Wayne RESA Schools-
Burger Baylor

specifications manual

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architects planners interiors

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SECTION 01 0400 - COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. Generals project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination Drawings.
4. General installation provisions.
5. Cleaning and protection.
6. Coordination program.

B. Related Section: The following Sections contain requirements that relate to this Section:

1. Division 01 6000 Section “Product Requirements” for coordinating materials and equipment for general installation.
2. Division 01 7300 Section “Execution Requirements” for Layout and Measurements, specifies procedures for field engineering services, including establishment of benchmarks and control points.

1.3 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend upon each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
3. Make adequate provisions to accommodate items schedule 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.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare coordination drawings for above ceiling work, equipment rooms and other areas where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components on separate Shop Drawings.
2. Indicate required installation sequence.

B. Staff Names: Within fifteen (15) calendar days of "Notice to Proceed," submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, 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. Other Project names, addresses and information:

1. Lists of sub-contractors and erectors.
2. List of suppliers and manufacturers.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each component to inspect both the substrate and conditions under which Work is to be performed. Proceed when unsatisfactory conditions have been corrected.

B. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction.

3.2 COORDINATION PROGRAM

A. It shall be the responsibility of the Construction Manager/General Contractor to coordinate the equipment room requirements and the above ceiling space requirements of the various subcontractors and to determine that adequate clearance is allowed with respect to their equipment and the building.

B. The Coordination Program shall consist of a series of meetings with all trades involved and the preparation of installation drawings prepared from base drawings produced by the Sheet Metal Subcontractor. The Mechanical, Electrical and Fire Protection Subcontractors shall use the base drawings for producing their individual installation drawing overlays for coordination with other trades.

C. The following sequence shall be followed:

1. After the award of contract and prior to construction the Construction Manager/General Contractor will schedule a meeting to introduce the Coordination Program and determine its implication to the progress schedule. Attendees shall include the Construction Manager/General Contractor, Owner's Representative, Architect/Engineer and all subcontractors responsible for work in equipment rooms and in or above the ceilings which includes (but is not limited to) those items below:

    a. Recessed lighting fixtures.
    b. Plumbing waste, vent and roof drainage.
    c. Steam, condensate and all other pitched services.
    d. Ductwork and appurtenances.
    e. Fire protection (sprinkler system).
    f. HVAC piping.
    g. Plumbing, supply and service piping.
    h. Cable tray.
    i. Electrical conduit.

        (1) The above list, in descending order, is the precedence for space priority. Recessed light fixtures and space for their installation have first priority, plumbing waste, vent and roof drainage has second priority, etc.

2. The Construction Manager/General Contractor shall confirm that the following have been provided to the Sheet Metal Subcontractor prior to commencing the base drawings:

    a. Approved structural steel drawings.
    b. Clearance requirements for plumbing, piping, etc. from the Mechanical Subcontractor.
    c. Clearance requirements for recessed lighting, cable trays, etc. from the Electrical Subcontractor.
    d. Clearance requirements for piping from the Fire Protection Subcontractor.

3. The Sheet Metal Subcontractor shall prepare and provide the Mechanical, Electrical and Fire Protection Subcontractors with reproducible transparent drawings which shall serve as the base drawings. The base drawings shall show column center lines, interior partition locations, and ceiling heights.

4. The Sheet Metal Subcontractor, with reference and consideration to the structural, mechanical, electrical, fire protection, and plumbing requirements provided and the reflected ceiling plans, shall draw, to scale (minimum ¼" scale), the proposed ductwork installation showing duct sizes, equipment layouts, and dimensions from column lines and distance from finished floors to bottom of ducts and equipment. In congested areas, the Sheet Metal Subcontractor shall, in addition, prepare drawings in Section view.

5. The base drawings with ductwork layouts shall be produced in sequence as mandated by the project schedule. The earliest area indicated in the schedule will receive the first effort, etc.

6. When the base drawings for the earliest scheduled area have been completed (time limitation as determined in the initial coordination meeting), the Sheet Metal Subcontractor shall provide the Construction Manager/General Contractor with one set of mylars for each participant in the effort. Upon receipt of the base drawings from the Construction Manager/General Contractor each participant shall incorporate on the drawings, their proposed installation. Each of the subcontractors proposed installation drawings shall indicate to scale, size, equipment layout, equipment clearance requirements, dimensions from column centerlines and distance from the finish floor to bottom of equipment, piping, conduits, etc. The Contract Drawings shall be followed as a general guide for the proposed installation drawings.

7. The major components to be indicated include (but are not limited to):

a. Roof drain leaders.
b. Waste and vent piping.
c. Fire protection piping.
d. Plumbing and lab service piping.
e. HVAC and Mechanical ductwork routing.
f. Electrical conduit and Cable tray runs.
g. Contract ceiling heights and Soffit locations.
h. Access points for access to valves and Dampers.
i. Firewall penetrations.

8. Prior to fabrication of ductwork and within a period of not to exceed two (2) calendar weeks after distribution of the mylars to the individual participants, the Construction Manager/General Contractor will schedule a meeting with the Owner's Representative, the Architect/Engineers and participating Subcontractors at which time areas of conflict shall be resolved through the following process:

   a. The transparent tracings shall be overlaid on a light table to identify areas of conflict. All parties shall then cooperate in resolving the conflicts.

   b. The Owner's Representative and the Architect/Engineer reserve the right to determine space priority of the Subcontractors in the event of interference between piping, conduits, ducts and equipment of the various Subcontractors.

   c. Records of the areas of conflict and the names of the subcontractor who is to make modifications to their drawings shall be kept by the Construction Manager/General Contractor. This record shall be updated on a weekly basis and shall be incorporated into the coordination meeting minutes.

   d. Once all areas of conflict are resolved, each participant shall revise their drawings and shall submit for review. After review, ductwork can be fabricated, and installation of work can begin. A permanent record of the agreement shall be entered on each Subcontractors' installation drawings, acknowledged by all participants' by signature in a space provided for this purpose. The Construction Manager/General Contractor shall provide and distribute two graphic copies of each subcontractor's signed installation drawings to all parties involved. Revisions of drawings as a result of the coordination process shall not be considered an extra and will not result in a change to the contract.

   e. The above drawings, review and coordination process will be repeated until all areas on the Project have been coordinated.

9. Shop drawings shall be modified through the coordination process to reflect the final resolved locations of equipment prior to submittal for review.

10. In the event a Subcontractor fails to cooperate in the Coordination Program, he shall be held responsible for all costs incurred for adjustments to the work of others made necessary to accommodate the uncooperative Subcontractor's installations.

11. When a Change Order request is issued, the affected Subcontractors shall review the Coordination Drawings and bring to the attention of the Construction Manager/General Contractor any revisions necessary to the work of others affected by the Change Order.

D. At the completion of the project, each subcontractor shall provide the Construction Manager/General Contractor with a reproducible transparent drawing of the installation drawings to be forwarded to the Owner.

3.3 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 ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. 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. Radiation.
11. Puncture.
12. Abrasion.
13. Heavy traffic.
14. Soiling, staining and corrosion.
15. Bacteria.
16. Rodent and insect infestation.
17. Electrical current.
18. Improper lubrication.
19. Unusual wear or other misuse.
20. Contact between incompatible materials.
21. Misalignment.
22. Excessive weathering.
23. Unprotected storage.
24. Improper shipping or handling.
25. Theft.
26. Vandalism.

END OF SECTION 01 0400

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1. Shop drawings and Samples
2. Product data submittal procedures.
3. Shop Drawing and Samples Transmittal Form.
4. Contract Close-out Deliverables Form.

B. Related Sections include the following:
1. Divisions 02 0000 through 33 0000 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals (Shop Drawings, Samples, Product Data, Catalog Cuts, etc.): Written and graphic information that requires Architect's **and Construction Manager's** responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings may be provided at Architect’s discretion and at extra cost to Contractor for use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. **Architect reserves** the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **Architect's** receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow twenty (20) calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. **Architect** will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow eighteen (18) calendar days for review of each resubmittal.
3. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow twenty (20) calendar days for initial review of each submittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow twenty (20) calendar days for review of each submittal.

D. Shop Drawing Submittal Procedures: The procedures and quantity of drawings, catalog cuts, samples and other information for submittal are minimum. The Contractor and Architect will finalize format at the Project Kick-Off Meeting.

1. Contractor to Construction Manager and then to Architect
   a. All submittals shall be sent as pdf files via email.
   b. Each submittal shall include one pdf that includes the Submittal Transmittal as provided in this specification (completely filled out) and all other 8.5 x 11 documents as a single pdf file.
   c. Submittal documents that are not 8.5 x 11 shall be submitted as a separate pdf file for each size documents. For instance, 24" x 36" sheets shall be sent as a separate pdf. Always include the separate pdf file with the filled out transmittal with each submittal pdf.
2. Architect to CM to Contractor
   a. A pdf file of each reviewed submittal will be sent via email.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 x 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Name and email address of subcontractor.
   f. Name and email address of supplier.
   g. Name and website address of manufacturer.
   h. Contractors Submittal number
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Other necessary identification.

F. Deviations: **Highlight and encircle**, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Transmittal: Package each submittal item individually and appropriately for transmittal and handling. Do not group submittals related to different specification sections. Transmit each submittal using the official transmittal form. Architect received submittals from sources other than General Contractor will be discarded without review.

1. Transmittal Form: **Use submittal form included at the end of Specification.**
2. Form:

a. Project name.
b. Date.
c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Drawing number and detail references, as appropriate.
j. Transmittal number**, numbered consecutively**.
k. Submittal and transmittal distribution record.
l. Remarks.
m. Signature of transmitter.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2 Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with Architect's "REVIEWED FOR CONSTRUCTION" or Architect's "REVIEWED AS NOTED" stamp

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating Architect's "REVIEWED FOR CONSTRUCTION" or "REVIEWED AS NOTED" stamp and Construction Manager's or General Contractor's release for construction stamp.

1. DO NOT USE Shop Drawings noted "XRR = RETURNED FOR CORRECTIONS" for construction or fabrication.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Submit electronic submittals directly to extranet specifically established for Project.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's written recommendations.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Standard color charts.
    e. Manufacturer's catalog cuts.
    f. Wiring diagrams showing factory-installed wiring.
    g. Printed performance curves.
    h. Operational range diagrams.
    i. Mill reports.
    j. Standard product operating and maintenance manuals.
    k. Compliance with specified referenced standards.
    l. Testing by recognized testing agency.
    m. Application of testing agency labels and seals.
    n. Notation of coordination requirements.

4. Submit Product Data concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.
    d. Roughing-in and setting diagrams.
    e. Wiring diagrams showing field-installed wiring, power, signal, and control wiring.
    f. Shop work manufacturing instructions.
    g. Templates and patterns.
    h. Schedules.
    i. Design calculations.
    j. Compliance with specified standards.
    k. Notation of coordination requirements.
    l. Notation of dimensions established by field measurement.
    m. Relationship to adjoining construction clearly indicated.
    n. Seal and signature of professional engineer if specified.
    o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 24 by 36 inches (750 by 1000 mm).

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    p. Generic description of Sample.

q. Product name and name of manufacturer.
r. Sample source.
s. Number and title of appropriate Specification Section.

2. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

3. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one (1) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, **through Construction Manager**, will return submittal with options selected.

4. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit number of samples as indicated in Part 1.4 "Submittal Procedures".

1. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2. If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Room name, room number, space and location.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation" for Construction Manager's action.

G. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

J. Schedule of Values: Comply with requirements specified in Division 01 Section “Payment Procedures.”

K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit two (2) copies of subcontractor list, unless otherwise indicated.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two (2) copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Division 01 4000 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 01 3100 Section “Project Management and Coordination.”

C. Contractor's Construction Schedule: Comply with requirements in Division 01 3200 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer’s letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 4000 Section "Quality Requirements."

N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 7700 Section "Closeout Procedures" for Operation and Maintenance Data."

R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles and term of the coverage.

V. Material Safety Data Sheets (MSDSs): Submit information directly to Construction Manager; do not submit to Architect, **except as required in "Action Submittals´ Article**."

1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three (3) copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

A. General: Architect will not review submittals that do not bear Construction Manager's or General Contractor's review approval stamp and will return them without action.

B. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action to be taken.

C. Informational Submittals: Architect will review each submittal and will return it to the Construction Manager or General Contractor with review comments for their review.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

3.3 ARCHITECT'S FORMS

A. Shop Drawings and Samples Transmittal form, attached at end of Section.

B. Contract Close-out Deliverables form, attached at end of Section.

END OF SECTION 01 3300

SHOP DRAWING AND SAMPLES TRANSMITTAL

FRENCH associates
architects planners interiors

FA Submittal No.

Consultant Submittal No.

Project Name:	Architect's Project No.:	Submittal Date: ☐ Resubmittal	Contr. Submittal No. / Refer. Submittal No.
CM / Contr. Name: / CM / Contr. Address:	Contr. Proj. No.	Sub-Contr, Supplier, Etc. Name: / Sub-Contr, Supplier, Etc. Submittal No:	

Spec Section (not Bid Ctgy.)	No. of Prints	No. of Tracing	No. of Cat/etc.	No. of Sample	Sub-Contractor, Suppler, Manufacturer, Misc.	* List Each * Draw ing No.	Draw ing Title, Item Description	**Architect Review Code**	Copies Returned to Contractor

Contractor(s) certifies that the above submitted information has been review ed in detail and comply w ith the Contract Documents, except as indicated, and is submitted to the Architect, " FOR REVIEW AND COMMENTS ONLY." The Architect's and Engineer's critique w ill not relieve the Contractor(s) from compliance w ith requirements of the Contract Documents. Contractor(s) assumes responsibility for all information and comments indicated in Shop Draw ings.

Contractor / Const. Manager Comments

Priority ☐ High ☐ Normal ☐ Low

Signature

Consultant's Comments

Signature

Architect's Comments

Signature

Date: Copies: Attn:

CONTRACTOR TRANSMITTED TO:
- ☐ Structural
- ☐ Mechanical
- ☐ Electrical
- ☐ Architect
- ☐ Other

CONSULTANT TRANSMITTED TO:
- ☐ Architect
- ☐ Other Consul.
- ☐ Other

ARCHITECT TRANSMITTED TO:
- ☐ Contr./Mgr.
- ☐ Consultant
- ☐ Other

Architect Review Code Legend

RC = Reviewed for Construction
That part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance

RN = Reviewed as Noted
That part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

XRR = Returned for Corrections
Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a "Reviewed for Construction" or "Reviewed as Noted" action mark.

Contractor / Const. Manager - Record Copy Sent To:

Date:

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

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

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. 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.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. 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.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. 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.

G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, **and the Contract Sum will be adjusted by Change Order**.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least forty-eight (48) hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 3300 Section "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractors in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractors promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel.

1. Incidental labor and facilities necessary to facilitate tests and inspections.
2. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
3. Facilities for storage and field curing of test samples.
4. Delivery of samples to testing agencies.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

A. Construction Manager will select testing agency before construction begins.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 01 7329 Section "Cutting and 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 01 4000

SECTION 01 6000 - PRODUCT REQUIREMENTS - OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Substitutions Request Procedures.
2. Product Substitutions and Options.
3. Substitution Request Form. (included at end of this Specification Section)

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility**, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise**. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions (after selection of successful bidder): Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

A. Substitution Requests Procedures: Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request must be proposed and submitted only to the Construction Manager or General Contractor. Substitution Requests must not be sent directly to the Architect.
2. Substitution Request Form: Use form provided at end of Section.
3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and other separate Contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Cost information, including a proposal of change, if any, in the Contract Sum.
    j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

4. Architect/Engineer shall have right to reject proposed substitution without explanation.
5. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within Seven (7) calendar days of receipt of a request for substitution. Architect will notify General Contractor of acceptance or rejection of proposed substitution within Ten (10) calendar days of receipt of request, or Seven (7) calendar days of receipt of additional information or documentation, whichever is later.

    a. **Should the Architect not respond within Twelve (12) calendar days of the dated date of Request, the proposed substitution is considered REJECTED.**
    b. Form of Acceptance: Construction Change Directive (CCD).
    c. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
    d. Owner or Architect does not have to give any reason for rejection of substitutions.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 3300 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1. 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.
2. 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.
3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store products to allow for inspection and measurement of quantity or counting of units.
5. Store materials in a manner that will not endanger Project structure.
6. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
7. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
8. Protect stored products from damage.

1.7 PRODUCT WARRANTIES

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

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 0000 through Divisions 33 0000 Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS and SUBSTITUTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product acceptable to the Architect.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

    a. The product is a single source item.
    Substitutions will not be considered.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

    a. Substitutions may be considered.

3. Manufacturer’s Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

    a. Substitutions will not be considered.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

    a. Substitutions by non-listed manufacturers will not be considered.

5. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by a specified manufacturer. Comply with provisions in "Product Substitutions" Article.

6. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, design profiles, dimensions, and other characteristics that are based on the product named.

   a. Provide Basis-of Design product or by one of the listed manufacturers.
   b. Substitutions of other products will not be considered.

7. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

8. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

   a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
   b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS CRITERIA

A. Timing: Architect may consider requests for substitution if received within thirty (30) calendar days after the “Notice to Proceed” or before the first (1st) “Application for Payment.” Requests received after that time may be considered or rejected at discretion of Architect without explanation.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action or reason, except to record noncompliance with these requirements:

   1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   2. Requested substitution does not require extensive revisions to the Contract Documents.
   3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   4. Substitution request is fully documented and properly submitted.
   5. Requested substitution will not affect work of other Trades Contractor's construction time schedule.

6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

3.1 Architect's "Substitution Request" form included at end of this Specification Section.

END OF SECTION 01 6000

FRENCH associates

architects planners interiors

SUBSTITUTION REQUEST

Project: _____

_____

To: _____

_____

Re: _____

Substitution Request Number: _____

From: _____

Date: _____

A/E Project Number: _____

Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - < REQUIRED BY A/E >

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution (if applicable): _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports
< REQUIRED BY A/E >

SUBSTITUTION REQUEST (CONT'D)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

Note: Should the Architect not respond within Twelve (12) calendar days of the dated date of Request, the proposed substitution is considered rejected.

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Printed name: _____ Title: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E

_____

_____

_____

_____

_____

_____

cc: Technical Specifications Committee

SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. General installation of products.
   2. Starting and adjusting.
   3. Protection of installed construction.
   4. Correction of the Work.

B. Related Sections include the following:
   1. Division 01 3300 Section "Submittal Procedures" for submitting surveys.
   2. Division 01 7329 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

PART 2 - PRODUCTS (Not Used)

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: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities 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. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. 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, Owner and Architect 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. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner and Architect not less than seven (7) calendar days in advance of proposed utility interruptions. Provide information on length of interruptions.
2. Do not proceed with utility interruptions without Owner’s and Architect’s written permission.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. 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 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 (2.4 m) in spaces without a suspended ceiling.

B. Building Envelope Integrity: The completed project must provide a building enclosure that does not allow water to penetrate the building envelope. Outside air infiltration into the building must be minimized unless controlled or part of hvac system operation. Outside air infiltration is not allowable in a quantity that can allow freezing or negatively impact piping (plumbing, fire protection, hvac), hvac systems, electrical systems or any other building system.

