kind of material required.

1.5 SUBMITTALS

- A. Product Data
 - 1. Manufacturer's catalogue and specifications.
 - 2. Recommended installation procedures.
- B. Shop Drawings
 - 1. Elevations and sections.
 - 2. Method of anchoring and connecting to surrounding construction.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver storage shelving in ample time to facilitate the work of this Section.
- B. Take care to protect components during handling and storage.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acid/Flammables Cabinet: Sheldon SC4236 Acid/Flammable Storage Cabinet.
- B. Safety Glasses Cabinet: Sheldon 31170.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where laboratory storage is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Manufacturers' installation procedures shall govern.
- B. Install required accessories as recommended by the manufacturer.

3.3 ADJUST AND CLEAN

- A. Clean and leave free from blemishes, defects and dirt. Use only cleaning agents recommended by the manufacturer.
- B. Adjust hardware and accessories for maximum efficiency.

END OF SECTION

SECTION 12 24 13

WINDOW SHADES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the window shades as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Manually-operated window shades.
 - 2. Field measurements of as-built conditions.
 - 3. Accessories and hardware required for complete installation and operation.

1.3 QUALITY ASSURANCE

- A. Provide assemblies which are complete assemblies produced by one manufacturer, including hardware, accessory items, mounting brackets, and fasteners.
- B. Provide materials in colors as selected by the Architect from manufacturer's standard colors.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Submit floor layout and elevations, indicating location of all window treatments, mechanism details, type and size of each unit, type and location of controls. Shop drawings must also show seaming of shade fabric. Submit shop drawings showing details of installation and relation to adjoining construction and conditions.
- C. Samples: Submit full size sample of each shade type for Architect's acceptance.
- D. Mock-Up
 - 1. Install each type of shade assembly on one complete column bay for Architect's acceptance of installation details, workmanship and operation.
 - 2. Approved mock-up shall be used as the standard for installation of work under this Section, and no further installation work shall proceed before Architect's acceptance of the mock-up.

1.5 WARRANTY

- A. Manufacturer's standard non-depreciating 25-year limited warranty covering all hardware, motors, motor control system and shade cloth.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect shades from damage, soiling and deterioration during transit, storage and handling to, until Owner's acceptance.

PART 2 PRODUCTS

2.1 MANUALLY OPERATED SHADES

- A. Provide manually operated shade system equal to "R Series" made by the SWF Contract or equal made by Graber, MechoShade, Rollease Acmeda or approved equal conforming to standards specified herein.
- B. Shade system shall be pre-engineered overrunning clutch design that disengages to 90% during the raising and lowering of the shade. The brake can stand a pull force of 40 lb. in the stop position, or sized as required for shade weight, requiring no adjustment. Self-lubricating hub on to which the brake system is mounted includes an articulated brake assembly which assures smooth, non-jerky operation in raising and lowering the shades. System shall include the following components:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing mounting hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and remounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
 - 4. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 - 5. Provide shade hardware system that allow for operation of multiple shade bands (multi-banded shades) by a single chain operator. Connectors shall be offset to assure alignment from the first to the last shade band.
 - 6. Provide shade hardware constructed of minimum 1/8" thick plated steel or heavier as required to support 150% of the full weight of each shade.
 - 7. Drive Bracket/ Brake Assembly:
 - a. MechoShade Drive Bracket M5, WT Shade SoloMount, or equal by other manufacturers noted herein.

- b. Rollease Acmeda chain driven clutch operating system of self-lubricating, uv stabilized fiberglass reinforced nylon construction and tempered high carbon steel internal springs, designed for smooth, trouble-free operation, precise control, and uniform aesthetics. Galaxy geared or spring boost counter balance system to achieve < 6 lbs. constant pull forces
Drive Chain: #10 qualified stainless steel chain rated to 90 lb.
 - c. Minimum Breaking Strength: Nickel plate chain shall not be accepted.
 - C. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be the same, for all shades within one room.
 - 2. Shade Band and Shade Roller Attachment:
 - a. Provide extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without deflection. Provide for positive mechanical engagement with drive/ brake mechanism.
 - b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable/ replaceable with a snap-on/snap-off spline mounting, without having to remove shade roller from shade brackets.
 - c. Mounting spline shall not require use of adhesives, adhesive tapes, staples and/or rivets.