C. Structural Integrity: All walls, ceilings, soffits and other components must be adequately supported to remain plumb and square. Provide bracing as required to prevent sway, cracking or collapse.

D. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

E. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

F. 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.

G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

I. 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.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. 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.

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

3.4 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 seven (7) calendar days during normal weather or three (3) calendar days if the temperature is expected to rise above 80 deg F (27 deg C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 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 Division 01 4000 Section "Quality Requirements."

3.6 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.

3.7 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 7329 Section "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 01 7300

SECTION 01 7329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching of items indicated but not limited to the following:

1. Architectural work.
2. Structural work.
3. Mechanical work.
4. Electrical work.
5. Partial Demolition work.

B. Related Sections include the following:
1. Divisions 02 0000 through Divisions 33 0000 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
2. Division 07 8413 Section "Penetration Fire-stopping" for patching fire-rated construction.

1.3 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.

1.4 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. Consult with Architect and Structural Engineer before beginning work.

a. Provide work program for removal and shoring of the existing structural members and framing conditions of the building.

2. Comply with all requirements of governmental, local and agencies having jurisdiction.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or results that increase maintenance or decreased operational life or safety. Operating elements include, but not limited to, the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Electrical wiring systems.
8. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous 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. Miscellaneous elements include, but not limited to, the following:]

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall 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.

1.5 WARRANTY

A. Existing 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 existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will 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 in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 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. 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 Divisions 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

6. Proceed with patching after construction operations requiring cutting are complete.

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.

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.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

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.

4. Remove in-place 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.

5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 7329

SECTION 02 4119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.

B. Related Sections include the following:
1. Division 01 7329 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Owner's representative, who will establish procedures for removal and salvage.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 01 1000 Section "Summary."

1.6 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES, MECHANICAL and ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

      a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 7419 Section "Construction Waste Management and Disposal."

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

END OF SECTION 02 4119

SECTION 04 2000 - UNIT MASONRY

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.

B. The provisions and guidelines indicated in ACI 530.1/ASCE 6/TMS 602 Specification for Masonry Structures (referred to hereinafter as the **MSJC Code**), current at the time of project bidding shall constitute the masonry standard and shall apply to this Section.

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Face brick types (Refer to Drawings).
3. Precast concrete trim units
4. Joint Types.
5. Mortar and grout.
6. Reinforcing steel.
7. Masonry joint reinforcement.
8. Ties and anchors.
9. Miscellaneous masonry accessories.
10. Thermal Insulation.
11. Temporary bracing of masonry walls.

B. Related Sections include the following:
1. Division 04 2200 Flexible Flashing System

C. Products furnished, but not installed, under this Section include the following:

1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel Framing."

D. Products installed, but not furnished, under this Section include the following:
1. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section "Metal Fabrications."
2. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Flashing and Trim."
3. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Hollow Metal Doors and Frames."

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.

B. Determine net-area compressive strength (f'm) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in Section 1.4 of the **MSJC Code**. Provide f'm for concrete masonry construction according to the following:

Use	Compressive Strength, f'm (psi)	Unit Strength (psi)	Grout Strength (psi)	Mortar Type
Typical, unless noted otherwise	1500 min.	1900 min.	2000 min.	M or S

C. Masonry Inspection Requirements:

1. Testing Frequency for Non-Essential Facilities - Level B Quality Assurance:

   a. Assurance level to be in accordance with Table 4 of the MSJC Specification for Masonry Structures.

   b. Frequency level for Category I, II or III buildings to be in accordance with Table 1704.5.1 Level 1 Special Inspections of the Michigan Building Code.

2. For this project, the testing and inspecting agency will be hired by the Owner or the Owner's representative.
3. Contractor may retain a qualified consultant to review procedures and construction methods to comply with this specification, industry standards and construction codes.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

C. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Samples for Verification: For the following:

1. Full-size units, if requested, for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project**.** Provide mix data.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

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

1. Each type of masonry unit required.

    a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.

2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. For each combination of masonry unit type and mortar type, include a written statement identifying the following:

    a. Net-area compressive strength of masonry units.
    b. Mortar type.
    c. Net-area compressive strength of the completed masonry system determined according to Tables 1 and 2 in Section 1.4 of **the MSJC Code**.
4. Each material and grade indicated for reinforcing bars.
5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

G. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports from past projects which were performed in accordance with ASTM C 780, for mortar mixes intended for this project required to comply with property specification.
2. Include test reports from past projects which were performed in accordance with ASTM C 1019, for grout mixes intended for this project required to comply with compressive strength requirement.

H. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in Section 1.4 of **the MSJC Code**.

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

J. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot-weather requirements.

1.6 QUALITY ASSURANCE

A. Testing Agency Services

1. The Construction Manager/Owner will secure and pay for the services of a qualified, independent materials engineer to perform quality assurance testing of mortar and grout materials, to confirm re-bar and anchorage placement, to verify compliance of materials with specified requirements, to observe and document compliance with hot and cold weather construction methods, and to perform required field and laboratory testing. Testing Agency shall be acceptable to the architect and the owner and shall be licensed to practice in the state in which the project is located.

B. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

C. Masonry Standard: Comply with **the MSJC Code** unless modified by requirements in the Contract Documents.

D. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

F. Pre-construction Testing Service: Owner may engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

1. Clay Masonry Unit Test: For each type of unit required, per ASTM C 67.
2. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
4. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
5. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.

G. Construction Testing Service: Refer to Article 3.15 “Field Quality Control” herein.

H. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1. UL-Design No. U905: 2 hour rating. 6” (5-5/8”) nominal thick concrete block (CMU) bearing and non-bearing fire-rated wall construction.
2. UL-Design No. U906: 2 hour rating. 8” (7-5/8”) nominal thick concrete block (CMU) bearing and non-bearing fire-rated wall construction.

I. Mockups: Before installing unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Locate mockups in the locations as directed by Construction Manager or Architect.
2. Build mockups for the following types of masonry in sizes approximately 48 inches (12 long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.

    a. Typical exterior wall with cast stone trim and through-wall flashing.
    b. Provide through-wall flashing to 16 inches above the ground floor line.
    c. Provide mortar-net at least 10 inches high or 4 inches (minimum) deep of washed pea gravel at the bottom of the weep hole line.
    d. Provide at least 2 inches of rigid insulation on the back-up cavity CMU wall with all insulation joints taped.
3. Notify Architect seven (7) calendar days in advance of dates and times when mockups will be constructed.
4. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship and does not constitute approval of deviations from the Contract Documents.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units and other material accessories on elevated platforms in a dry location, cover tops and sides of stacks with waterproof sheeting, securely tied.

1. Protect Type-1 concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.8 PROJECT CONDITIONS

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

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three (3) calendar days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with other installed materials.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the cold-weather construction requirements contained in Section 1.8C of **the MSJC Code**.

1. General: Comply with the following construction procedures for masonry construction, based on air temperatures at time of installation. When the ambient temperature is below 40 degrees F, implement cold weather procedures and comply with the following:

a. Do not lay glass unit masonry.

2. **Preparation** – comply with the following requirements prior to conducting masonry work:

a. Do not lay masonry units having either a temperature below 20 degrees F or containing frozen moisture, visible ice, or snow on their surface.
b. Remove visible ice and snow from the top surface of existing foundations and masonry to receive new construction. Heat and maintain these surfaces above freezing, using methods that do not result in damage.

3. **Construction** – These requirements apply to work in progress and are based on ambient air temperatures. Do not heat water or aggregates used in mortar or grout above 140 degrees F. Comply with the following requirements during construction when the following ambient air conditions occur:

a. 40 degrees F to 32 degrees F:

1) Mortar: Heat sand and mixing water to produce mortar with temperature between 40 degrees F and 120 degrees F at the time of mixing.
2) Grout and Units: Heated materials not required unless temperature falls below 32 degrees F.

b. 32 degrees F to 25 degrees F:

1) Mortar: Heat sand and mixing water to produce mortar with temperature between 40 degrees F and 120 degrees F. Maintain mortar temperature temperatures above 40 degrees F until used in masonry.
2) Grout – Heat grout aggregates and mixing water to produce grout with temperature between 70 degrees F and 120 degrees F. Maintain grout temperature above 70 degrees F at the time of grout placement.
3) Units – Heat units to a minimum temperature of 32 degrees F at the time of placement.

c. 25 degrees F to 20 degrees F:

1) Mortar: Heat sand and mixing water to produce mortar with temperature between 40 degrees F and 120 degrees F. Maintain mortar temperature temperatures above 40 degrees F until used in masonry.
2) Grout – Heat grout aggregates and mixing water to produce grout with temperature between 70 degrees F and 120 degrees F. Maintain grout temperature above 70 degrees F at the time of grout placement.
3) Units – Heat units to a minimum temperature of 40 degrees F at the time of placement.
4) Provide wind breaks or enclosures when wind velocity exceeds 15 MPH.
5) Heat constructed masonry to 40 degrees prior to grouting.

d. 20 degrees F and below:

1) Mortar: Heat sand and mixing water to produce mortar with temperature between 40 degrees F and 120 degrees F. Maintain mortar temperature temperatures above 40 degrees F until used in masonry.
2) Grout – Heat grout aggregates and mixing water to produce grout with temperature between 70 degrees F and 120 degrees F. Maintain grout temperature above 70 degrees F at the time of grout placement.

3) Units – Heat units to a minimum temperature of 40 degrees F at the time of placement.
4) Provide an enclosure with auxiliary heat to maintain air temperature of 32 degrees within the enclosure.
5) Heat constructed masonry to 40 degrees prior to grouting.

e. Grouted construction: On any day when the anticipated nighttime temperature is 32 degrees F or less, in addition to complying with general procedures above, heat grout materials between 90 degrees F and 120 degrees to produce in-place grout temperature of not less than 70 degrees F at end of work day.

f. Clay masonry units: Comply with the following requirements for clay masonry units which must be wetted before laying because initial rate of absorption (suction) greater than 1 gram per square inch per minute (ASTM C 67):

1) Surface temperatures above 32 degrees F: Sprinkle with water heated to 70 degrees F or above, just before laying.
2) Surface temperatures below 32 degrees F: Sprinkle with water heated to 130 degrees F or above, just before laying.

g. Water: Do not heat water for mortar or grout to more than 160 degrees F.

h. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F and above and will remain so until masonry has dried, but not less than seven (7) calendar days after completing cleaning.

4. **Protection** – These requirements apply after masonry is placed and are based on anticipated minimum daily temperature. Protect completed masonry in the following manner:

a. Maintain the temperature of unit masonry above 40 degrees F for the first 48 hours after construction.

b. 40 degrees F to 25 degrees F:

1) Protect newly constructed masonry by covering with a weather-resistive membrane for 24 continuous hours after being completed.

c. 25 degrees F to 20 degrees F:

1) Cover newly constructed masonry completely with weather-resistive insulating blankets for 48 continuous hours.

d. 20 degrees F and below:

1) Maintain newly constructed masonry temperature above 32 degrees F for at least 48 continuous hours after being completed by using heated enclosures and a continuous heat source such as heaters, electric heating blankets, infrared lamps, etc.

e. Grouted construction: On any day when the anticipated nighttime temperature is 32 degrees F or less, in addition to complying with general procedures above, provide insulating blankets and heated enclosures for not less than 72 continuous hours and longer if conditions threaten completed work.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Comply with the hot-weather construction requirements contained in Section 1.8D of **the MSJC Code**.

1. General: Comply with the following construction procedures for masonry construction, based on air temperatures at time of installation. When the ambient temperature is 100 degrees F, or exceeds 90 degrees F with a wind velocity greater than 8 MPH implement hot weather procedures and comply with the following:

2. **Preparation** – comply with the following requirements prior to conducting masonry work:

   a. Maintain sand piles in a damp, loose condition.

   b. Provide necessary conditions and equipment to produce mortar having a temperature below 120 degrees F.

   c. When the ambient temperature exceed 115 degrees F, or exceeds 105 degrees F with a wind velocity greater than 8 MPH, shade materials and mixing equipment from direct sunlight.

3. **Construction** – These requirements apply to work in progress and are based on ambient air temperatures. Comply with the following requirements during construction when the following ambient air conditions occur:

   a. When the ambient temperature is 100 degrees F, or exceeds 90 degrees F with a wind velocity greater than 8 MPH:

      1) Maintain temperature of mortar and grout below 120 degrees F.

      2) Flush mixer, mortar transport container, and mortar boards with cool water before they come in contact with mortar ingredients or mortar.

      3) Maintain mortar consistency by re-tempering with cool water.

      4) Use mortar within 2 hours of initial mixing.

      5) Do not spread mortar beds more than 48 inches ahead of units. Set masonry units within one minute of spreading mortar.

   b. When the ambient temperature exceed 115 degrees F, or exceeds 105 degrees F with a wind velocity greater than 8 MPH:

      1) Implement the requirements of E.3.a above and use cool mixing water for mortar and grout. Ice is permitted in the mixing water prior to use. Do not permit ice in the mixing water when added to the other mortar or grout materials.

4. **Protection** – These requirements apply after masonry is placed and are based on the average daily temperature. Protect completed masonry in the following manner:

   a. When the mean air temperature is 85 degrees F or above, if relative humidity is less than 30 percent or if wind velocity is in excess of 15 MPH:

1) Provide protection by immediately covering newly constructed walls, by providing wind breaks, or by using fog spray to reduce rate of evaporation.

b. When the mean daily temperature exceeds 100 degrees F, or exceeds 90 degrees F with a wind velocity greater than 8 MPH:

1) Fog spray newly constructed masonry until damp, at least three times a day until the masonry is three days old.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

B. Integral Water Repellant

1. Provide “Integral Water Repellent” masonry units where CMU’s are located or indicated on exterior locations as single-wythe walls.
2. Provide “Field Applied Water Repellent Coating” where CMU’s are located or indicated on exterior locations as single-wythe walls.

C. Where CMU walls are to be painted, standard aggregate mix, color grey is acceptable.

2.2 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

a. Supply standard open-end units and open-end bond beam units to facilitate placement of vertical reinforcement. Units shall comply with the material specification of adjacent construction.

2. Provide bullnose units for outside corners, unless otherwise noted.

B. CMU-1: Standard Finish Concrete Masonry Units - for interior locations only - comply with ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength specified under the Performance Requirements of Article 1.4.B above.
2. Weight Classification:

a. Exterior Walls: Normal or Medium weight – Cavity/Veneer Walls Only
b. Exterior Walls: Normal weight – Singly Wythe Walls
c. Interior Load or Non-Load Bearing Walls: Normal or Medium weight.

3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

4. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

C. CMU-2: Split-faced Concrete Masonry Units with integral water repellent: Comply with ASTM C-90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight – load bearing walls.
   Medium weight – non-load bearing walls.
3. Provide Type I, moisture-controlled units.
4. Size: Manufactured to dimensions indicated for nondecorative units.
5. Finish: Exposed faces of the following general description matching integral color, pattern, and texture of Architect's samples.

   a. Split-faced CMU Color 2B (dark gray)- Grand Blanc Cement, color: Ironwood, 4" high x 16" long x 4" deep units (nominal).

6. Integral Water-Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water-repellent, when tested as a wall assembly made with mortar containing integral water repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.
   a. Install mortar and grout joints made with water-repellent admixture.
   b. Provide adhesive-set thru-wall flashing at CMU transition of foundation and building walls.
   c. Provide 3/8" x 2" plastic weep inserts at 32 inches on-center.

   d. Manufacturer's Product:

      1) Block Plus W-10; Addiment Inc.
      2) Dry-Block; W.R. Grace & Co., Construction Products Division.
      3) Rheopel; Master Builders.

D. CMU-3: Smooth-faced (Burnished) Concrete Masonry Units with integral water repellent: Comply with ASTM C-90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight – load bearing walls.
   Medium weight – non-load bearing walls.
3. Provide Type I, moisture-controlled units.
4. Size: Manufactured to dimensions indicated for nondecorative units.
5. Finish: Exposed faces of the following general description matching integral color, pattern, and texture of Architect's samples.

   a. Burnished CMU Color 1A (tan)- Grand Blanc Cement Products color: Sedona, 8" high x 16" long x 8" deep units (nominal).

6. Integral Water-Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water-repellent, when tested as a wall assembly made with mortar containing integral water repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.
   a. Install mortar and grout joints made with water-repellent admixture.

b. Provide adhesive-set thru-wall flashing at CMU transition of foundation and building walls.
c. Provide 3/8” x 2“ plastic weep inserts at 32 inches on-center.

d. Manufacturer’s Product:

1) Block Plus W-10; Addiment Inc.
2) Dry-Block; W.R. Grace & Co., Construction Products Division.
3) Rheopel; Master Builders.

7.

2.3 CONCRETE AND MASONRY LINTELS

A. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below.

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section "Cast-in-Place Concrete." Use in hidden or un-exposed conditions only.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
5. Out-of-Tolerance, warped and damaged brick shall not exceed five (5) per cent of the brick delivered to the project. Brick manufacturer and brick supplier shall provide additional material to the project at no additional cost to the Project.

B. Face Brick: Grade SW, Type FBX, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi
2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet.

C. Face Brick Types Schedule:
1. General:

a. Special shapes: Provide specially molded units as required to meet conditions indicated, unless standard units can be sawn to produce the same effect. Do not use standard units in any configuration which exposes cores or frogging.

2. Face Brick Schedule (substitutions are not allowed).
   a. Face Brick Color A: To match existing

PRECAST CONCRETE TRIM UNITS

D. Provide precast concrete sills, caps, trim and other pieces in sizes and shapes as indicated on the drawings.
   1. Integrally colored architectural precast concrete units.
   2. Submit shop drawings by the Manufacturer for approval.
   3. Provide shapes as indicated on drawings.
   4. Masonry contractor shall verify all dimensions and coordinate the shop drawings with filed conditions and other trades.
   5. Color is to match Architect's sample (buff Indiana limestone).
   6. Provide sand block or light sandblast finish to match Architect's sample. Finished product shall show no obvious repairs or imperfections other than minimal color variations. Finish all exposed surfaces.
   7. Provide reinforcing as recommended by manufacturer.
   8. Minimum compressive strength 0f 3,500 psi at 28 days.
   9. Water absorption not to exceed 5% by weight per ASTM C 642.
   10. Follow standards established by PCI "Architectural Precast Concrete Design Manual, 2nd Edition.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction.

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

C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

F. Aggregate for Grout: ASTM C 404.

G. Cold-Weather Admixture: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C 270-08a and ASTM C 1384, and recommended by the manufacturer for use in masonry mortar of composition indicated.

   1. Although ASTM C 270 appendix and BIA recommend against using any admixtures, a non-chloride, non-corrosive, accelerating admixture may be considered if submitted prior to masonry work proceeding, is demonstrated to be compatible with the proposed mortar mix design and is used consistently throughout the project.

   2. Accelerating admixture approval is contingent upon the following requirements:

a. Laboratory testing for compatibility with mortar mix used.
b. Proportions and mix to comply with the admixture manufacturer's written instructions.
c. Admixture shall used throughout the Project so the mortar will be a consistent color.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture is required in mortar joints for all CMUs containing integral water repellent. Mortar admixture is to be by the same manufacturer as the CMU admixture. Coordinate with CMU supplier prior to mixing mortar.

1. Manufacturer's Product:

a. Acme Shield, Acme-Hardesty Co.
b. Block Plus W-10; Addiment Inc.
c. Dry-Block; W.R. Grace & Co., Construction Products Division.
d. Rheopel; Master Builders.

I. Water: Potable.

2.6 REINFORCEMENT

A. Un-coated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Multi-wythe Masonry:

1. Ladder type with perpendicular cross rods spaced not more than 16 inches o.c. and 1 side rod for each face shell of hollow masonry units more than 4 inches in width.
2. Tab type, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
3. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

1. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 153, Class B-2 coating.
2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.8 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.1875-inch- diameter, hot-dip galvanized steel wire.

2.9 FLEXIBLE ANCHORS FOR CONNECTING TO STEEL FRAME

A. Joint Stabilizing Anchors: Single-piece assembly with sliding rods held in receiver which allows vertical and horizontal movement but resists tension and compression forces perpendicular to plane of wall.

1. Receiver Section: Fabricated with stainless steel 1/32 inch sheet steel sleeves, one side embedded in masonry, the other connected to the steel frame with self tapping screws for full capacity of the anchor assembly.
2. Tie Section: Two 8 gauge stainless wires encased in plastic sleeves held in the receiver section.

a. Dur-O-Wal # D/A 2200 or approved equal.

2.10 RIGID ANCHORS

A. General: Fabricate from steel bars as follows:

1. 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
2. Finish: Hot-dip galvanized to comply with ASTM A 153.
3. Weld to structural steel frame.

2.11 INTERSECTING WALL ANCHORS

A. Exterior Walls and Interior Bearing Walls: Fabricate steel bars as follows:

1. 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
2. Finish: Hot-dip galvanized to comply with ASTM A 153.
3. Lay-up in alternate courses between adjacent intersection walls which are not interlocked or at control joint locations.

B. Interior Non-Bearing Walls and Interior Partitions:

1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

2.12 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C.

B. Post-installed Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Type: Expansion or Adhesive anchors.
   2. Type: Undercut anchors.
   3. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
   4. For Post-installed Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
   5. For Post-installed Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.13 FLASHING

A. For cavity wall construction provide flashing as specified in section 04 2200 Flexible Flashing System.

B. For Single Wythe wall construction, provide flashing as detailed in the Masonry Institute of Michigan details for 8” Single Wythe and 12” single wythe walls.
   1. Details available at https://www.masonryinfo.org/details-single-wythe/

2.14 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane.

B. Preformed Control-Joint: Material designed to fit standard sash block and to maintain lateral stability in masonry wall and designed to allow for movement.

   1. PVC: ASTM D 2287, Type PVC-65406.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Cavity Drainage Material: Wall Drainage System: 1” thick x 10” high x continuous high density polyethylene or nylon mesh in trapezoidal configuration designed to allow moisture to flow downward in the cavity. Manufacturer’s Product - Basis of Design: “The Mortar Net” by Mortar Net USA.
   1. Cavity Drainage Material Manufacturer:

      a. Mortar Break; Advanced Building Products, Inc.
      b. CavClear Masonry Mat; CavClear.
      c. Mortar Net; Mortar Net USA, Ltd.
      d. Mortar Stop; Polytite Manufacturing Corp.

E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.187-inch steel wire, hot-dip galvanized after fabrication.

1. Provide self-positioning units with either two loops or four loops as needed for number of bars indicated recessed downward into core a minimum of 1-1/4".
2. Reinforcing Bar Positioners Manufacturer:

a. Wire-Bond: Core-Lock Seated Rebar Positioner.

F. Weep Hole Vent Inserts:

1. Brick and CMU Locations: Plastic Weep Hole/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, designed to fill open head joints with outside face held back 1/4 inch (6 mm) from exterior face of masonry. Color to match grout joint color. Size of weep slot shall be width of mortar joint and brick height. Install Weep Hole Vents at not more than 24 inches spacing.

a. Weep Hole Vent Manufacturers:

1) Dur-O-Wal, Inc.
2) Advanced Building Products.
3) Wire Bond.
4) Sandell Manufacturing Company, Inc.

2.15 INSULATION

A. Cavity Wall Insulation: Extruded polystyrene board insulation: ASTM C 578 of type and density indicated. Maximum flame-spread and smoke-developed indices of 75 and 45° respectively.

1. Rigid Insulation: Extruded polystyrene insulation by "Owens-Corning High-R, CW Plus" 2-1/8 inch thick R-12.0. (R=10.0 minimum requirement).

2. Contractor's Option: "Dow-Styrofoam Cavitymate" ULTRA 2-1/8 inches thick, R=10.8.
3. (R=10.0 minimum requirement).

B. Foam Insulation: Install foam insulation in cells of concrete masonry units at all single wythe masonry exterior walls (Concessions/Restroom Building and Maintenance Building)

1. Basis of Design: Core Fill 500 Spray Polyurethane Foam

2. Install from interior side of masonry unit grout joints only.
3. Fire safety according to ASTM E-84 and ASTM E-119.
4. Density: Wet 2.5 to 0.9 lb/ft^2.
5. Water Absorption: Not to exceed 15%.
6. Shrinkage: Not less than 4%.
7. Insulation R Value: R = 20.0 minimum for 12" CMU.
8. Insualtion R-Value: R = 10.0 minimum for 8" CMU.

2.16 MASONRY CLEANERS

A. Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:

    a. “Sure Klean No. 600 Detergent”; ProSoCo, Inc.
    b. Other manufacturers complying with Specifications.

2.17 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. For exterior masonry and reinforced masonry, use portland cement-lime or mortar cement mortar.
3. For un-reinforced masonry, use portland cement-lime, masonry cement or mortar cement mortar.
4. Add cold-weather admixture (if approved) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced or un-reinforced masonry not in contact with earth, use Type M or S.
3. For mortar parge coats, use Type S.
4. For interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For veneers, use Type N. Coordinate with other architectural requirements specified herein for veneer mortars.

6. Water-Repellent Admixture: Liquid water-repellent mortar admixture is required in mortar joints for all CMUs containing integral water repellent. Mortar admixture is to be by the same manufacturer as the CMU admixture. Coordinate with CMU supplier prior to mixing mortar. Water-repellant shall be supplied according to the manufacturer’s recommendations in quantity sufficient to provide maximum water repelling qualities.

    a. Manufacturer’s Product:
        1) Acme Shield, Acme-Hardesty Co.
        2) Block Plus W-10; Addiment Inc.
        3) Dry-Block; W.R. Grace & Co., Construction Products Division.
        4) Rheopel; Master Builders.

D. Mortar/Grout Colors:

1. Provide mortar to match existing building mortar color.
2. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.

E. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 7 of the **MSJC Code** for dimensions of grout spaces and pour height. Fine grout shall not be used unless absolutely necessary to comply with Table 7.
2. Proportion grout in accordance with ASTM C 476, Paragraph 4.2.2 for specified 28-day compressive strength indicated by Article 1.4.B Performance Requirements of this specification.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

2.18 SOURCE QUALITY CONTROL

A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:

1. Payment for these services will be made by Owner.
2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

B. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.

C. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

2.19 FIELD APPLIED WATER REPELLENTS ON EXTERIOR MASONRY SURFACES

A. Provide penetrating water repellent coating at the following locations:
1. Install at all exposed CMU exterior masonry surfaces.

B. Provide clear penetrating water repellents on masonry surfaces in compliance with manufacturer's written instructions. Water repellents shall be Silanes or Siloxanes products with at least 20 % solids that can be applied to slightly damp surfaces.

1. Provide coating according to the manufacturer's recommendations and in quantity sufficient to provide maximum water repelling qualities.
2. Provide a water repellent product with at lest a ten (10) year warranty.

C. Manufacturer's Product:

1. Prime-A-Pell Plus, ChemProbe/Tnemec Co., Inc.
2. Other Manufacturer's products acceptable to the Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

B. Field apply water repellent on exterior surfaces of single-wythe masonry units' construction.

C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

E. Use full-size units without cutting. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

G. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

H. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

I. Comply with construction tolerances in the **MSJC Code** and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint

thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond and pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

F. Fill space between hollow-metal frames and masonry solidly with mortar.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

H. Install reinforcing bar positioners in locations coordinated with the vertical reinforcement spacing. Positioners shall be located accurately to install reinforcement bars in the center of the unit core or offset as specified on the Drawings.

1. Based on the size of the vertical wall reinforcement, do not exceed the following maximum vertical spacing of positioners:

   a. #3 Bar: 6’-3”
   b. #4Bar: 8’-4”
   c. #5 Bar: 10’-0”
   d. #6 Bar: 12’-6”
   e. #7 Bar: 14’-7”
   f. #8 Bar: 16’-8”

2. At lap splices, the upper reinforcement bar shall be held within the positioner adjacent to the lower bar being spliced.

I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items. Fill cores at anchors and embedded items.

J. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 8446 Section "Fire-Resistive Joint Systems."

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Set stone or cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Mortar/Grout Joint Types: Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

1. Provide tooled joints (concave) unless otherwise indicated.
2. Other joint types – flushed, raked, struck will be indicated on the Drawings.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.5 COMPOSITE MASONRY

A. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

B. Exterior Walls and Intersecting or Abutting Interior Bearing Walls::

1. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.
2. Lay-up in alternate courses between adjacent intersection walls which are not interlocked or at control joint locations.

C. Intersecting or Abutting Interior, Non-Bearing Walls and Interior Partitions:

1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units laid up in alternate courses.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. of wall area spaced not to exceed 16 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

   a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
   b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type ties to allow for differential movement regardless of whether bed joints align.

2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

   a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
   b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
   c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
2. Tape all insulation joints with Manufacturer's approved insulation tape.

3.7 MASONRY-CELL INSULATION

A. Inject foamed in-place insulation into cavities to fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each area. Close the ports after filling has been confirmed. Limit the fall of insulation to 1 story in height, but not more than 10 feet.

3.8 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

    a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches on-center vertically and 32 inches on-center horizontally.

3.10 ANCHORING MASONRY VENEERS

1. Space anchors as indicated, but not more than 16 inches o.c. vertically and horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.11 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated in Drawings but not spaced more than 20'-0" apart. Build-in related items as masonry progresses. Do not form a continuous span through movement joints. Verify control joint locations with Architect.

B. Form control joints in concrete masonry as follows using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

4. Location and spacing of control joints shall comply with industry standards.
5. Interrupt joint reinforcing each side of joint.

C. Form expansion joints in brick made from clay or shale as follows:
1. Build flanges of factory-fabricated, expansion-joint units into masonry.
2. Form open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

D. Build in horizontal, pressure-relieving joints where required and indicated; construct joints by either leaving an air space or inserting a compressible filler of width required."

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.12 LINTELS

A. Install steel lintels where indicated.

B. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

1. Where 8 inches of bearing is not available at jambs, provide additional jamb reinforcement to obtain adequate structural bearing capacity.

D. One end of lintel shall remain un-connected to allow for movement. The choice of which end to remain free is arbitrary, but if possible, it end should located adjacent to the nearest control joint.

3.13 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall.

B. Provide and install flashing and weep holes at locations in the first course of masonry above finished ground level above the foundation wall or slab; at the heads of windows, doors, and other wall openings; at window sills and at other points of support including structural floors, shelf angles, and lintels where anchored veneers are designed or installed.

3.14 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Temporary Wind Bracing

1. Provide temporary masonry wall bracing to MIOSHA Construction Safety Standards, Part 2: Masonry Wall Bracing.
2. The limited access zone shall be equal to the height of the wall to be constructed plus four feet, and shall run the entire length of the wall.
3. Provide temporary wind bracing at masonry foundation walls and at other interior and exterior masonry free-standing walls exceeding 8'-0" in height according to MOSHA maximum unsupported wall heights.
4. Bracing may be of metal or wood material capable of resisting uniform lateral wind pressures of 70 miles per hour.
5. The Contractor shall be responsible to engineer and construct temporary wind bracing system as part of the base contract.

C. Placing Reinforcement: Comply with requirements in the **MSJC Code**.

1. Install reinforcing bar positioners in locations coordinated with the vertical reinforcement spacing. Positioners shall be located accurately to install reinforcement bars in the center of the unit core or offset as specified on the Drawings.

   a. Based on the size of the vertical wall reinforcement, do not exceed the following maximum vertical spacing of positioners:

      1) #3 Bar: 6'-3"
      2) #4Bar: 8'-4"
      3) #5 Bar: 10'-0"
      4) #6 Bar: 12'-6"
      5) #7 Bar: 14'-7"
      6) #8 Bar: 16'-8"

   b. At lap splices, the upper reinforcement bar shall be held within the positioner adjacent to the lower bar being spliced.

1. Reinforcement Splices:The following lap splice requirements shall supersedes the **MSCJ Code** requirements. Specified wall heights refer to the distance from the top of foundation or slab support to the upper joist or beam bearing or slab/deck tie-in elevation. For wall heights which equal the specified limit, the lesser provision may apply. As a minimum, reinforcing bars shall be lapped according to the following:

Wall Configuration	#4 Bar	#5 Bar	#6 Bar	#7 Bar	#8 Bar
8" Walls less than 12 ft. high	20"	32	32	40	40"
8" Walls greater than 12 ft. high	40	48	56	64	72"
10" Walls less than 15 ft. high	20"	32	32	40	40"
10" Walls greater than 15 ft. high	40	48	56	64	72"
12" Walls less than 18 ft. high	20"	32	32	40	40"
12" Walls greater than 18 ft. high	40	48	56	64	72"

D. Grouting:

1. Grouting may not proceed until the grout cavity is inspected, vertical reinforcement spacing and position and lap dimensions are confirmed, and anchor size, spacing and position are confirmed.
2. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
3. General: Grout the cores of all masonry at all locations of reinforcement, bond beams, bearing plates, anchors and embedded items.
4. Comply with requirements in the **MSJC Code** for cleanouts and for grout placement, including minimum grout space, maximum lift and pour height, vibration and consolidation.
5. Unless previously approved, limit height of vertical grout lifts to not more than 60 inches.
6. Stop grout placement 1.5 inches lower than top of masonry to form a grout key between successive lifts.

3.15 FIELD QUALITY CONTROL

A. Inspectors: Construction Manager/Owner will engage a qualified, independent agency to perform field inspections and prepare inspection reports.

B. Testing: Construction Manager/Owner will engage a qualified, independent agency to perform field tests indicated below and prepare test reports.

C. Quality Assurance Level and Frequency:

1. Testing Frequency for Non-Essential Facilities - Level B Quality Assurance:

   a. Assurance level to be in accordance with Table 4 of the MSJC Specification for Masonry Structures.

   b. Frequency level for Category I, II or III buildings to be in accordance with Table 1704.5.1 Level 1 Special Inspections of the Michigan Building Code.

   c. Note: The **MSJC and Michigan Building Codes** require inspectors to observe all grouting operations <u>continuously</u>. Communication with inspector is the contractor's responsibility. Grouting shall not proceed until the inspector is onsite and has made the required pre-grouting observations.

   d. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

   e. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, locations and position of reinforcement.

D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

H. Testing agency will report results of tests and inspections promptly, in detail and in writing to Contractor, Architect and authorities having jurisdiction.

I. Remove and replace work that does not comply with specified requirements.

J. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

3.16 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with nonmetallic scrape hoes or chisels.
2. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
3. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.17 FIELD APPLIED WATER REPELLENTS ON EXTERIOR MASONRY SURFACES

A. Provide penetrating water repellent coating at the following locations:
1. Install at all exposed CMU exterior masonry surfaces.

B. Provide clear penetrating water repellents on masonry surfaces in compliance with manufacturer’s written instructions. Water repellents shall be Silanes or Siloxanes products with at lest 20 % solids that can be applied to slightly damp surfaces.

1. Provide coating according to the manufacturer’s recommendations and in quantity sufficient to provide maximum water repelling qualities.
2. Application shall be made in weather conditions no less favorable than that specified by the manufacturer.
3. Provide a water repellent product with at lest a ten (10) year warranty.

3.18 MASONRY WASTE DISPOSAL

A. Waste Disposal: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove and dispose of legally from Project site.

END OF SECTION 04 2000

SECTION 04 22 00

FLEXIBLE FLASHING SELF-ADHERING TYPE 304 STAINLESS STEEL

PART 1 - GENERAL

1.01 SUMMARY

A. Flexible stainless steel self-adhering flashing.
B. Related sections:
   1. 04 2000 Unit Masonry.

1.02 REFERENCES

A. Standards of the following as referenced:
   1. ASTM
   2. Brick Industry Association (BIA)
   3. Recycled content & Recyclability

B. Industry standards:
   1. BIA *Technical Notes on Brick Construction No. 7, Water Penetration Resistance- Design and Detailing*, August 2005.
   2. BIA *Technical Notes on Brick Construction No. 28B, Brick Veneer/Steel Stud Walls*, August 2005.

1.03 DEFINITIONS

A. Terms:
   1. Cavity wall flashing: Same as flexible flashing.
   2. Foundation sill flashing: Same as flexible flashing.
   3. Flexible flashing: Water-proof material typically used in cavity wall construction to contain and assist in the proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
   4. Head and sill flashing: Same as flexible flashing.
   5. Through-wall flashing:
      a. Generally considered the same as flexible flashing.
      b. Rare definition referred to full width cap flashing under copings or wall caps.

1.04 SUBMITTALS

A. Product data: Indicate material type, composition, thickness, and installation procedures.

B. Samples: 3" by 5" flashing material.

C. 1. **Performance Attributes**
   a. Tensile strength, >90,000 psi minimum
   b. Puncture Resistance, >2,500 pounds average
   c. When tested as manufactured, product resists growth of mold pursuant to test method ASTM-D3273.
   d. Certify the use of domestic manufactured stainless steel for flashing.
   f. Certify products contain no silica or asbestos.

1.05 QUALITY ASSURANCE

A. Qualifications:
   5. Manufacturer: Provide flashing materials by single manufacturer with not less than twenty five years of experience in manufacturing flexible flashing products.

2. Flashing materials must be able to withstand 300º F temperature without changing the long term performance of the flashing.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Flexible flashing:
1. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to compliance with specified requirements.
a. Product standard of quality:
a. York Manufacturing, Inc.; York 304 SS
b. Illinois Products, Inc.; IPCO Self-Adhesive Stainless Steel
c. STS Coatings, Inc.; Wall Guardian Self Adhering Stainless Steel Flashing
d. TK Products, Inc.; TK Self-Adhering Stainless Steel TWF
e. Vapro Shield, Inc.; VaproThru-Wall Flashing SA
f. Other products that meet the criteria in section 1.04 to 1.06.
2. Characteristics:
a. Type: stainless steel core with one uncoated (bare) stainless steel face (outward facing) with a butyl block co-polymer adhesive (inward facing).
b. b. Stainless steel: type 304, ASTM A240. Domestically sourced per DFARS 252.225-7008 and/or DFARS 252.225-7009.
c. Adhesive: block co-polymer
d. Size: Manufacturer's standard width rolls.