2.2 SHADE CLOTH

- A. Shade cloth shall be traditional 2 x 2 basketweave, "Eternity E300" of weave, color and optical properties as selected by the Architect made by SWF Contract, or approved equal by other manufacturers noted herein.

2.3 FABRICATION

- A. The shade and the fabric shall hang flat without buckling or distortion. The edge, when trimmed, shall hang straight without curling or raveling. An unguided roller shade cloth shall roll true and straight, without tracking sideways more than +/- 1/8" in either direction due to warp distortion or weave design. Shades shall fill window openings from head to sill and jamb to jamb.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where window treatments are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION: GENERAL

- A. Coordinate with the work of other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the indicated design and the installation recommendations of the manufacturer as approved by the Architect.
- C. Upon completion of the installation, put all components through at least ten (10) complete cycles of operation, adjusting as necessary to achieve optimum operation.

3.3 INSTALLATION OF MANUAL ROLLER SHADES

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions and located so shade band is not closer than 2" to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturers written instructions.

3.4 PROTECTION AND CLEANING

- A. Protect installed units to ensure proper operating condition, without damage or blemishes. Repair or replace damaged units as directed by the Architect.

END OF SECTION

SECTION 12 35 53

LABORATORY CASEWORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the laminate clad casework as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Fixed modular laminate clad casework and components.
 - 2. Countertops.
 - 3. Storage units, tables and components.

1.3 RELATED SECTIONS

- A. Carpentry - Section 06 20 00.

1.4 DEFINITIONS

- A. Identification of casework components and related products by surface visibility.
 - 1. Open Interiors: Any open storage unit without solid door or drawer fronts and units with full glass insert doors and/or acrylic doors.
 - 2. Closed Interiors: Any closed storage unit behind solid door or drawer fronts, sliding solid doors.
 - 3. Exposed Ends: Any storage unit exterior side surface that is visible after installation.
 - 4. Other Exposed Surfaces: Faces of doors and drawers when closed, and tops of cabinets less than 72 inches above furnished floor.
 - 5. Semi-Exposed Surfaces: Interior surfaces which are visible, bottoms of wall cabinets and tops of cabinets 72 inches or more above finished floor.
 - 6. Concealed Surfaces: Any surface not visible after installation.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Minimum of 5 years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
- B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-1998 testing standards.

1.6 SUBMITTALS

- A. Product Data: Manufacturer's catalog with specifications and construction details.
- B. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
 - 1. Include section drawings of typical and special casework, work surfaces and accessories.
 - 2. Indicate locations of plumbing and electrical service field connection by others.
- C. Casework Samples:
 - 1. Base Cabinet: Cabinet conforming to specifications, with drawer and door.
 - 2. Wall Cabinet: Cabinet conforming to specifications, with door.
 - 3. Cabinet samples shall be complete with specified hardware for doors, drawers and shelves.
 - 4. Component samples: Two sets of samples for each of the following:
 - a. Decorative laminate color charts.
 - b. PVC and ABS edgings.

1.7 PRODUCT HANDLING

- A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed, store in ventilated place, protected from the weather, with relative humidity range of 25 percent to 55 percent.
- B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

1.8 JOB CONDITIONS

- A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
 - 1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.

2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.

- B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete.

1.9 WARRANTY

- A. All materials and workmanship covered by this Section will carry a five (5) year warranty from date of acceptance.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Manufacturer:

1. Sheldon

- a. Other manufacturers shall comply with the minimum levels of material and detailing indicated on the drawings or as specified.

2.2 MATERIALS

- A. Core Materials:

1. Particleboard up to 7/8 inch thick: Industrial Grade average 47-pound density particleboard, ANSI A 208.1-1999, M-3.
2. Particleboard 1 inch thick and thicker: Industrial Grade average 45-pound density particle-board, ANSI A 208.1-1999, M-2.
3. Medium Density Fiberboard 1/4 inch thick: Average 54-pound density grade, ANSI A208.2.

- B. Decorative Laminates:

1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-2000.
2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-2000.
3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-2000.
4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-2000.
5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-2000.

- C. Laminate Color Selection: See schedule.

- D. Edging Materials: See drawings.

- E. Glass:

1. Wall unit full sliding glass doors: 1/4 inch thick laminated safety glass.

2. Glass insert doors, hinged or sliding wall cabinets: 1/4 inch thick laminated safety glass.
3. Glass insert doors, hinged or sliding tall or base cabinets. 1/4 inch thick laminate safety glass.
4. Sliding doors mounted in aluminum track.
5. Trim glass inserts: Extruded rigid PVC channel and self-locking insert retainer strip.