B. Accessories:
1. Polyether sealant:
1) York Manufacturing, Inc.; UniverSeal US-100
2) STS Coatings; GreatSeal LT-100
3) Prosoco, Inc.; R-Guard Joint Seam Sealer
2. Splice Tape:
1) York Manufacturing, Inc.; York 304 SS
2) Illinois Products, Inc.; IPCO Self Adhering Stainless Steel Flashing
3. Corner and End Dams: Use 26 gauge stainless steel pre-manufactured corners.
4. Mortar deflection: polyester strands that will not degrade and will keep weep vents from clogging with mortar.
1) York Manufacturing; Weep-Armor
2) Or approved comparable product
5. Termination bar: rigid PVC or stainless steel termination bar with sealant catch lip
1) York Manufacturing; T-96 termination bar
2) York Manufactuirng; SS Term Bar

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Install where indicated, specified, or required in accord with flashing manufacturer's written instructions and as follows.

2. Extend flashing 6" minimum beyond opening. Fold flashing ends at end of openings or horizontal flashing terminations to form end dam or use pre-manufactured units made of 26 gauge stainless steel.
3. Flashing width: Width required starting flush with outside face of exterior wythe, extending through cavity, rising height required to extend above lintel steel at least 2".
4. Splice end joints by overlapping them a minimum of 2" and seal with a compatible sealant or metal splice tape.
5. Masonry back up:
   a. Surface apply after dampproofing installation specified in Damp proofing/Air Barrier Section in accord with manufacturer's installation instructions.
   b. Fasten to masonry back-up surface at top by use of a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with compatible sealant or use a termination clamp, which is embedded in the block back up wall.
6. Concrete back up:
   a. Surface apply after damp proofing/air barrier installation specified in damp proofing Section in accord with manufacturer's installation instructions.
   b. Fasten to concrete surface at top by embedding in layer of sealant or use a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with a compatible sealant.
7. Stud back up with sheathing:
   a. Fasten to stud back-up at top by embedding in layer of sealant or use a non-corrosive termination bar and fasten it to the backer wall at the top edge of the flashing and seal the top edge with a compatible sealant.
8. Leave ready for certified compatible building felt or air barrier installation lapping flashing top installed in another Section.
9. Fold ends of flashing at end of opening to form dam; seal with polyether sealant or use purchased manufacturers preformed end dams.
10. Inside and outside corners: Make in industry accepted manner using corner and splice material or purchase manufactured corners from manufacturer.
12. Use stainless steel or copper drip edge any location that the underside of the flashing will be exposed and/or deemed necessary by the design professional or AHJ on the project. Provide hemmed edges on exposed drips.
11. Cover flashing within a few days of installation to protect it from damage from the different trades, the environment and falling debris. If flashing is left unprotected and it is punctured, torn, or has loose scrim you should contact the manufacturer for repair instructions.

3.02 SCHEDULES

A. Locations:
   1. Exterior door heads.
   2. Window heads and sills.
   3. Storefront heads.
   4. Horizontal control joints.
   5. Changes in veneer materials, vertically.
   6. Other wall openings.
   7. Other locations indicated.

END OF SECTION 04 22 00

SECTION 05 5000 - METAL FABRICATIONS

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. This Section includes the following:

1. Joist or Beam Reinforcement.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Shelf angles.
5. Loose bearing and leveling plates.
6. Steel wire mesh

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.
3. Division 05 Section "Structural Steel Framing."

1.3 DEFINITIONS

A. Action Submittals: Mandatory submittals by the Sub-Contractor which require action on the part of the General Contractor, Construction Manager and Design Professional.

1. General Contractor and Construction Manager: Review, Stamp and Forward to the Design Professional.
2. Design Professional: Review, Stamp and Return to the General Contractor or Construction Manager.

B. Informational Submittals: Mandatory submittals by the Sub-Contractor to the General Contractor, Construction Manager and Design Professional which are not returned but kept by each for their project record.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.

1.6 INFORMATIONAL SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications 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 dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.9 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.

1. Size of Channels: 1-5/8
2. Depth of Channels: As required by field and framing conditions.
3. Material: Galvanized steel complying with ASTM A 653/A 653M, commercial steel, Type B, with G90 coating.
4. Nominal thickness: As required by field and framing conditions.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

D. Lag Bolts: ASME B18.2.1.

E. Wood Screws: Flat head, ASME B18.6.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Undercut or Adhesive Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 JOIST OR BEAM REINFORCEMENT

A. General: Fabricate material in lengths manageable at the site. Splices of material shall be made with full penetration welds or other as reviewed in advance by the Engineer of Record.

1. Coordinate material lengths with access logistics. Headroom or other access limitations may require Substitutions of plates or shapes with other plates or shapes of nominally equal weight. Substitutions must be reviewed by the Engineer of Record prior to fabrication.

B. Field verify web and chord configurations of existing joists to be reinforced. Configurations indicated on the Drawings are diagrammatic only which indicate only the extent of web and chord reinforcement. Other configurations may exist, i.e. panel dimensions may be different and there may be more verticals and diagonals than shown on the Drawings, but nonetheless all web members within the zone indicated are to be reinforced.

1. The shape of the existing chords or web members may require Substitutions of plates or shapes with other plates or shapes of nominally equal weight. Substitutions must be reviewed by the Engineer of Record prior to fabrication.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts if units are installed after concrete is placed.

C. Fabricate supports for ceiling-hung toilet compartments from continuous steel beams or channels of sizes indicated with attached bearing plates, anchors, and braces as indicated.

D. Galvanize miscellaneous framing and supports where exposed to the elements such at the Building Exterior as well as interior locations which are humid or corrosive.

2.9 LOOSE STEEL LINTELS

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

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 4 inches, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.10 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

2.11 LOOSE BEARING AND LEVELING PLATES

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

B. Galvanize plates after fabrication.

2.12 STEEL WIRE MESH

A. Manufacturer: McNichols

B. Product: Square, welded wire mesh.
1. Size: 2” x 2”
2. Primary material: Galvanized steel
3. Alloy, grade or Type: Hot Dipped (HD)
4. Wire diameter/gauge: 0.120” (11 gauge)

2.13 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING JOIST AND BEAM REINFORCEMENT

A. General: Install reinforcement material to comply with the strengthening requirements indicated on the Design Drawings.

B. Prior to welding new material to existing surfaces, thoroughly clean all surfaces to remove rust, paint, dirt, mill scale or other foreign matter in the weld area.

C. All field welds shall be cleaned of slag and scale and inspected by the site quality assurance inspector.

D. Prime paint welds after welding passes inspection.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use non-shrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 5000

SECTION 07 9200 - JOINT SEALANTS

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. This Section includes joint sealants for the following applications:

1. Exterior joints in, but not limited to the following vertical surfaces and horizontal non-traffic surfaces:
    a. Construction joints in cast-in-place concrete.
    b. Control and expansion joints in unit masonry.
    c. Perimeter joints between frames of doors, windows, and louvers.
2. Exterior joints in but not limited to the following horizontal Pedestrian and Vehicular traffic surfaces:
    a. Isolation and contraction joints in cast-in-place concrete slabs.
3. Interior joints in, but not limited to the following vertical surfaces and horizontal non-traffic surfaces:
    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings.
    c. Tile control and expansion joints.
    d. Vertical joints on exposed surfaces of interior unit masonry, concrete, walls, and partitions.
    e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    g. All joints between dissimilar materials.
4. Interior joints in but not limited to the following horizontal traffic surfaces:
    a. Isolation joints in cast-in-place concrete slabs.
    b. Control and expansion joints in tile flooring.

B. Related Sections include the following:

1. Division 03 3000 Section “Cast-in-Place Concrete” for joints in concrete.
2. Division 04 2000 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
3. Division 09 2900 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
4. Division 095123 Section "Acoustical Tile Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

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

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer in continuous business at least three (3) years who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

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

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below **40 deg F (5 deg C)**.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer's Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

1. Manufacturer's sealant products are indicated for Manufacturer's "Basis of Design" only. Other manufacturer's products complying to specified criteria comparable to the Basis of Design Product will be reviewed for acceptability.

B. Silicone Sealants (Low-Modulus)

1. Dow Corning Corp.
2. GE Silicones
3. Pecora

C. Polyurethane Sealants

1. Sika Corp.
2. Pecora
3. Sonneborn Building Products
4. Tremco

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

1. Vertical Joint Sealant Color: Provide color to match as closely as possible the brick or Masonry unit (CMU) color. Where two brick colors are in the same façade, provide sealant colors to closely match each brick area. Submit samples for selection by Architect.
2. Horizontal Joint Sealant Color: Provide color to match the grout color.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to

ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.4 SEALANT TYPES

A. Manufacturer's products indicated are Basis of Design. Other manufacturers products complying to specified criteria will be considered.

B. Silicone Sealant for Exterior: ASTM C 920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.

1. Product: 790 manufactured by Dow Corning Building Sealant.
2. Movement Capability: Plus 100 percent, minus 25 percent.
3. Service Temperature Range: -65 to 180 degrees F (-54 to 82 degrees C).
4. Shore A Hardness Range: 15 to 35.
5. Location Applications:
    a. Exterior joints.
    b. Control, expansion and soft joints in masonry.
    c. Joints between concrete and other materials.
    d. Joints between metal frames and other materials.
    e. Butt glazing.
    f. Joints between precast architectural and precast structural concrete joints with precast concrete and other materials.

C. Fixtures/Tile Sealant: Silicone; ASTM C 920, Uses M, NT, O and A; single component, mildew resistant.

1. Product: 786 Mildew Silicone Sealant manufactured by Dow Corning.
2. Product: Sanitary 1700 manufactured by GE Silicones.
3. Location Applications: Interior uses only.
    a. Joints between plumbing fixtures and floor and wall surfaces.
    b. Joints between kitchen and bath counter tops and wall surfaces.
    c. Joints between counter tops (with sinks) and wall surfaces.
    d. Color to match adjacent materials.

D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, single component, paintable.

1. Product: Sonolac manufactured by Sonneborn Building Products Div.
2. Product: Tremco Acrylic Latex 834 manufactured by Tremco Inc.
3. Product: AC-20 manufactured by Pecora Corp.
4. Location Applications:
    a. Interior wall and ceiling control joints.
    b. Joints between door and window frames and wall surfaces.
    c. Joints between casework and adjacent surfaces.
    d. Other interior joints for which no other type of sealant is indicated.

E. Interior Floor Joint Sealant: Polyurethane, self-leveling: ASTM C 920, Grade P, Class 25, Uses T, M, O and A, multi-component.

1. Approved by manufacturer for wide joints up to 1-1/2 inches.
2. Product: SL2 manufactured by Sonneborn Building Products Div.
3. Location Applications:
    a. Expansion joints in floors.

2.5 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Manufacturer’s Products:
    a. Dow Corning Corporation; 123 Silicone Seal.
    b. GE Silicones; UltraSpan US1100.
    c. Pecora Corporation; Sil-Span.
    d. Tremco; Spectrem Ez Seal.

B. Preformed Foam Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in precompressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:

1. Manufacturer’s Products:
    a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
    b. illbruck Sealant Systems, Inc.; Wilseal 600.
    c. Polytite Manufacturing Corporation; Polytite B.
    d. Polytite Manufacturing Corporation; Polytite Standard.
    e. Sandell Manufacturing Co., Inc.; Polyseal.

2. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
    a. Density: Manufacturer's standard.

2.6 PREFORMED TAPE SEALANTS

A. Back-Bedding Mastic Tape Sealant: Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.

B. Expanded Cellular Tape Sealant: Closed-cell, PVC foam tape sealant; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800.

2.7 JOINT-SEALANT BACKING (BACKER ROD)

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

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

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

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates.

B. Joint Priming: Prime joint substrates, where required, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform

beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint, unless otherwise indicated.

H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

I. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

J. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

3.4 CLEANING

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

3.5 PROTECTION

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

END OF SECTION 07 9200

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hollow doors and frames.
2. Sidelight frames
3. Borrowed-light frames.
4. Fire-rated door and frame assemblies.
5. Louvers in hollow metal doors

B. Related Sections include the following:

1. Division 04 2000 Section "Unit Masonry" for installing anchors and grouting frames in masonry construction.
2. Division 08 7200 Section "Door Hardware" for door hardware and weather stripping.
3. Division 08 8000 Section "Glazing" for glass in glazed openings in doors and frames.
4. Division 09 2900 Section "Gypsum Board" for spot-grouting frames installed in steel-framed gypsum board partitions.
5. Division 09 9100 Section "Painting" for field painting factory-primed doors and frames.

1.3 DEFINITIONS

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

B. Steel Door Institute (SDI): SDI Level for minimum steel sheet thickness for door faces.

1.4 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:

1. Elevations of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Frame details for each frame type including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Coordination of glazing frames and stops with glass and glazing requirements.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Oversize Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

1.5 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Remove and replace damaged items.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation and ventilation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Hollow Doors and Frames:

a. Amweld Building Products, Inc.
b. Ceco Door Products; a United Dominion Company.
c. Detroit Door.
d. Pioneer Industries Inc.
e. Republic Builders Products.
f. Steelcraft; a division of Ingersoll-Rand.
g. Mesker Door Incorporated.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.3 HOLLOW METAL DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated per SDI level ratings.

B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level-2 and Physical Performance Level-B (Heavy Duty), Model-1 (Full Flush).
2. Steel thickness: 18 gauge, fully welded unit.
3. Fire-rated doors and door frames where indicated in Schedule. Provide UL -label.

C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level-3 and Physical Performance Level-A (Extra Heavy Duty), Model-2 (Seamless).
2. Steel thickness: galvanized 16 gauge, fully welded unit.

D. Vision-Lite Systems: Manufacturer's standard kits consisting of glass-lite moldings to accommodate glass thickness and size of vision-lite indicated

2.4 FRAMES

A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frame minimum steel thickness:

1. Interior – 18 gauge
2. Exterior – 16 gauge (galvanized).
3. Frames spaced 48” and wider – 14 gauge.
4. Fire Rating Frames: Provide UL -label the same rating as indicated for the door.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

D. Plaster Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

E. Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet.

1. Wall Anchors in Masonry Construction: 0.177-inch- (4.5-mm-) diameter, steel wire complying with ASTM A 510 (ASTM A 510M) may be used in place of steel sheet.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

G. Provide ½" thick by 1-3/4" wide full height filler strip of styrofoam behind hinge jamb to allow for drilling and topping for continuous hinge in field, where continuous hinges are indicated..

H. Grout-filled Frames and Door Frames:

1. Where frames are indicated to be grouted or grout-filled, the inside of the frame must be installed with an asphaltic paint or an application of water-repellent sealer to prevent corrosive action to the steel frame.

2.5 LOUVERS IN HOLLOW METAL DOORS

1. General: Provide clear anodized aluminum louvers in hollow metal door frames as indicated.

2. Louver Basis of Design: Price Transfer/Door Grilles type ATG 1 with 1 ¼" flat border on one side only. Concealed fastening.

3. Louvers to be mounted to classroom side of door.

4. Provide louvers in dimensions indicated with 50% free opening.

2.6 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (1.3-mm-) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

C. Interior Door and Panel Faces: Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from the following material:

1. Cold-rolled steel sheet, unless otherwise indicated.
2. Metallic-coated steel sheet where indicated.

D. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:

1. Resin-impregnated kraft/paper honeycomb.
2. Polyurethane.
3. Polystyrene.

4. Vertical steel stiffeners.
5. Rigid mineral-fiber board.

E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 1/4 inch (6.4 mm) at bottom to flooring or thresholds. Coordinate with other trades.

F. Clearances for Fire-Rated Doors: As required by NFPA 80.

G. Single-Acting, Door-Edge Profile: Beveled edge, unless square edge is indicated.

H. Double-Acting, Door-Edge Profile: Round vertical edges with 2-1/8-inch (54-mm) radius.

I. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

J. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

K. Exposed Fasteners: Provide countersunk flat or oval heads for exposed screws and bolts where acceptable by the Architect.

L. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better.

M. Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested according to ASTM E 1408, and classified according to ASTM E 413.

1. Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or greater.

N. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.

O. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
3. Provide welded frames with temporary spreader bars.
4. Provide terminated stops where indicated.

P. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

Q. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

R. Glazing Stops: Manufacturer's standard, formed from 0.032-inch- (0.8-mm-) thick steel sheet.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.

S. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.7 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

B. Factory-Applied Paint Finish: Manufacturer's standard, factory-applied paint finish complying with ANSI A250.3 for performance and acceptance criteria.

1. Finished paint coat will be field applied unless otherwise noted.
2. Refer to drawing schedules for color and finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
4. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
5. For existing gypsum board partitions, knock-down, drywall slip-on frames are acceptable.
6. Install fire-rated frames according to NFPA 80.
7. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

1. Fire-Rated Doors: Install within clearances specified in NFPA 80.
2. Smoke-Control Doors: Install to comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08 1113

SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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, but not limited to the following:

1. Exterior and interior storefront framing.
2. Storefront entrance doors.
3. Storefront door hardware.
4. Aluminum finishes.

B. Related Sections:

1. Division 07 9200 Section "Joint Sealants" as part of the entrance system.
2. Division 08 7200 Section "Door Hardware."
3. Division 08 8000 Section "Glazing" (glass) for types of glass.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Provide a thermally-improved Aluminum-framed systems that will withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.

3. Failure includes, but not limited to the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
d. Glazing-to-glazing contact.
e. Noise or vibration created by wind and by thermal and structural movements.
f. Loosening or weakening of fasteners, attachments, and other components.

g. Sealant failure.
h. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads:

a. Basic Wind Speed: Minimum **85 mph (38 m/s)** and as indicated.

b. Positive Wind Load: 30 lbs./sf (1436 Pa) minimum.

c. Negative Wind Load: 30 lbs/sf (1436 Pa) minimum.

2. Dead Loads: Provide Store Front entrance systems that will not deflect an amount which will reduce bite below 75 % of design dimensions when carrying full dead load.

3. Live Loads: Provide Store Front entrance systems, including anchorage, that accommodate live loads indicated without failure of materials or permanent deformation.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886.

G. Story Drift: Provide aluminum-framed systems that accommodate design displacement of adjacent stories indicated.

1. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.

H. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of **0.06 cfm/sq. ft. (0.03 L/s per sq. m)** of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of **6.24 lbf/sq. ft. (300 Pa)**.

I. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa)**.

J. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa)**.

1. Maximum Water Leakage: According to AAMA 501.1 and no uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

K. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of **180 deg F (82 deg C)**.
    b. Low Exterior Ambient-Air Temperature: **0 deg F (minus 18 deg C)**.

3. Interior Ambient-Air Temperature: **75 deg F (24 deg C)**.

L. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

M. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than **0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K)** when tested according to AAMA 1503.

N. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:

1. Sound Transmission Class (STC): Minimum STC = 30 rating when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

O. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.

2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

P. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

E. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

G. Qualification Data: For qualified Installer approved by the manufacturer.

H. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

J. Field quality-control reports.

K. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

D. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.

E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

F. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

G. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

H. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.

I. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

J. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

K. 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 mockup of typical wall area as directed by Architect.
2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

L. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Adhesive or cohesive sealant failures.
   e. Water leakage through fixed glazing and framing areas.
   f. Failure of operating components.

2. Warranty Period: Two (2) years from Contractor’s date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: Five (5) years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six (6) months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Product – Basis of Design:

1. Manufacturers: Kawneer;
2. Design Series: Store Front # 451T.
3. Section Size: 2” x 4 ½”
4. Color/Finish: Dark Bronze

B. Manufacturers: Subject to compliance with requirements, provide the Basis-of-Design product or comparable product by one of the following:

1. Amarlite Architectural Products.
2. Arcadia, Inc.
3. Cross Aluminum Products.
4. EFCO Corporation.
5. Kawneer North America; an Alcoa company.
6. TRACO.
7. Tubelite.
8. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
9. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.

2. Glazing System: Retained mechanically with gaskets on four sides.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials or dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.

a. Color: Black unless as selected by Architect from manufacturer's full range of colors.

2. Weather-seal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weather-seal sealant, and aluminum-framed-system manufacturers for this use.

a. Color: Matching structural sealant.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: **1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-)** thick (unless otherwise indicated) extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

   a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Wide stile; 5-inch (127-mm) nominal width, unless otherwise indicated.

   a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

   a. Provide nonremovable glazing stops on outside of door.

B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products, products equivalent in function and comparable in quality to named products and products complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

   a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
   b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

B. Opening-Force Requirements:

1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf (67 N) for not more than 3 seconds.
2. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

C. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf, unless otherwise indicated.

D. Butt Hinges: BHMA A156.1, Grade 1, radius corner, unless otherwise indicated.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:
    a. For doors up to **87 inches (2210 mm)** high, provide 3 hinges per leaf.
    b. For doors more than **87 and up to 120 inches (2210 and up to 3048 mm)** high, provide 4 hinges per leaf.

E. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

G. Manual Flush Bolts: BHMA A156.16, Grade 1.

H. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

I. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

J. Cylinders: As specified in Division 08 Section "Door Hardware."

1. Keying: No master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

K. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

L. Operating Trim: BHMA A156.6.

M. Removable Mullions (where indicated): BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

N. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

O. Surface-Mounted Holders: BHMA A156.16, Grade 1.

P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

Q. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

S. Silencers: BHMA A156.16, Grade 1.

T. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

U. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 9200 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Storefront Framing: Fabricate components for assembly using shear-block system, head-and-sill-receptor system with shear blocks at intermediate horizontal members.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Aluminum Members: ASTM B 221 for extrusions, ASTM B 209 for sheet/plate; alloy and temper recommended by the manufacturer for the strength required, for corrosion resistance, and for the finish required.

1. Type AL-2 Color Anodized Aluminum Finish – Dark Bronze

Class-1; Color anodized finish: AA-M12C22A42/A44
(Nonspecular, as-fabricated Mechanical finish; medium etched matte chemical finish; integral or electrolytically deposited color, Architectural Class-1 anodic coating minimum 0.7 mil thick). Comply with AAMA 611.

B. Fluoropolymer Coating (Kynar- 500): Basis of Design based on PPG Kynar colors.

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

a. PPG Industries, Inc., Pittsburgh Paints.
b. Devoe Coatings, ICA Devoe.
c. Duron Paints and Wall Coverings.
d. ICI Dulux Paints, Glidden Co.
e. Martin Senour Paint, Div. Sherwin Williams.
f. Benjamin Moore and Co.
g. Pratt Lambert.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate structural-sealant-glazed systems.

B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks.

C. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weather-tight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 8000 Section "Glazing."

1. Structural-Sealant Glazing:

a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
b. Install weather-seal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weather-tight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weather-tight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: When requested by Owner, engage a qualified independent testing and inspecting agency to perform field tests and inspections.

B. Testing Services: When requested by Owner, provide testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.

   a. Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C 1401, Appendix X2, shall be used.

      1) A minimum of two (2) areas on each building face shall be tested.
      2) Repair installation areas damaged by testing.

2. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C 1401.
3. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. (0.03 L/s per sq. m), of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of **6.24 lbf/sq. ft. (300 Pa)**.

   a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10 percent, 35 percent, and 70 percent completion.

4. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum **uniform and cyclic** static-air-pressure difference of **0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. (200 Pa)**, and shall not evidence water penetration.

   a. Test Area: One bay wide, but less than 30 feet (9m), by 1 story of aluminum-framed systems.
   b. A minimum of two (2) tests in areas as directed by Architect.

5. Water Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

   a. Test Area: A minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

3.6 ENTRANCE DOOR HARDWARE SETS

Door Hardware Set No. Refer to information indicated on the Drawings.

END OF SECTION 08 4113

SECTION 08 5113 - ALUMINUM WINDOWS

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. This Section includes fixed and operable aluminum-framed windows for exterior locations.

1. Single-hung windows.

B. Related Sections include the following:

1. Division 08 4113 Section "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
2. Division 08 8000 Section “Glazing (Glass).”

1.3 DEFINITIONS

A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:

1. AW: Architectural.
2. HC: Heavy Commercial.
3. C: Commercial.
4. LC: Light Commercial.
5. R: Residential.

B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:

1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:

1. Minimum size required by AAMA/NWWDA 101/I.S.2.
2. Minimum size required by gateway performance requirements for determining compliance with AAMA/NWWDA 101/I.S.2 for both gateway performance requirements and optional performance grades.
3. Window Opening Force: Provide mechanisms and other concealed window opening features capable of lifting or sliding the operable window to open with a maximum force of not more than 30 lbs.

B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1. Performance Class: **[R] [LC] [C] [HC] [AW].** Class-C, unless otherwise noted.
2. Performance Grade: Minimum for performance class indicated.
3. Performance Grade: 40.
4. Exception to AAMA/NWWDA 101/I.S.2: In addition to requirements for performance class and performance grade, design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or ¾ inch (19 mm), whichever is less, at design pressure based on the following:

    a. Testing performed according to AAMA/NWWDA 101/I.S.2. Uniform Load Deflection Test or structural computations.

C. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

    a. Basic Wind Speed: **85 mph (38 m/s)** and as indicated.
    b. Design Pressure 25 lbf/sq. ft.

2. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

D. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 or AAMA 506 and requirements of authorities having jurisdiction.

E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): **120 deg F (67 deg C)**, ambient**; 180 deg F (100 deg C)** material surfaces.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Thermal-break details.
7. Glazing details.
8. Window System Operators: Show locations, mounting, and details for installing operator components and controls.

C. Samples for Verification: For aluminum windows and components required, prepared on Samples of size indicated below.

1. Main Framing Member: 12-inch- (300-mm-) long, full-size sections of extrusions with factory-applied color finish.
2. Window Corner Fabrication: 12-by-12-inch- (300-by-300-mm-) long, full-size window corner including full-size sections of extrusions with factory-applied color finish, weather stripping, and glazing.
3. Operable Window: Full-size unit with factory-applied finish.
4. Hardware: Full-size units with factory-applied finishes.
5. Weather Stripping: 12-inch- (300-mm-) long sections.

D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

E. Qualification Data: For Installer and manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

G. Maintenance Data: For operable window sash, operating hardware, weather stripping, window system operators and finishes to include in maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of data for aluminum windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1. Provide AAMA or WDMA-certified aluminum windows with an attached label.

F. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

G. Mockups: Build in-place mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 3100 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum 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 aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
c. Faulty operation of movable sash and hardware.

d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window Unit Assembly: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Product – Basis-of-Design:

1. Manufacturer: Quaker Window
2. Model Series: T500 SH single-hung
3. Window Type: As indicated on drawings
4. Size: As indicated on drawings
5. Color / Finish: Dark Bronze
6. Screen: Black anodized aluminum wire-fabric on exterior
7. Insulated Glass with Internal Blinds

B. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following manufacturers:

1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
2. EFCO Corporation.
3. Graham Architectural Products Corp.
4. Heritage Window and Door, Inc.
5. Kawneer; an Alcoa Company.
6. Litex Incorporated.
7. Peerless Products Inc.
8. Thermal Windows, Inc.
9. TRACO.
10. Wausau Window and Wall Systems.
11. Winco Window Company.
12. Vistawall/Moduline.
13. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and sash members.

B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.

1. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
2. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
3. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.

F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

G. Replaceable Weather Seals: Comply with AAMA 701/702.

H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOW

A. Window Type: **As Specified or as indicated on Drawings.**

B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS.

1. Performance Class: **C**, Class-C, unless otherwise noted.

C. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 52.

D. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503, ASTM E 1423 or NFRC 100.

1. U-Factor: **0.60 Btu/sq. ft. x h x deg F (3.4 W/sq. m x K)** or less.

E. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC maximum of 0.40, determined according to NFRC 200 procedures.

F. Sound Transmission Class (STC): Provide glazed windows rated for not less than 35 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

G. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.

1. Maximum Rate: 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 1.57 lbf/sq. ft. (75 Pa).

H. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.

1. Test Pressure: 20 percent of positive design pressure, but not more than 15 lbf/sq. ft. (720 Pa).

I. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

1. Manual Force: Maximum 30 pound pressure of lifting to open or close operating window.

2.4 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

1. Glass Types: Refer to Drawings.

B. Dual-Action Windows: Provide pivoting unit for double glazing, constructed of one sheet of glass in a removable sash for access to interior of unit, installed with airtight gaskets.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals.

1. Refer to Door Hardware Schedule indicated in the Drawings.

B. Counterbalancing Mechanism: Comply with AAMA 902.

1. Sash Balance: Concealed, **ultralift spring type capable of lifting 70 percent of sash weight**, of size and capacity to hold sash stationary at any open position. Manual lifting or sliding weight not to exceed 15 pounds pressure.

C. Sill Cap/Track: **Extruded-aluminum track with natural anodized finish**, **Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color**, of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.

D. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

E. Roller Assemblies: Low-friction design.

F. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.

G. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.

1. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.

H. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.

1. Locking mechanism and handles for manual operation.
2. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

I. Limit Devices: Provide safety limit devices designed to restrict sash or ventilator opening.

J. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches (1500 mm) above floor; 1 pole operator and pole hanger per room that has operable windows more than 72 inches (1800 mm) above floor.

K. Window Hardware: Provide necessary and appropriate hardware for the window type specified for the Project.

2.6 INSECT SCREENS AND FRAMES

A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on **outside** of window for sliding and hung window systems and on inside of window for casement systems. provide for each operable exterior sash or ventilator.

1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows, **Architectural C-24** or **Monumental M-32** class.

B. Stainless-Steel Insect Screen Frames: Fabricate frames of nonmagnetic stainless-steel members of 0.020-inch (0.5-mm) minimum wall thickness, with mitered or coped joints or corner extrusions, concealed fasteners, adjustable rollers, and removable PVC spline/anchor concealing edge of frame. Finish frames with No. 2B, bright mill finish.

1. Insect Screen: Manufacturer's standard stainless steel fabric.

C. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners and removable PVC spline/anchor concealing edge of frame.

1. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch (0.28-mm-) diameter, coated aluminum wire.

a. Wire-Fabric Finish: [Natural bright] [Charcoal gray] [Black]

D. Glass-Fiber Mesh Fabric: Provide **18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm)** mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656.

1. Mesh Color: [Charcoal gray] [Silver gray] [Aquamarine] <Insert color>.

E. Wickets (where required): Provide **sliding** or **hinged** wickets, framed and trimmed for a tight fit and for durability during handling. Coordinate with surrounding elements to insure proper operation.

2.7 ACCESSORIES

A. Integral Louver Blinds: Provide remotely operated horizontal louver blinds in the space between two panes of glass. Construct blinds of aluminum slats, approximately 1 inch (25 mm) wide, with polyester fiber cords, equipped for tilting, raising, and lowering by standard operating hardware located on inside face of sash.

B. Exterior Louver Units: Manually adjustable, extruded-aluminum, solar-shade louver units; of type recommended by manufacturer for application over operable or fixed windows. Provide main extrusion members of 0.062-inch (1.6-mm) minimum wall thickness.

1. Operator: Crank-type gang operator, operable from inside building, designed to rotate louver blades simultaneously at least 80 degrees and to lock units in closed position; one operator per each louver unit. Form unit framing or mounting without interfering with insect screens.

2.8 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.

3. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.

D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

1. Horizontal-Sliding Windows: Provide operable sash with a double row of sliding weather stripping in horizontal rails and single- or double-row weather stripping in meeting or jamb stiles, as required to meet specified performance requirements. Provide compression-type weather stripping at perimeter of each movable panel where sliding-type weather stripping is not appropriate.
2. Vertically Pivoted Windows: Provide double-row weather stripping.

E. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

F. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

G. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

H. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

I. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.

J. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Type AL-1: Class II, Clear Anodic Finish: Natural Clear Aluminum Satin Finish.

1. AA-M12C22A31 (Mechanical Finish): nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

C. Type AL-2: Class I, Color Anodic Finish: Bronze

1. AA-M12C22A42/A44 (Mechanical Finish): nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

2. Color and Finish: Architect selected from Manufacturer's full range.

D. Type AL-3: Kynar (Fluoropolymer Coating):

1. High-Performance Organic Finish (2-Coat or 3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than **70** percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with **AAMA 2604** or **AAMA 2605** and with coating and resin manufacturers' written instructions.

Color and Finish: Architect selected from Manufacturer's full range.

2. Fluoropolymer Coating (Kynar- 500): Basis of Design based on PPG Kynar colors.

3. Color and Finish: Architect selected from Manufacturer's full range.

4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed.

a. PPG Industries, Inc., Pittsburgh Paints.
b. Devoe Coatings, ICA Devoe.
c. Duron Paints and Wall Coverings.
d. ICI Dulux Paints, Glidden Co.
e. Martin Senour Paint, Div. Sherwin Williams.
f. Benjamin Moore and Co.
g. Pratt Lambert.

E. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish): cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating and Organic Coating.
Apply Baked-Enamel complying with paint manufacturer's written instructions.

1. Organic Coating: Thermosetting, modified-acrylic or polyester enamel primer topcoat system complying with AAMA 2603, except with minimum dry film thickness of 1.5 mils (0.04 mm) medium gloss.

2. Color and Finish: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, accurate locations of connections to building electrical system; and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Connect automatic operators to building electrical system.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather-tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. 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.

E. Protect window 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.

END OF SECTION 08 5113

08 7200 DOOR HARDWARE

PART 1 - GENERAL

1.1 Refer to "General and Special Conditions", and "Instructions to Bidders", Division 1 of Specifications. Requirements of these Sections and the project drawings shall govern work in this section.

1.2 Work Included:

A. Furnish all items of Finish Hardware specified, scheduled, shown or required herein except those items specifically excluded from this section of the specification.

B. Related work:

1. Division 00 00 00 – Procurement and Contracting Requirements
2. Division 01 00 00 – General Requirements
3. Division 06 00 00 – Wood, Plastics, and Composites
4. Division 08 00 00 – Openings
5. Division 10 00 00 – Specialties
6. Division 11 00 00 – Equipment
7. Division 26 00 00 – Electrical
8. Division 27 00 00 – Communications
9. Division 28 00 00 – Electronic Safety and Security

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere, unless specifically listed in the hardware sets:

1. Cabinet Hardware.
2. Signs, except as noted.
3. Folding partitions, except cylinders where detailed.
4. Sliding aluminum doors
5. Chain link and wire mesh doors and gates
6. Access doors and panels
7. Overhead and Coiling doors

1.3 Quality Assurance

A. Requirements of Regulatory Agencies:

1. Furnish finish hardware to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
2. Furnish finish hardware to comply with the requirements of the regulations for public building accommodations for physically handicapped persons of the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

3. Provide hardware for fire-rated openings in compliance with NFPA 80 and state and local building code requirements. Provide only hardware that has been tested and listed by UL for types and sizes of doors required and complies with requirements of door and door frame labels.

B. Hardware Supplier:

1. Shall be an established firm dealing in contract builders' hardware. He must have adequate inventory, qualified personnel on staff and be located within 100 miles of the project. The distributor must be a factory-authorized dealer for all materials required. The supplier shall be or have in employment an Architectural Hardware Consultant (AHC).

C. Electrified Door Hardware Supplier:

1. Shall be an experienced door hardware supplier who has completed projects with electrified door hardware 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, and who is acceptable to manufacturer of primary materials.
2. Shall prepare 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.
3. Shall have experience in providing consulting services for electrified door hardware installations.

D. Pre-installation Meeting:

1. Before hardware installation, General Contractor/Construction Manager will request a hardware installation meeting be conducted on the installation of hardware; specifically that of locksets, closers, exit devices, overhead stops and coordinators. Manufacturer's representatives of the above products, in conjunction with the hardware supplier for the project, shall conduct the meeting. Meeting to be held at job site and attended by installers of hardware for aluminum, hollow metal and wood doors. Meeting to address proper coordination and installation of hardware, per finish hardware schedule for this specific project, by using installation manuals, hardware schedule, templates, physical product samples and installation videos.
2. When any electrical or pneumatic hardware is specified this meeting shall also include the following trades/installers: Electrical, Security, Alarm systems and Architect.
3. Convene one week or more prior to commencing work of this Section.
4. The Hardware Supplier shall include the cost of this meeting in his proposal.

E. Manufacturer:

1. Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
2. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.

1.4 Submittals:

A. Hardware Schedule

1. Submit number of Hardware Schedules as directed in Division 1.

2. Follow guidelines established in Door & Hardware Institute Handbook (DHI) Sequence and Format for the Hardware Schedule unless noted otherwise.
3. Schedule will include the following:
   a. Door Index including opening numbers and the assigned Finish Hardware set.
   b. Preface sheet listing category only and manufacturer's names of items being furnished as follows:

CATEGORY	SPECIFIED	SCHEDULED
Hinges	Manufacturer A	Manufacturer B
Lock sets	Manufacturer X	Manufacturer X
Kick Plates	Open	Manufacturer Z

   c. Hardware Locations: Refer to Article 3.1 B.2 Locations.
   d. Opening Description: Single or pair, number, room locations, hand, active leaf, degree of swing, size, door material, frame material, and UL listing.
   e. Hardware Description: Quantity, category, product number, fasteners, and finish.
   f. Headings that refer to the specified Hardware Set Numbers.
   g. Scheduling Sequence shown in Hardware Sets.
   h. Product data of each hardware item, and shop drawings where required, for special conditions and specialty hardware.
   i. Electrified Hardware system operation description.
   j. "Vertical" scheduling format only. "Horizontal" schedules will be returned "Not Approved."
   k. Typed Copy.
   l. Double-Spacing.
   m. 8-1/2 x 11 inch sheets
   n. U.S. Standard Finish symbols or BHMA Finish symbols.

B. Product Data:

1. Submit, in booklet form Manufacturers Catalog cut sheets of scheduled hardware.
2. Submit product data with hardware schedule.

C. Samples:

1. Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample, if required, of each type of exposed hardware unit, finished as required and tagged with full description for coordination with schedule.
2. Samples will be returned to the supplier. Units, which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.

D. Key Schedule:

1. Submit detailed schedule indicating clearly how the Owner's final keying instructions have been followed.
2. Submit as a separate schedule.

E. Electrified Hardware Drawings:

1. Submit elevation drawings showing relationship of all electrical hardware components to door and frame. Indicate number and gage of wires required.
   a. Include wiring drawing showing point to point wire hook up for all components.

b. Include system operations descriptions for each type of opening; describe each possible condition.