2.3 BUTCHER BLOCK TOPS

- A. Maple multi ply to match Architect's sample.

2.4 EPOXY COUNTERTOPS

- A. Epoxy Top Surfaces: Chemical and abrasion resistant, durable top of one inch thick cast material of epoxy resins and inert products, cast flat, with a uniform non-glare dark grey matte finish.
 1. 1-1/2" edge and 4" backsplash.

2.5 CABINET HARDWARE

A. Hinges:

1. Concealed hinges, epoxy powder coated, institutional grade ANSI-BHMA standard A156.9, Grade 1.
 - a. Doors 48 inches and over in height have 3 hinges per door.
 - b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.

B. Pulls:

1. Door and drawer front pulls, are epoxy powder coated metal wire, 96mm spacing on screws. Pull design shall comply with the Americans with Disability Act (ADA).

C. Drawer Slides:

1. Regular, kneespace and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.
2. File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

D. Adjustable Shelf Supports:

1. Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support has 2 integral

support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support automatically adapts to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.

- E. Sliding Door Track: Anodized aluminum double channel.
- F. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
- G. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders.
- H. Mirrors: 1/4 inch thick polished mirror plate.

2.6 FABRICATION

- A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown.
- B. All casework panel components to be finished precisely to size and squareness within 0.3mm utilizing a sizing process to ensure strict dimensional quality and structural integrity in the final fabricated product.
- C. Cabinet Body Construction:
 - 1. Tops and bottoms are glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals. Minimum 6 dowels each joint for 24 inch deep cabinets and a minimum of 4 dowels each joint for 12 inch deep cabinets.
 - a. Tops, bottoms and sides of all cabinets are particleboard core.
 - 2. Cabinet backs: 1/2 inch thick particleboard core.
 - a. Exposed back on fixed or movable cabinets: 3/4 inch thick particleboard with the exterior surface finished in VGS laminate as selected.
 - b. Flexible rail mounted cabinet backs: 3/4 inch thick particleboard structurally doweled into cabinet sides and top panels.
 - 3. Fixed base and tall units have an individual factory-applied base, constructed of 3/4 inch thick particleboard. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings.
 - 4. Base units, except sink base units: Full sub-top. Sink base units are provided with open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.
 - 5. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.

6. Exposed and semi exposed edges.
 - a. Edging: 1mm PVC.
 7. Adjustable shelf core: 3/4 inch thick particleboard up to 36 inches wide, 1 inch thick particleboard over 36 inches wide.
 - a. Front edge: 1mm PVC.
 8. Interior finish, units with open Interiors:
 - a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine laminate with matching prefinished back.
 9. Interior finish, units with closed Interiors:
 - a. Top, bottom, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine laminate with matching prefinished back.
 10. Exposed ends:
 - a. Faced with VGS high-pressure decorative laminate.
 11. Wall unit bottom:
 - a. Faced with thermally fused melamine laminate.
 12. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
- D. Drawers:
1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 1mm PVC.
 2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
 3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.
- E. Door/Drawer Fronts:
1. Core: 3/4 inch thick particleboard.
 2. Provide double doors in opening in excess of 24 inches wide.
 3. Faces:

- a. Exterior: VGS High-pressure decorative laminate.
 - b. Interior: High-pressure cabinet liner CLS.
- 4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.
- F. Miscellaneous Shelving:
 - 1. Core material: 3/4 inch or 1 inch thick particleboard.
 - 2. Exterior: VGS High-pressure decorative laminate.
 - 3. Edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

2.7 INSTRUCTOR DEMONSTRATION CENTER

- A. Provide Model 20790 Sheldon Instructor Demonstration Center 54" L. X 24" W. X 36" H. Top is 1" Mobile Instructor's Demo Unit provided with one (1) storage cubical (15"D. x 20"L. x 16-3/4"H) with three drawers. Assembly is provided with finished back; four (4) rubber-tired swivel casters, two (2) with locking brake; 110V electrical raceway with three plug-in receptacles; full length modesty panel; and one (1) 86375 clamp on upright rod assembly. Rod storage is incorporated into the frame. Top is 1" Shelresin.
- B. Sheldon 20650 Demonstration Center: Includes one (1) S353528-200 sink cabinet, one (1) B353528-570 seven-drawer cabinet, one (1) 24" kneespace, and a finished back. The Center also includes a black Shelresin top with epoxy resin drop-in sink on left end. Internal service piping and wiring not included.
 - 1. Standard services and accessories included:
 - a. One (1) 80020-CV Unicast combination hot and cold water, no gas required.
 - b. One (1) D20 Shelresin 16" x 16" x 7-1/2" I.D. drop-in sink.
 - c. One (1) sink outlet, strainer and stopper.
 - d. One (1) 85101 GFI duplex electrical outlet.
 - e. One (1) 86380 upright rod assembly with two (2) 86320 rod bases.