F. Submit to General Contractor/Construction Manager, the factory order acknowledgement numbers for the various hardware items to be used on the project. The factory order acknowledgement numbers shall help to facilitate and expedite any service that may be required on a particular hardware item. General Contractor/Construction Manager shall keep these order acknowledgement numbers on file in the construction trailer.

1.5 Product Delivery, Storage, and Handling:

A. Label each item of hardware with the appropriate door number and Hardware Schedule heading number, and deliver to the installer so designated by the contractor.

1.6 Existing Conditions:

A. Where existing doors, frames and/or hardware are to remain, conditions, preparations and functions shall be field verified to confirm compatibility with specified hardware. Where any incompatibility is discovered, notify the contractor or construction manager immediately and provide a suggested solution based on industry standard business practices.

1.7 Warranties:

A. Refer to Division 1 for warranty requirements.

B. Special Warranty Periods:

1. Closers shall carry manufacturer's 30-year warranty against manufacturing defects and workmanship.
2. Locksets shall carry manufacturer's 3-year warranty against manufacturing defects and workmanship.
3. Exit Devices shall carry manufacturer's 3-year warranty against manufacturing defects and workmanship.
4. Continuous gear hinges shall carry manufacturer's lifetime warranty to be free from defects in material and workmanship.
5. Balance of items shall carry a manufacturer's 1-year warranty against manufacturing defects and workmanship.

C. During the warranty period, replace defective work, including labor, materials and other costs incidental to the work.

PART 2 - PRODUCT

2.1 Furnish each category with the products of only one manufacturer unless specified otherwise; this requirement is mandatory whether various manufacturers are listed or not.

2.2 Provide the products of manufacturer designated or if more than one manufacturer is listed, the comparable product of one of the other manufacturers listed. Where only one manufacturer or product is listed, it is understood that this is the owner's Building Standard and "no substitution" is allowed.

A. Continuous Gear Hinge:

1. 6063-T6 aluminum alloy, anodized finish (cap on entire hinge painted if specified). Manufacture to template, uncut hinges non-handed, pinless assembly, three interlocking extrusions, full height of door and frame, fasteners 410 stainless steel plated and hardened. Anodizing of material shall be done after fabrication of components so that all bearing slots are anodized.
2. Length: 1" less than door opening height. Fastener 12-24 x 1/2" #3 Phillips keen form stainless steel self-tapping at aluminum and hollow metal doors, 12- 1/2" #3 Philips, flathead full thread at wood doors.
3. Furnish fire rated hinges "FR" at labeled openings.
4. Numbers used are Ives.
   a. For Aluminum frames;
      1) Ives 112XY/157XY
      2) Equal products by Pemko & Select will also be accepted.
   b. For hollow metal frames;
      1) Ives 224XY/157XY
      2) Equal products by Pemko & Select will also be accepted.

B. Locksets and Latchsets - Mortise Type:

1. Locksets shall be manufactured from heavy gauge steel, minimum lockcase thickness 1/8", containing components of steel with a zinc dichromate plating for corrosion resistance.
2. Locks are to have a standard 2 ¾" backset with a full ¾" throw two-piece stainless steel mechanical anti-friction latchbolt. Deadbolt shall be a full 1" throw, constructed of stainless steel.
3. Lockcase shall be easily handed without chassis disassembly by removing handing screw on lockcase and installing in opposite location on reverse side. Changing of door hand bevel from standard to reverse hand shall be done by removing the lockcase scalp plate, and pulling and rotating the latchbolt 180 degrees.
4. Lock trim shall be through-bolted to the door to assure correct alignment and proper operation. Lever trim shall have external spring cage mechanism to assist in support of the lever weight.
5. Function numbers are Schlage.
   a. Schlage LV9000
6. Lockset Trim:
   a. Schlage 03N
7. Provide strikes with extended lips where required to protect trim from being marred by latch bolt. Provide strike lips that do not project more than 1/8" beyond door frame trim at single doors and have 7/8" lip to center at pairs of 1-3/4" doors.
8. Provide strikes as required to match existing conditions and preparations at existing openings.

C. Exit Devices:

1. Exit devices shall be touchpad style, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
2. All exit devices shall incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. Touchpad shall

extend a minimum of one half of the door width. All latchbolts to be deadlatching type, with a self-lubricating coating to reduce wear.

3. End-cap will be sloped to deflect any impact from carts and they shall be flush with the external mechanism case. End caps that overlap and project above the mechanism case are unacceptable. End cap shall utilize a two-point attachment to the mounting bracket.
4. Touchpad shall match exit device finish, and shall be stainless steel for US26, US26D, US28, US32, and US32D finishes. Only compression springs will be used in devices, latches, and outside trims or controls.
5. Plastic templates shall be included with each exit device to facilitate a quick, easy and accurate installation.
6. Strikes shall be roller type and come complete with a locking plate to prevent movement.
7. All rim and vertical rod exit devices shall have passed a 5 million(5,000,000) cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
8. All mortise exit devices shall have passed a 10 million(10,000,000)cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
9. Provide cylinder dogging on panic exit hardware where noted in hardware sets.
10. Exit devices shall be UL listed panic exit hardware. All exit devices for fire rated openings shall be UL labeled fire exit hardware.
11. Lever trim for exit devices shall be vandal-resistant type, which will travel to a 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
12. Von Duprin 98 Series. Series and function numbers as listed in sets.
13. Trim:

    a. As specified in sets.
    b. Levers to match lockset design where specified.

D. Closers:

1. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1 ½" in diameter, and double heat treated pinion shall be 11/16" in diameter with double D slab drive arm connection.
2. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to –30 degrees F.
3. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.
4. All closers shall have solid forged steel main arms (and forged forearms for parallel arm closers).
5. All surface mounted mechanical closers shall be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory.
6. Closers will have Powder coating finish certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.
7. Refer to door and frame details and furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of door swing in the hardware schedule.
8. LCN Series as listed in sets.

E. Overhead Holders and Stops:

1. Type, function and fasteners must be same as Glynn-Johnson specified. Size per manufacturer's selector chart. Plastic end caps, hold open mechanisms and shock blocks are not allowed. End caps must be finished same as balance of unit.

2. Manufacture products using base material of Brass/Bronze for US3, US4, & US10B finished products and 300 Stainless Steel for US32 & US32D finished products.
3. Type, function, and fasteners must be the same as Glynn-Johnson specified. Size per manufacturer's selector chart.
   a. Glynn-Johnson

F. Wall Stops:

1. Length to exceed projection of all other hardware. Provide with threaded studs and expansion shields for masonry wall construction. *Install with slope on top*.
   a. Ives WS33(X)
   b. BHMA L12011 or L12021

G. Miscellaneous:

1. Furnish items not categorized in the above descriptions but specified by manufacturer's names in Hardware Sets.

H. Fasteners:

1. Furnish fasteners of the proper type, size, quantity and finish. Use machine screws and expansion shields for attaching hardware to concrete or masonry, and wall grip inserts at hollow wall construction. Furnish machine screws for attachment to reinforced hollow metal doors and frames and reinforced aluminum doors and frames. Furnish full thread wood screws for attachment to solid wood doors and frames. "TEK" type screws are not acceptable.
2. **Sex bolts will not be permitted on reinforced metal doors or wood doors where blocking is specified.**

2.3 Finishes:

A. Generally, Satin Chrome, US26D / BHMA 626. Provide finish for each item as indicated in sets.

2.4 Templates and Hardware Location:

A. Furnish hardware made to template. Supply required templates and hardware locations to the door and frame manufacturers.

B. Furnish metal template to frame/door supplier for continuous hinge.

C. Refer to Article 3.1 B.2, Locations, and coordinate with templates.

2.5 Cylinders and Keying:

A. All cylinders for this project will be supplied by one supplier regardless of door type and location.

B. The Finish Hardware supplier will meet with Architect and/or Owner to finalize keying requirements and obtain keying instructions in writing.
   1. Supplier shall include the cost of this service in his proposal.

C. Provide a cylinder for all hardware components capable of being locked.

D. Final cores will be provided by the Owner.

PART 3 - EXECUTION

3.1 Installation

A. General:

1. Install hardware according to manufacturers installations and template dimensions. Attach all items of finish hardware to doors, frames, walls, etc. with fasteners furnished and required by the manufacture of the item.
2. Provide blocking/reinforcement for all wall mounted Hardware.
3. Reinforced hollow metal doors and frames and reinforced aluminum door and frames will be drilled and tapped for machine screws.
4. Solid wood doors and frames: full thread wood screws. Drill pilot holes before inserting screws.
5. Continuous gear hinges attached to hollow metal doors and frames and aluminum doors and frames: 12-24 x 1/2" #3 Phillips Keenform self-tapping. Use #13 or 3/16 drill for pilot.
6. Continuous Gear Hinges require continuous mortar guards of foam or cardboard 1/2" thick x frame height, applied with construction adhesive.

B. Locations:

1. Dimensions are from finish floor to center line of items.
2. Include this list in Hardware Schedule.

CATEGORY	DIMENSION
Hinges	Door Manufacturer's Standard
Levers	Door Manufacturer's Standard
Wall Stops/Holders	At Head

C. Field Quality Inspection:

1. Inspect material furnished, its installation and adjustment, and instruct the Owner's personnel in adjustment, care and maintenance of hardware.
2. Locksets and exit devices shall be inspected after installation and after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
3. Closers shall be inspected and adjusted after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
4. A written report stating compliance, and also locations and kinds of noncompliance shall be forwarded to the Architect with copies to the Contractor, hardware distributor, hardware installer and building owner.

D. Technical and Warranty Information:

1. At the completion of the project, the technical and warranty information coalesced and kept on file by the General Contractor/Construction Manager shall be given to the Owner or Owner’s Agent. In addition to both the technical and warranty information, all factory order acknowledgement numbers supplied to the General Contractor/Construction Manager during the construction period shall be given to the Owner or Owner’s Agent. The warranty information and factory order acknowledgement numbers shall serve to both expedite and

properly execute any warranty work that may be required on the various hardware items supplied on the project.

2. Submit to General Contractor/Construction Manager, two copies each of parts and service manuals and two each of any special installation or adjustment tools. Include for locksets, exit devices, door closers and any electrical products.

3.2 Hardware Sets:

Hardware Group No. 001
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-NL		643E	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC		630	VON
1	EA	OH STOP	90S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 002
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	157XY	710	IVE
1	EA	PANIC HARDWARE	CDSI-98-DT	643E	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	643e	
1	EA	OH STOP	90S	643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC ST-2730	695	LCN
1	EA	DOOR SWEEP	39D	D	ZER
1	EA	THRESHOLD	65D-223	D	ZER

Hardware Group No. 003
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	157XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-DT		643E	VON
1	EA	PANIC HARDWARE	CDSI-98-NL		643E	VON
3	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC		630	VON
2	EA	OH STOP	90S		643E/716	GLY
2	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN
2	EA	DOOR SWEEP	39D		D	ZER
2	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 004
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	157XY		710	IVE
1	EA	DOOR CORD	798-18		626	SCE
2	EA	SURFACE BOLT	SB453 8" TB		643E/716	IVE
1	EA	STOREROOM LOCK	LV9080BDC 03N		643e	SCH
1	EA	ELECTRIC STRIKE	6223 FSE DS CON		613	VON
2	EA	OH STOP & HOLDER	90H		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MCSRI ST-2730		695	LCN
2	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-V3-223		D	ZER

Hardware Group No. 005
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-NL		643E	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC		630	VON
1	EA	OH STOP	100S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)			
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 006
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-DT		643E	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	OH STOP	100S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)			
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 007
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-DT		643E	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	EA	WALL STOP	WS33X		626	IVE
1	SET	WEATHER SEAL	(BY FRAME MFR)			
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 008
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
1	EA	FIRE EXIT HARDWARE	9849-EO-F-LBL		626	VON
1	EA	FIRE EXIT HARDWARE	9849-L-F-03-LBL		626	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)		626	
2	EA	SURFACE CLOSER	4111 EDA MC		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850	✓	689	LCN

DOORS MAY BE HELD-OPEN ELECTROMAGNETICALLY. UPON ACTIVATION OF THE BUILDING FIRE ALARM, THE DOORS WILL CLOSE AND POSITIVELY LATCH.
COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 009
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		710	IVE
1	EA	CONT. HINGE	224XY TWP CON	✓	710	IVE
2	EA	SURFACE BOLT	SB453 8" TB		643E/716	IVE
1	EA	STOREROOM LOCK	LV9080BDC 03N		643e	SCH
1	EA	ELECTRIC STRIKE	6223 FSE DS CON	✓	613	VON
2	EA	OH STOP & HOLDER	90H		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MCSRI ST-2730 ST-1631		695	LCN
1	SET	GASKETING	429AA-S		AA	ZER
2	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-V3-223		D	ZER

Hardware Group No. 010
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	157XY		710	IVE
2	EA	DUMMY PUSH BAR	350		643E	VON
2	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O		643E/716	IVE
2	EA	OH STOP	90S		643E/716	GLY
2	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN

Hardware Group No. 011
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	157XY		710	IVE
2	EA	PANIC HARDWARE	CDSI-98-EO-990		643E	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
2	EA	OH STOP	90S		643E/716	GLY
2	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN
2	EA	DOOR SWEEP	39D		D	ZER
2	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 012
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	DUMMY PUSH BAR	350		643E	VON
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O		643E/716	IVE
1	EA	OH STOP	100S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN

Hardware Group No. 013
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	DUMMY PUSH BAR	350		643E	VON
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O		643E/716	IVE
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	EA	WALL STOP	WS33X		626	IVE

Hardware Group No. 014
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		710	IVE
1	EA	STOREROOM LOCK	LV9080BDC 03N		643e	SCH
1	EA	OH STOP	100S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)			
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-V3-223		D	ZER

Hardware Group No. 015
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-NL		643E	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC		630	VON
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	EA	WALL STOP	WS33X		626	IVE
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 016
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	DUMMY PUSH BAR	350		643E	VON
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O		643E/716	IVE
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	EA	WALL STOP	WS33X		626	IVE

Hardware Group No. 017
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	STOREROOM LOCK	LV9080BDC 03N		643e	SCH
1	EA	OH STOP	90S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-V3-223		D	ZER

Hardware Group No. 018
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-NL		643E	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	SURFACE CLOSER	4111 EDA MC		695	LCN
1	EA	WALL STOP	WS33X		626	IVE
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 019
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	PANIC HARDWARE	CDSI-98-EO-990		643E	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)		643e	
1	EA	OH STOP	90S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN
1	EA	DOOR SWEEP	39D		D	ZER
1	EA	THRESHOLD	65D-223		D	ZER

Hardware Group No. 020
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	157XY		710	IVE
1	EA	DUMMY PUSH BAR	350		643E	VON
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O		643E/716	IVE
1	EA	OH STOP	90S		643E/716	GLY
1	EA	SURFACE CLOSER	4111 EDA MC ST-2730		695	LCN

END OF SECTION

SECTION 08 8000 – GLAZING (GLASS)

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. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified.

1. Windows.
2. Doors.
3. Glazed entrance storefronts.
4. Interior borrowed lites.
5. Glass Types (Locations are indicated in the Drawings).

B. Related Sections include the following:

1. Division 07 2100 Section “Thermal Insulation” at curtain-wall spandrel areas.
2. Division 07 8413 Section “Penetration Firestopping” at perimeter floor areas.
3. Division 07 9200 Section “Joint Sealants”.

1.3 DEFINITIONS

A. Glass Manufacturer: A firm that develops and produces glass from their factory.

B. Glass Fabricator: A company that fabricates glass purchased from a Glass Manufacturer.

C. Deterioration of Coated Glass: Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Laminated Glass: Defects include edge separation, delamination materially obstructing vision through glass, and blemishes.

E. Deterioration of Insulating Glass: Failure of the hermetic seal. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed, heat-treated or tempered) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

   a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
   b. Limit glass deflection to L/240 or flex use limit of glass, whichever is less, with full recovery of glazing materials.
   c. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
   d. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 3/4 inch (19 mm), whichever is less.

      1) For monolithic-glass lites heat treated to resist wind loads.
      2) For insulating glass.
      3) For laminated-glass lites.

   e. Minimum Glass Thickness for Exterior Lites: Not less than ¼ inch (6 mm).
   f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

2. Safety and Fire-rated glass shall comply with CPSC – 16 CFR 1201 safety standards.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Glass Wind Load Design: 25 psf (1196 mm) minimum or higher to comply with exterior wall and roof design loads indicated. Comply with criteria of Governing Authorities and Agencies having jurisdiction.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass and insulated panels.

1. The name of the glass manufacturer and all technical data shall be included on the glass sample.
2. The name of the glass fabricator or supplier shall be included on the glass sample.
3. For each type of glass provided on the project. Refer to glazing glass types.
4. For each color of exposed glazing sealant.

5. For insulated panels submit manufacturers full range of color samples for final selection.

C. Glazing Schedule: Use same designations indicated on Drawings or Specifications for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners.

F. Product Data on Glass Types: Provide manufacturer's structural, physical and environmental characteristics, size limitations and installation requirements.

G. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.

H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: An experienced firm with at least five (5) years in business who has completed glazing similar in material, design, and extent to this Project; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program and acceptable to the glass manufacturer.

B. Source Limitations for Glass Types: Obtain glass from one primary-glass manufacturer for each glass type listed.

C. Adhesion and Compatibility Testing: Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

1. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

D. Glazing Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

E. Glazing Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

F. Safety Glazing Products: Comply with testing requirements of CPSC in 16 CFR 1201 and for CPSC CAT-1 and CPSC CAT-11.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.

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. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) 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.

3. Glazing Requirements: Comply with all Rules and Standards for Safety Glazing of the current Michigan Construction Code and other agencies and authorities having jurisdiction.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below.

1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."

2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."

3. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."

H. Mockups (In-place): Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Construct mockups in the exterior building wall at the location and size indicated as directed by Architect.

2. Build mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods for Architect’s review before proceeding with general installation:

a. Insulated and spandrel glass.

3. Obtain Architect's acceptance of mockups before proceeding with construction.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 3100 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

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

B. Manufacturer's Special Warranty on Coated-Glass Products: Written Warranty, made out to Owner and signed by coated-glass manufacturer agreeing to remove existing and furnish and install replacements for those coated-glass units that are deteriorated.

1. Warranty Period: ten (10) years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Laminated and Tempered Glass: Written warranty, made out to Owner and signed by glass manufacturer agreeing to remove existing and furnish and install replacements for glass units that deteriorate as defined in "Definitions" Article.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

D. Manufacturer's Special Warranty on Insulating Glass: Written Warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to remove existing and furnish and install replacements for insulating-glass units that deteriorate as defined in "Definitions" Article.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Glass Manufacturers – General

1. Obtain materials from only one manufacturer or fabricator for each type; obtain tinted primary glass (if any) used for each type from only one manufacturer.
2. Where manufacturer’s product names are indicated, only comparable products of the manufacturers listed as the Basis of Design will be considered.

B. Glass Manufacturers

1. Glass Products: The following listed glass manufacturers, provided they comply with the requirements of the contract documents, will be among the firms considered acceptable: Substitutions of other non-listed glass manufacturers will not be permitted.

a. Oldcaste

b. AFG Industries
c. Guardian Industries
d. PPG Industries, Inc.
e. Pilkington
f. Visteon
f. Vetrotech Saint-Gobain
g. Cardinal Industries Corp.

h. Paragon Architectural Products.

C. Glass Fabricators

1. Obtain materials from only one manufacturer or fabricator for each type; obtain tinted primary glass (if any) used for each type from only one manufacturer.
2. Where manufacturer's product names are indicated, comparable products of the glass manufacturers listed as the Basis of Design will be considered.

   a. Spec-temp / Atwood Inc.
   b. Oldcastle Glass Group
   c. PDC Glass of Michigan
   d. SAFTI, a division of O'Keeffe's Inc.
   e. Viracon
   f. Vetrotech Saint-Gobain
   g. Other glass fabricators in continuous business at least ten (10) years. Submit "Substitution Request" on form located in Specification Division 01 6000 Section "Product Requirements" to the Architect for evaluation.

D. Glass types: General Information

1. Not all glass types indicated here-in will be used on the project. Refer to the Drawings for applicable glass types to be provided.
2. Provide glass to comply with Building Codes and other Authorities and Agencies having jurisdiction.
3. Notify Architect of any conflicts. Glass fire-ratings shall be the same fire-rating as for the door or wall partitions indicated on the Drawings.
4. Glass Type for Skylights: Glass criteria and data is indicated in the Specification Sections 08 6300 "Metal-Framed Skylights."

E. GLASS TYPES

Note: Not all glass types indicated here-in will be used on the project. Refer to the Drawings for applicable glass types to be provided.

Note: Provide glass to comply with Building Codes and other Agencies having jurisdiction.

Note: Notify Architect of any conflicts. Glass fire-ratings shall be the same fire-rating as for the door or wall partitions indicated on the Drawings.

GL-1 ¼ inch thick Clear Tempered (FT) Glass
Fully-Tempered glass – Safety glass

GL-5a 1/4 inch thick clear glass
20 minute door and sidelite applications
Impact Safety-Rated and Fire-Rated glass
Basis of Design: Superlite I by Safti First
Maximum door lite area = 3,299 square inches
Maximum sidelite pane area = 5,760 square inches

GL-5c 3/4 inch thick clear glass

45 minute door and window applications
Impact Safety-Rated and Fire-Rated glass
Basis of Design: Superlite 45-HS-LI by Safti First
Maximum door lite area = 3,288 square inches
Maximum window or sidelite pane area = 3,880 square inches

GL-10 1" Insulated Clear Tempered glass unit
1" Total thickness; Double pane with silicone sealant edge seal.
Exterior pane: ¼" thick clear
Low-E (transparent coating) (locate on # 2 surface)
½" Air space
Interior pane: ¼" thick clear
Visible light; % transmittance- 62
Shading coefficient- 0.36
U-value – 0.29
Manufacturer (Basis of Design); Guardian Sunguard- SuperNeutral 62

GL-12 1" Insulated clear annealed gray fritted glass unit
1" Total thickness; Double pane with silicone sealant edge seal.
Exterior pane: ¼" thick clear
Low-E (transparent coating) (locate on # 2 surface)
½" Air space
Interior pane: ¼" thick clear
Warm Gray Frit, 100% full coverage on #4 surface
Visible light; % transmittance- 2
Shading coefficient- 0.28
U-value – 0.29
Manufacturer (Basis of Design); Guardian Sunguard- SuperNeutral 62 w/ warm gray frit

GL-13 1" Insulated clear annealed white fritted glass unit
1" Total thickness; Double pane with silicone sealant edge seal.
Exterior pane: ¼" thick clear
Low-E (transparent coating) (locate on # 2 surface)
½" Air space
Interior pane: ¼" thick clear
White Frit, 60% coverage, 1/8" holes at ¼" on center on #3 surface
Visible light; % transmittance- 2
Shading coefficient- 0.28
U-value - 0.29
Manufacturer (Basis of Design); Guardian Sunguard- SuperNeutral 62 w/ white frit

GL-15 1" Insulated TINTED Fully-Tempered (FT) Insulating Spandrel Glass Unit - (dark bronze)
1" Total thickness; Double pane with silicone sealant edge seal.
Exterior pane: ¼" thick 6mm), Fully-Tempered, spandrel
½" Air space
Interior pane: ¼" thick 6mm), Clear, Fully-Tempered
Tinted Ceramic Frit coating on # 4 surface. Color to match glass
Manufacturer (Basis of Design): Viracon 1" VE1-48 Insulating spandrel - dark bronze

2.2 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
1. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of custom and special colors.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

2.3 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers, and complying with ASTM C 1281 and AAMA 800.

B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
3. Thermoplastic polyolefin rubber.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

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.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials.

B. Glazing channel dimensions, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove imperfections and damaged glass from Project site and legally dispose of off Project site.

D. Apply primers to joint surfaces where required for adhesion of sealants.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass-lites where the length plus width is larger than 50 inches (1270 mm) as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where needed to prevent glass-lites from moving sideways in glazing channel.

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.

3.4 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. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 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. Compress gaskets to produce a weather-tight 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.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 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. Remove them immediately as recommended by glass manufacturer.

C. Promptly remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08 8000

SECTION 08 8010 – WINDOW FILM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes window film products and installation. At locations indicated on drawings, install window film on all glass in new and existing door/window openings.

1.2 SUBMITTALS

A. Product Data: For each product and material indicated.

B. Samples: Of each window film.

1.3 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: An experienced firm with at least five (5) years in business who has completed window film installation similar in material, design, and extent to this Project.

B. Source Limitations: Obtain window film from one manufacturer.

C. Mockups (In-place): Before full installation install window film on one pane of glass for Owner and Architect review and approval.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect materials according to manufacturer's written instructions and as needed to prevent damage.

1.9 WARRANTY

A. General Warranty: Fifteen years from the manufacturer and installer that the window film will-

1. Maintain Solar Reflective Properties without cracking, crazing or peeling.

2. Maintain Adhesion Properties without blistering, bubbling or delaminating from the glass.

3. Maintain appearance without discoloration

B. In the event that the product is found to be defective under this warranty, the installer will replace the quantity of film shown to be defective and provide removal and reapplication labor free of charge.

C. Installer also warrants against glass failure due to thermal shock fracture for a value of up to $500 per pane of glass caused as a direct result of the window film application for 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers
1. Window film: 3M.

2.2 Products

A. Window Film Type 1:
1. 3M Scotchshield Safety and Security Window Film Ultra Prestige Series Ultra S6000.
a. Film Thickness: 8 mil
b. Micro-layered construction
c. Tear resistance: 1,100 lbs.
d. Tensile strength: 27,000 psi
e. Break strength: 215 lbs/in
f. Elongation at Break: 120%

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exiting glazing and condition prior to installation, with Installer present, for compliance with the following:

1. Manufacturers requirements.
.

3.2 PREPARATION

A. Clean existing glass, inside and out, prior to installation.

3.3 WINDOW FILM, GENERAL

A. Comply with written instructions of manufacturers.

3.4 PROTECTION AND CLEANING

A. Protect window film from damage immediately after installation. Remove nonpermanent labels, and clean surfaces.

B. Promptly remove and replace window film that is bubbled, peeling, or damaged in any way, including natural causes and accidents.

END OF SECTION 08 8010

SECTION 09 2900 - GYPSUM BOARD

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. This Section includes, but not limited to coordination of metal stud spacing for curved wall and other partition types and the following:

1. Steel suspended ceiling and soffit framing.
2. Steel partition framing.
3. Interior gypsum wallboard.
4. Exterior gypsum panels for ceilings and soffits
5. Tile backing panels.
6. Trim accessories.
7. Joint Sealants.

B. Related Sections include the following:

1. Division 05 4000 Section “Cold-Formed Metal Framing" for load-bearing steel framing.
2. Division 06 1000 Section "Rough Carpentry" for wood framing and furring.
3. Division 07 2100 Section "Thermal Insulation" for insulation and vapor retarders installed in gypsum board assemblies.
4. Division 07 8413 Section “Penetration Fire-Stopping and Smoke System.”
5. Division 09 3000 Section "Tiling" for cementitious backer units installed as substrates for ceramic type tile materials.
6. Division 09 9100 Section “Painting” for primers applied to gypsum board surfaces.

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

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

B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to

ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from FM's "Approval Guide, Building Products", UL's "Fire Resistance Directory", GA-600, "Fire Resistance Design Manual."

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steel Framing and Furring:

a. Clark Steel Framing Systems.
b. Dale Industries, Inc. - Dale/Incor.
c. Dietrich Industries, Inc.
d. Unimast, Inc.
e. Western Metal Lath & Steel Framing Systems.

2. Gypsum Board and Related Products:

a. American Gypsum Co.
b. G-P Gypsum Corp.
c. Lafarge North America Inc.
d. National Gypsum Company.
e. United States Gypsum Co. (USG Corp.)

2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Components, General: Comply with ASTM C 754 for conditions indicated.

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

C. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to five (5) times that imposed by construction as determined by testing according to ASTM E 488.
2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to ten (10) times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.

D. Hangers: As follows:

1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, minimum 0.162-inch (4.12-mm) diameter.
2. Rod Hangers: ASTM A 510 (ASTM A 510M), galvanized mild carbon steel.
3. Flat Hangers: Commercial-steel sheet, ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized or ASTM A 366/A 366M, with corrosion-resistant paint finish.
4. Angle Hangers: ASTM A 653/A 653M, [G60 (Z180)], hot-dip galvanized commercial-steel sheet, sized to structurally support materials.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2-inch- (12.7-mm-) wide flange, with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized manufacturer's standard corrosion-resistant zinc coating.

1. Depth: 2-1/2 inches (63.5 mm) unless otherwise indicated.

F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized manufacturer's standard corrosion-resistant zinc coating.

1. Cold Rolled Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange, 3/4 inch (19.1 mm) deep.
2. Steel Studs: ASTM C 645.
    a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
    b. Depth: 3-5/8 inches (92.1 mm) unless otherwise indicated.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
    a. Interior Locations - Minimum Base Metal Thickness: 0.0312 inch (0.79 mm) unless otherwise indicated.
    b. Exterior Locations: Install 18 ga. Minimum light-gauge metal stud type and bracings not more than 4’-0” apart to resist 25 lbs./sf for wind up-lift.
4. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.

G. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
b. Chicago Metallic Corporation; Fire Front 630 Drywall Furring 640 System.
c. USG Interiors, Inc.; Drywall Suspension System.

2.3 STEEL PARTITION FRAMING

A. Components, General: Refer to Section 05 4000 “Cold-Formed Metal Framing” and as follows:

1. Comply with ASTM C 754 for conditions indicated.
2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized manufacturer's standard corrosion-resistant zinc coating.

B. Steel Studs and Runners: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
2. Depth: 3-5/8 inches (92.1 mm) unless otherwise indicated.
3. Exterior Locations: 18 gauge Minimum light gauge steel studs.

C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges.

D. Proprietary Deflection Track for Non-Rated Partitions: Steel sheet top runner manufactured to prevent cracking of gypsum board applied to interior partitions resulting from deflection of structure above; in thickness indicated for studs and in width to accommodate depth of studs.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Delta Star, Inc., Superior Metal Trim; Superior Flex Track System (SFT).
b. Metal-Lite, Inc.; Slotted Track.

E. Proprietary Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
b. Metal-Lite, Inc.;The System.

F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm) unless otherwise required.

G. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange.

1. Depth: 1-1/2 inches (38.1 mm) minimum.
2. Clip Angle: 1-1/2 by 1-1/2 inch (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.

H. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Interior Locations: Minimum Base Metal Thickness: 0.0312 inch (0.79 mm) at interior locations and 0.0428 at exterior locations.
2. Depth: 7/8 inch (22.2 mm) unless otherwise indicated.
3. Exterior Locations: 18 gauge Minimum light gauge steel studs.

I. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.

J. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange.

1. Depth: 3/4 inch (19.1 mm) minimum.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch (0.79 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

K. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare metal thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.

L. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

M. Install horizontal bracing at 8’-0” on center maximum vertical spacing along entire height of partitions type forming construction.

2.4 INTERIOR GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

1. Joint Locations: Provide joints at transitions, at one side of openings and at not more than 30 feet along walls and ceilings and elsewhere, where indicated on Drawings. Coordinate and review with the Architect. Provide joint accessories.

B. Gypsum Wallboard.

1. All interior drywall on walls to 8’-0” above the floor to be High-Impact Type Wallboard: ASTM C 36, manufactured with Type X core, plastic film to backside for greater resistance to through-penetration (impact resistance).
   a. 5/8 inch (15.9 mm), High-impact Type X.
   b. Long Edges: Tapered.
   c. Curved Partitions: Adhere and mechanically fasten in layers to total partition thickness indicated. Coordinate metal stud spacing to 6 – 12 inches on-center to suit minimum radius of widthwise bent board of 40 foot curve.
   d. Manufacturer’s Product: National Gypsum Company; Gold Bond Hi-Impact XP.
      1) Other manufacturer’s equal product acceptable to the Architect.
2. Regular Type:
   a. For ceilings and walls above 8’-0” off the floor
   b. Thickness: 5/8 inch, unless otherwise indicated.
   c. Long Edges: Tapered.

d. Locations: Regular partition types.

C. Fire-Rated Gypsum Wallboard Partition Assemblies (Note: The UL Design Numbers are noted for reference, other “UL HW D” Design Systems may be installed to suit fire-ratings.)

1. Metal Stud Gypsum Wallboard Partitions: UL Design No. U-400 Series.

a. One (1) Hour Rating: UL Design No. U-404.

1) Nonbearing partitions with total thickness as indicated on Drawings.

b. Two (2) Hour Rating: UL Design No. U-425.

1) Nonbearing partitions with total thickness as indicated on Drawings.

D. Accessories and Fasteners: Provide manufacturer’s standard fasteners and accessories as required for installation, maintaining same lead equivalence as rest of system.

2.5 EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

1. Joint Locations: Provide joints at transitions, at one side of openings and at not more than 15 feet along walls and ceilings and elsewhere, where indicated on Drawings. Coordinate and review with the Architect. Provide joint accessories.

B. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "Dens-Glass Gold" by G-P Gypsum Corp.
2. Core: As indicated, 1/2 inch (12.7 mm), regular type and 5/8 inch (15.9 mm), Type X.

2.6 TILE BACKING PANELS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M.

1. Core: 5/8 inch (15.9 mm), Type X.

C. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M.

1. Product: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, "Dens-Shield Tile Backer" manufactured by G-P Gypsum Corp.
2. Core: 5/8 inch (15.9 mm), Type X.

D. Cementitious Backer Units: ANSI A118.9.

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Custom Building Products; Wonderboard.
b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.

c. United States Gypsum Co.; DUROCK Cement Board.
d. National Gypsum Company; PermaBase Cement Board

2. Thickness: As indicated.

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead: Use at outside corners.
b. Bullnose Bead: Use where indicated.
c. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.
d. L-Bead: L-shaped; exposed long leg receives joint compound; use where required.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound; use at exposed panel edges.
f. Expansion (Control) Joint: Use where indicated and required.
g. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet or rolled zinc.
2. Shapes:

a. Cornerbead: Use at outside corners.
b. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening. Use where indicated and required.
d. Expansion Joint Unit: Install where indicated.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

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

a. Fry Reglet Corp.
b. Gordon, Inc.
c. MM Systems Corporation.
d. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified or Class II anodic finishes and factory-painted, baked-enamel finishes.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping and setting-type, sandable topping compounds.
2. Glass-Mat Gypsum Sheathing Board: As recommended by manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.
2. Glass-Mat, Water-Resistant Backing Panel: As recommended by manufacturer.
3. Cementitious Backer Units: As recommended by manufacturer.

2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Isolation Strip at Exterior Walls:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

G. Polyethylene Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

H. Fire-Safing Insulation: As specified in Division 07 Section “Thermal Insulation.” For fire-rated partitions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

3.2 PREPARATION

A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

1. Furnish concrete inserts and other devises indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.

2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.

   a. Use deep-leg deflection track.
   b. Use proprietary deflection track.
   c. Use proprietary firestop track.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure rod flat angle hangers to structure, including intermediate framing members, by attaching to inserts, eye-screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.

C. Sway-brace suspended steel framing with hangers used for support.

D. For exterior soffits, install cross bracing and framing to resist wind uplift.

E. Screw furring to wood framing.

F. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

G. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

H. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL PARTITION

A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt-felt or foam-gasket isolation strip between studs and wall.

B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch (13 mm) short of full height to provide perimeter relief.
2. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.

D. Install steel studs and furring at the following spacings:

1. Single-Layer Construction: 16 inches (406 mm) o.c., unless otherwise indicated.
2. Multilayer Construction: 16 inches (406 mm) o.c., unless otherwise indicated.
3. Cementitious Backer Units: 16 inches (406 mm) o.c., unless otherwise indicated.

E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

F. Curved Partitions:

1. Cut top and bottom track (runners) through leg and web at 2-inch (50-mm) intervals for arc length. In cutting lengths of track, allow for uncut straight lengths of not less than 12 inches (300 mm) at ends of arcs.
2. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
3. Support outside (cut) leg of track by clinching steel sheet strip, 1-inch- (25-mm-) high-by-thickness of track metal, to inside of cut legs using metal lock fasteners.
4. Begin and end each arc with a stud, and space intermediate studs equally along arcs at stud spacing recommended in writing by gypsum board manufacturer for radii indicated. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.

G. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install two studs at each jamb.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

H. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

I. Z-Furring Members:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (600 mm) o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (300 mm) from corner and cut insulation to fit.
4. Until gypsum board is installed, hold insulation in place with 10-inch (250-mm) staples fabricated from 0.0625-inch- (1.59-mm-) diameter, tie wire and inserted through slot in web of member.

J. Vapor Retarder: Install to comply with requirements specified in Division 07 Section” Thermal Insulation."

3.6 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members using resilient channels, or provide control joints to counteract wood shrinkage.

I. Control Joints and Expansion Joints: Install control and expansion joints at locations indicated on Drawings and according to ASTM C 840 and in locations acceptable to the Architect and to maintain fire-resistance rating of the assemblies and with space between edges of adjoining gypsum panels.

J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Fit gypsum panels around ducts, pipes, and conduits.
2. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

K. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

L. Floating Construction: Install gypsum panels over wood framing, with floating internal corner construction.

M. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

N. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

O. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

3.7 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of board.

b. At stairwells and other high walls, install panels horizontally, unless otherwise required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. Laminating to Substrate: Where gypsum panels are directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Partitions:

1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels to framing with screws spaced 12 inches (300 mm) o.c.
4. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.
5. Allow wetted gypsum panels to dry before applying joint treatment.