PART 3 EXECUTION

3.1 INSPECTION

- A. The casework contractor must examine the job site and the conditions under which the work under this Section is to be performed, and notify the building owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until satisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION

- A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.3 INSTALLATION

- A. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.
- B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind.
- C. Repair minor damage per plastic laminate manufacturer's recommendations.

3.4 CLEANING

- A. Remove and dispose of all packing materials and related construction debris.
- B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

3.5 CASEWORK SCHEDULE

- A. See Drawing A 501.

END OF SECTION

SECTION 12 48 13

FLOOR MATS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the floor mats as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Concrete - Section 033000.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Except as otherwise indicated, provide entrance mats and accessories by a single manufacturer for entire project.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions for entrance mat. Include methods of installation for each type of substrate.
- B. Samples: Submit samples for each type and color of exposed entrance mat,. Provide 12" square samples of mat materials.
- C. Maintenance Data: Submit manufacturer's printed instructions for cleaning, drying, maintaining and rehandling of removable entrance mat units.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MAT AND FRAME

- A. At Vestibules: Provide 1/2" thick Berber Carpet roll mats, Nubby Hobnail, EM-20 as manufactured by Pawling Corp., or approved equal, polypropylene blend with non-skid rubber backing. Color: Blue Grey.
- B. Adhesive: Type per manufacturer.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where floor mats and frames are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Adhere mat to concrete following manufacturers guidelines.
- B. Delay installation of mats until work on the project reaches substantial completion. Protect mat until accepted by Owner.

END OF SECTION

SECTION 14 24 00

HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the hydraulic elevators, as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Holeless, machine-roomless hydraulic elevators with cabs as shown on drawings.

1.3 RELATED SECTIONS

- A. Elevator hoistways - Section 04 20 00.
- B. Electrical power and wiring to elevator controllers and car lights - Division 26.

1.4 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; 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.

1.5 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch square samples of sheet materials; and 4-inch lengths of running trim members.
- D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and dimensions, as shown on Drawings, and electrical service, including emergency generator, as shown and specified, are adequate for elevator system being provided.

- E. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.
- F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."
 - 1. Seismic Risk Zone: Project is located in Zone ____.
 - 2. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)," Section 407 in ICC A117.1.

1.7 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance sub-sills; and electrical service, electrical outlets, lights, and switches in pits.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.
 - 1. Warranty Period: 12 months from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: Two hours or less.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly or other period maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide "Endura MRL" hydraulic elevators as manufactured by ThyssenKrupp Elevator, or equal by Otis Elevator Company, Schindler, Kone, or approved equal.

2.2 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.
- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide either of the following:
1. Pump, with fan-cooled squirrel-cage induction motor, mounted on top of oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch thick, glass-fiber insulation board.
 2. Submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts.
 3. Provide motor with wye-delta or solid-state starting.
 4. Provide variable-voltage variable-frequency motor control.
- C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
1. Provide dielectric couplings at plunger/cylinder units.

2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
- F. Car Frame and Platform: Welded steel units.
- G. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
 1. Satin Stainless Steel: ASTM A 240, Type 304, with No. 4, directional satin finish.
 - a. Surface is satin polished after rolling.
 2. Stainless Steel Bars: ASTM A 276, Type 304, No. 4 finish.

2.3 OPERATION SYSTEMS

- A. Elevators: Provide manufacturer's standard microprocessor operation system for each elevator or group of elevators as required to provide type of operation system indicated.
 1. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators.
 1. Standby Powered Lowering: On activation of standby power, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down.
 2. Loaded-Car Bypass: When car load exceeds a predetermined weight, car will respond only to car calls, not to hall calls. Predetermined weight can be adjusted.
 3. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.
 4. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.
- C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

1. Keyswitch Feature: Car push buttons are activated and deactivated by security keyswitches located adjacent to each pushbutton to prevent access to a given floor. Key is removable only in the "locked out" (deactivated) position.
2. Keypad Operation: Allows each landing to be restricted or unrestricted. When a restricted landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered into a keypad or predetermined time period has elapsed. Car calls for restricted landings do not register until landing access code is entered into keypad within predetermined time period after landing button is pressed.
 - a. Access codes are programmed at each car operating panel using a security keyswitch. Secured landing feature is activated and deactivated by a security keyswitch at the main landing.
3. Car-to-Lobby Feature: Feature, activated by a keyswitch at main lobby, that causes all cars in a group to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, cars complete calls registered before keyswitch activation and resume normal operation.

D. Emergency Control for Fire Department Use

1. Provide Phase I and Phase II fire emergency service per ANSI/ASME A17.1 and any other requirements in accordance with local laws and ordinances.
2. Emergency operation shall be actuated by the operation of two-position (Normal, Firemen Service) key operated switches located at the Lobby Floor.

2.4 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.
- B. Swing-Return Car Control Stations: Provide car control stations fully recessed in hinged return panel adjacent to car door.
 1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
 2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
 3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)," ICC A117.1.
- C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to

monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

- D. Fire Department Communication System: Provide flush-mounted cabinet in each car and required conductors in traveling cable for fire department communication system specified in Division 26 Sections.
- E. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 - 1. Include travel direction arrows if not provided in car control station.
- F. Hall Push-Button Stations: Provide hall push-button stations at each landing for each elevator or group of elevators as indicated.
 - 1. Provide units with flat stainless steel faceplate for mounting with body of unit recessed in wall.
 - 2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.
- G. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.
 - 1. Provide units with flat stainless steel faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
 - 2. Place lanterns above each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches above finished floor.
 - 3. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
- H. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 - 1. Integrate ground-floor hall lanterns with hall position indicators.

2.5 DOOR REOPENING DEVICES

- A. Door Edge Device: Provide retractable edge shoes on elevator entrance doors that cause doors to stop and reopen upon contacting an obstruction. Include photoelectric device with timed cutout that projects dual-light beams across car entrance at 5- and 29-inch heights; the beams, when interrupted, cause doors to stop and reopen.

- B. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.6 ELEVATOR CAR ENCLOSURES

- A. General: Provide manufacturer's standard steel-framed car enclosures with non-removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills, thresholds, lighting, and ventilation.
 - 1. Floor Finish: Porcelain tile (T-1) by others; 3/8" thick.
 - 2. Stainless Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless-steel sheet.
 - 3. Fabricate car with recesses and cutouts for signal equipment.
 - 4. Fabricate car door frame integrally with front wall of car.
 - 5. Stainless Steel Doors: Flush, hollow-metal construction, fabricated from 16 ga. stainless steel.
 - 6. Sills: Extruded aluminum, with grooved surface, 1/4 inch thick.
 - 7. Ceiling: Stainless steel drop ceiling panels with LED lighting.
 - 8. Handrails: Stainless steel.
 - 9. Provide stainless steel blanket hooks and two (2) complete sets of full height, quilted fire retardant protective pads.

2.7 PASSENGER HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
 - 1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
 - 1. Stainless Steel Doors and Frames: Formed 14 ga. stainless-steel sheet, No. 4 finish.
 - 2. Sills: Extruded aluminum, with grooved surface, 1/4 inch thick.
 - 3. Non-Shrink, Non-Metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107.

2.8 ELEVATOR CHARACTERISTICS

- | | |
|-------------------|---|
| A. Control | Holeless hydraulic |
| B. Capacity | 2,100 lbs. |
| C. Speed | 80 fpm |
| D. Clear Inside | See Drawings |
| E. Travel | See Drawings |
| F. Power Supply | 208 V, 60 Hz; coordinate w/ Division 26 |
| G. Stops | 3 |
| H. Openings | 2 front, 1 rear |
| I. Hoistway Doors | Single-speed, center-opening |
| 1. Size | 3'-6" x 8'-0" |

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.2 INSTALLATION

- A. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4 inches of non-shrink, non-metallic grout.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.

- E. Lubricate operating parts of systems as recommended by manufacturers.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- G. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with non-shrink, non-metallic grout.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use either temporary or permanent of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 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 operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.5 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
 - 1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.

2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

END OF SECTION