F. Exterior Soffits and Ceilings: Apply exterior gypsum soffit board panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

G. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
2. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at showers, tubs, and locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
3. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and locations indicated to receive tile.
4. Areas Not Subject to Wetting: Install standard gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
5. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.8 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings, install control joints according to ASTM C 840 and in specific locations approved by Architect.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level-1: Above finished ceilings concealed from view, ceiling plenum areas, and where indicated. Embed tape in joint compound, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies. Joint sanding not required.
2. Level-2: Areas that form substrate for Ceramic Tile or other hard surface materials. Embed tape in joint compound and apply separate first coat of joint compound to tape, fasteners, and trim flanges. Sand joints to substrate tolerances.
3. Level-3: Areas that form substrate for Wall Coverings or other flexible surface materials. Embed tape in joint compound and apply separate first coat of joint compound to tape, fasteners, and trim flanges. Sand smooth joints for flat transition.
4. Level-4: Walls and Ceilings for Painting. Embed tape in joint compound and sand joints. Apply a separate finish coat of joint compound to tape, fasteners, and trim flanges. Sand joints and fastener areas for a smooth flat transition.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: General Contractor will conduct an above-ceiling observation and report deficiencies in the Work observed. Proceed with installation of gypsum board to ceiling support framing after deficiencies have been corrected.

1. Notify all Contractors seven (7) calendar days in advance of date and time when Project, will be ready for above-ceiling observation.

END OF SECTION 09 2900

SECTION 09 5123 - ACOUSTICAL TILE CEILINGS

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. This Section includes acoustical tiles for ceilings and the following:

1. Exposed suspension systems.
2. Trim and Accessories
3. Acoustic ceiling tile types.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 SUBMITTALS

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

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
2. Suspension System Members: 12-inch- (300-mm-) long Sample of each type.
3. Exposed Moldings and Trim: Set of 12-inch- (300-mm-) long Samples of each type and color.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical tile ceiling.

E. Research/Evaluation Reports: For acoustical tile ceiling and components and anchor type.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

2. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class-A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.
b. Maximum Flame Spread: 25

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 3100 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

B. Within each space to receive specified products, do not begin installation until the following conditions are met:

1. Work above ceilings has been finished, tested, and approved.

2. Space to receive ceiling system is properly enclosed and protected from weather.
3. Any wet work within the space is dry.

1.8 EXTRA MATERIALS

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

1. Acoustical Ceiling Units: Full-size units equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

B. Manufacturers as indicated on the Drawings and as listed below.

1. Armstrong World Industries, Inc.
2. Celotex Corp. (The)
3. USG Interiors, Inc.

2.2 ACOUSTICAL TILES, GENERAL

A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances.

B. Coating-Based Antimicrobial Treatment: Provide acoustical tiles with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273.

C. AT1- USG Radar High Durability Square Lay-in 2’ x 2’ x 5/8” (2207)
1. 5/8” thick
2. Humidity resistant
3. Anti-Mold and Mildew
4. NRC 0.55
5. Class A Fire rating

D. AT2- USG Sheetrock Lay-In Ceiling Panel ClimaPlus Vinyl 2’ x 2’ x ½” (3260)
1. 1/2” thick
2. Humidity resistant
3. Anti-Mold and Mildew
4. Class A Fire rating

E. AT3- USG Eclipse Climaplus- Tegular Edge, 2’x2’x3/4” (76775)

1. 3/4” thick
2. Humidity resistant
3. Anti-Mold and Mildew
4. NRC 0.70
5. Class A Fire rating

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung.”

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung").

E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICALTILE CEILING

A. Manufacturer’s Products: Basis of Design: USG DXL 15/16” Exposed Tee System
1. Locations: With AT1
2. Include hemmed edge moldings and accessories.
3. Color: White

B. Curved perimeter trim for ceiling clouds (AT3)
1. Armstrong Axim Classic Trim
   a. 4” curved- AX4CUR
   b. Color: White

2.5 MISCELLANEOUS MATERIALS

A. Tile Adhesive: Type recommended by tile manufacturer, bearing UL label for Class 0-25 flame spread.

B. Staples: Divergent-point staples and as directed by the Acoustic Tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.

3.2 PREPARATION

A. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical tile ceilings to comply with ASTM C 636 per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. Do not attach hangers to steel deck tabs.

8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.
3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired.

END OF SECTION 09 5123

SECTION 09 6816 – SHEET CARPETING AND TILE CARPETING

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. This Section includes the following:

1. Carpet tile.
2. Carpet Tile types are scheduled in the Drawings.

B. Related Sections include the following:

1. Division 02 4119 Section "Selective Structure Demolition."
2. Division 09 6519 Section "Resilient Tile Flooring."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
2. Existing flooring materials to be removed.
3. Existing flooring materials to remain.
4. Carpet type, color.
5. Seam locations, types, and methods.
6. Type of installation.
7. Pattern type, repeat size, location, direction, and starting point.
8. Pile direction.
9. Type, color, and location of insets and borders.
10. Type, color, and location of edge, transition, and other accessory strips.
11. Transition details to other flooring materials.
12. Type of cushion.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch- (300-mm-) square Sample.
2. Exposed Edge Stripping and Accessory: 12-inch- (300-mm-) long Samples.
3. Carpet Cushion: 6-inch- (150-mm-) square Sample.

D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

E. Maintenance Data:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer in business at least five (5) years who is certified by the Floor Covering Installation Board.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an inspecting agency acceptable to authorities having jurisdiction.

C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Division 01 Section "Product Requirements" for Substitutions Requests.

D. Mockups: Before installing carpet, install mockups for each type of carpet installation required to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Obtain Architect's approval of mockups before starting work.
3. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 05, "Storage and Handling."

B. Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat, blocked off ground to prevent sagging and warping. Maintain temperature in storage area above 40° F.

1.6 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.7 WARRANTY

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

B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

C. Special Carpet Cushion Warranty: Written warranty, signed by carpet cushion manufacturer agreeing to replace carpet cushion that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse. Failure includes, but is not limited to, permanent indentation or compression.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type.
2. Carpet Tile: Full-sized units equal to five percent (5%) of the amount of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - CARPET TILE

A. Manufacturers Product – Basis of Design: The design for each material type is based on the product named. Subject to compliance with the requirements, provide the named product or a comparable product acceptable to the Architect by one of the other manufacturers.

1. Carpet manufacturers as indicated on drawings and as listed below:

a. Collins and Aikman (C&A)
b. Shaw Contract Group

B. Carpet Types – Material Information and Selection:

1. Refer to schedule located in the Architect's drawings.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet manufacturer, carpet cushion manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by carpet manufacturer, carpet cushion manufacturer.

1. Provide adhesives that comply with the content when tested according to ASTM D 5116.

C. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion thickness and that comply with CRI 104, Section 11.3.

D. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

E. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests.
2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.

B. Install trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

3.3 INSTALLATION

A. Direct-Glue-Down Installation: Comply with CRI 104, Section 8, "Direct Glue-Down Installation."

B. Double-Glue-Down Installation: Comply with CRI 104, Section 9, "Double Glue-Down Installation."

C. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 10, "Attached Cushion."

D. Carpet with Preapplied Adhesive Installation: Comply with CRI 104, Section 10.4, "Pre-Applied Adhesive Systems (Peel and Stick)."

E. Hook-and-Loop Installation: Comply with CRI 104, Section 10.5, "Hook and Loop Technology."

F. Stretch-in Installation: Comply with CRI 104, Section 11, "Stretch-in Installation."

G. Stair Installation: Comply with CRI 104, Section 12, "Carpet on Stairs."

H. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

1. Bevel adjoining border edges at seams with hand shears.
2. Level adjoining border edges.

I. Do not bridge building expansion joints with carpet.

J. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

K. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

L. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

M. Install pattern parallel to walls and borders, unless otherwise indicated.

N. Install carpet cushion seams at 90-degree angle with carpet seams.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 6816

SECTION 09 9100 - PAINTING

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. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections of work.
2. “Paint” as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
3. Paint walls/ceilings with primer where finished coverings are to be installed.
4. Paint Types, Colors and Finishes – For information, refer to Schedules located on Drawings.
5. Use color prime system per manufacturer’s recommendation.
6. Repair and repainting of metal lockers or other metal surfaces.
7. Repair and painting of existing, hard, slick and glossy surface materials.
8. Identification of fire and smoke barrier walls above ceiling.

B. Paint exposed surfaces, except where natural finish indicates that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint manufacturers prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 05 5000 Section "Metal Fabrications” for shop priming ferrous metal.
2. Division 08 1113 Section "Hollow Doors and Frames" for factory priming steel doors and frames.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
2. Submit three (3) samples on substrates for Architect's review of color and texture only:

a. Size: 6” x 6” minimum on actual material proposed in the project.
b. Paint color chips and stain colors.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual in continuous business at least five (5) years experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project. Use only thinners approved by the paint manufacturer.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.

2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing and excessive temperatures where necessary. Keep storage area neat, orderly and well ventilated. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C) or per manufacturer's written instructions.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:

a. Two (2) full unopened gallons of each type of color and finish of paint.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
1. Basis of Design: Sherwin-Williams Co. (S-W).
2. Other manufacturers must meet or exceed the properties of the Basis of Design manufacturer. Other acceptable manufacturers are:
a. Benjamin Moore
b. PPG (Pittsburgh Paints)

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: Colors and Finishes are indicated on the Architect’s drawings.

E. Identification of fire walls, fire barriers and smoke barriers (above ceiling).

1. At all 2 hour rated fire walls paint stenciled lettering stating- 2 HOUR RATED FIRE AND SMOKE BARRIER- PROTECT ALL OPENINGS
2. At all 1 hour rated fire barriers paint stenciled lettering stating- 1 HOUR RATED FIRE AND SMOKE BARRIER- PROTECT ALL OPENINGS
3. At all smoke barriers paint stenciled lettering stating- SMOKE BARRIER- PROTECT ALL OPENINGS
4. Refer to the CODE PLAN for locations.
5. Lettering to be 3" high with a minimum stroke width of 3/8"
6. Spacing- 10' maximum from the end of each wall and 20' maximum on center.

2.3 PAINT SCHEDULE

A. Paint 1 (P1) for Interior Walls
   1. Single component water-based epoxy
   2. Topcoat- Sherwin Williams Pro-Industrial Pre-Catalyzed Waterbased Epoxy
   3. Sheen- Eggshell or semi-gloss
   4. Surface preparation-Follow manufacturers written recommendation.
   5. Surface material- Concrete Masonry Units
      a. Primer: SW PrepRite Block Filler
      b. 1st Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
      c. 2nd Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
   6. Surface material- Gypsum Board
      a. Primer: SW ProMar 200 Zero VOC Latex Primer
      b. 1st Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
      c. 2nd Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
   7. Surface material- Wood
      a. Primer: SW PrepRite ProBlock Latex Primer/Sealer
      b. 1st Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
      c. 2nd Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
   8. Surface Material- Ferrous and non-ferrous metal
      a. Primer: SW Pro Industrial Pro-Cryl Universal Primer
      b. 1st Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy
      c. 2nd Coat: SW Pro Industrial Pre-Catalyzed Waterbased Epoxy

B. Paint 2 (P2) for Interior Walls
   1. Zero VOC vinyl acrylic
   2. Topcoat- Sherwin Williams ProMar 200 Zero VOC Interior Latex
   3. Sheen- Flat, Low Gloss, Eggshell, Semi-Gloss and Gloss
   4. Surface preparation-Follow manufacturers written recommendation.
   5. Surface material- Concrete Masonry Units
      a. Primer: SW PrepRite Block Filler
      b. 1st Coat: SW ProMar 200 Zero VOC Interior Latex
      c. 2nd Coat: SW ProMar 200 Zero VOC Interior Latex
   6. Surface material- Gypsum Board
      a. Primer: SW ProMar 200 Zero VOC Latex Primer
      b. 1st Coat: SW ProMar 200 Zero VOC Interior Latex
      c. 2nd Coat: SW ProMar 200 Zero VOC Interior Latex

C. Paint 3 (P3) for Interior
   1. Single component acrylic
   2. Topcoat- Sherwin Williams Pro Industrial Acrylic Coating
   3. Sheen- Eggshell, Semi-Gloss and Gloss
   4. Surface preparation-Follow manufacturers written recommendation.

5. Surface material- Wood
    a. Primer: SW PrepRite ProBlock Latex Primer/Sealer
    b. 1st Coat: SW Pro Industrial Acrylic
    c. 2nd Coat: SW SW Pro Industrial Acrylic

D. Paint 4 (P4) for Interior
1. Two component water based epoxy
2. Topcoat- Sherwin Williams Pro Industrial Water Based Catalyzed Epoxy
3. Sheen- Eggshell and Gloss
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Concrete Masonry Units
    a. Primer: SW Loxon Block Surfacer
    b. 1st Coat: SW Pro Industrial Water Based Catalyzed Epoxy
    c. 2nd Coat: SW Pro Industrial Water Based Catalyzed Epoxy
6. Surface material- Ferrous and Non-ferrous metals
    a. Primer: SW Pro Industrial Pro-Cryl
    b. 1st Coat: SW Pro Industrial Water Based Catalyzed Epoxy
    c. 2nd Coat: SW Pro Industrial Water Based Catalyzed Epoxy

E. Paint 5 (P5) for Interior Wet Areas
1. Fast cure epoxy
2. Topcoat- Sherwin Williams Macropoxy 646-100 Fast Cure Epoxy
3. Sheen- Eggshell and Semi-Gloss
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Concrete Masonry Units (Wet Areas)
    a. Primer: SW Kem Cati-Coat HS Epoxy Filler/Sealer
    b. 1st Coat: SW Macropoxy 646-100 Fast Cure Epoxy
    c. 2nd Coat: SW Macropoxy 646-100 Fast Cure Epoxy

F. Paint 10 (P10) for Interior Exposed Ceilings
1. Acrylic Dryfall
2. Topcoat- Sherwin Williams Pro Industrial Waterborne Acrylic Dryfall
3. Sheen- Flat, Eggshell and Semi-Gloss
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Ferrous and Non-ferrous metal
    a. Primer: SW Kem Pro Industrial Pro-Cryl Universal Primer
    b. 1st Coat: SW Pro Industrial Waterborne Acrylic Dryfall
    c. 2nd Coat: SW Pro Industrial Waterborne Acrylic Dryfall

G. Paint 11 (P11) for Interior Ceilings
1. Zero VOC vinyl acrylic
2. Topcoat- Sherwin Williams ProMar 200 Zero VOC Interior Latex
3. Sheen- Flat
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Masonry and Concrete
    a. Primer: SW Loxon Concrete and Masonry Primer/Sealer
    b. 1st Coat: SW ProMar 200 Zero VOC Interior Latex
    c. 2nd Coat: SW ProMar 200 Zero VOC Interior Latex
6. Surface material- Gypsum Board
    a. Primer: SW ProMar 200 Zero VOC Latex Primer
    b. 1st Coat: SW ProMar 200 Zero VOC Interior Latex
    c. 2nd Coat: SW ProMar 200 Zero VOC Interior Latex

H. Paint 20 (P20) for Concrete Floors
1. Concrete sealer and finish
2. Topcoat- Sherwin Williams ArmorSeal 8100 Finish

3. Sheen- Satin
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Concrete
    a. 1st Coat: SW ArmorSeal 8100 Finish
    b. 2nd Coat: SW ArmorSeal 8100 Finish

I. Paint 21 (P21) for Epoxy Floors
    1. See spec section 09 67120 Epoxy Flooring

J. Paint 22 (P22) for electrostatic painting of existing metal surfaces (lockers)
    1. Electrostatic Painting: Ransburg #2 electrostatic deposition system combined with two (2) component type epoxy material as manufactured and prepared by Spectrum. The final coat of paint must be a two (2) part polyamide catalyzed epoxy enamel that has a combination of adhesion toughness, wear and chemical resistance properties. The lockers shall be painted on the outside face of the door, the leading edge opposite the hinges, and all exposed sides.
    2. On the interior of all lockers clean and paint the locker bottom.
    3. Painting Operation on Existing Lockers: The painting operation shall consist of the following:
    4. Remove all existing locks, number plates and handles and other attached items in order to have a clean, neat appearance at completion. Mask all items neatly including existing items that cannot be removed for painting.
    5. Lockers and other equipment shall be sanded to remove all rust and surface irritations that could flaw the final coat. Any areas that cannot be totally sanded will be scuffed in order to stop any adhesion problems.
    6. Degrease and clean lockers and other equipment with a solvent to remove any surface contamination which could cause paint adhesion problems. The solvent shall have a flash point above 100 degrees Fahrenheit to present minimal fire hazard.
    7. Prime lockers with a heavy duty rust inhibitive primer. Apply an intermediate coat between old painted surfaces and the new coating that could lift the existing paint.
    8. The lockers and other equipment surfaces shall be dust coated in order to prevent runs and stop lifting.
    9. The lockers and other equipment shall be final coated with a film of uniform thickness and have a smooth and clean appearance.
    10. Reinstall locks, number plates and handles and other items. Remove all masking and dispose of all waste properly leaving job site neat and clean.

K. Paint 23 (P23) high performance coating for Pool Environments

L. Paint 24 (P24) Painting and repainting of existing steel guardrail and angles.
    1. Remove existing paint finish
    2. Surface Preparation: as recommended by coating manufacturer.
    3. Base Coat: TNEMEC Series 161 Tnemec-Fascure Polyamide Epoxy corrosion resistant coating for protection against abrasion and mild chemical contact at 5.0 to 6.0 mils
    4. Finish Coat: TNEMEC Series 75 Endura-Shield Alihatic Acrylic Polyurethane highly resistant coating for abrasion, wet conditions corrosive fumes, chemical contact and excellent weathering properties at 2.5 to 3.0 mils DFT.

M. Paint 25 (P25) Dry Erase Coating
    1. Clear Gloss two-coat system
    2. Painted over finished paint system and color

N. Paint 26 (P26) Game Line Paint on Rubber flooring
    1. Endura Coating, Flexible, two component, polyurethane paint
    2. Topcoat- Endura EX-2C
    3. Sheen- High-Gloss
    4. Surface preparation – refer to Mondo painting game lines on advance
        a. Ensure the floor is thoroughly scrubbed and free of any wax, oil or lint.
        b. Mark off gymnasium floor lines in accordance with game requirements and as shown on architectural drawings, confirm layout with Owner.

c. Apply solvent resistant masking tape as recommended by manufacturer – 3m 233+ green masking tape.
d. Scuff the line surface area with 80-100 grit sandpaper. Remove any abrasive particles or surface debris.
e. Clean surface with dissipating solvent (Acetone, MEK, or Toluol)
f. Apply Endura Prime-Lock with Prime-Lock Additive to the sanded and cleaned game line surface with green scuff pad. This application must be thorough and wet the entire game line surface. Do not apply Thinner to areas that will not be painted. Allow a sweat-in period of 5-10 minutes and cover with paint within 30 minutes.

5. Paint application
   a. Maintain ambient and surface temperature between 65 and 75 degrees Fahrenheit and a relative humidity near 50%. For higher humidity conditions above 85%, use EX-2C Slow Thinner and/or Endura Retarder. Maintain the temperature of the mixed paint between 72 and 75 degrees Fahrenheit. Substrate temperature should not be lower than 50 degrees or higher than 86 degrees.
   b. Surface must be completely dry.
   c. Apply with a pure bristle or HVLP (high volume low pressure) spray equipment
   d. Application Procedure
      i. Check to see if color is correct before combining EX-2C Component A and Special Component B.
      ii. Apply two thin wet coats with each coat at a wet film thickness of 2-2.5 mils. Flash off time between coats must be a minimum of 15-30 minutes.
      iii. Masking should be removed as soon as the paint has dried sufficiently to be tacky.
6. Curing
   a. No traffic on the painted floor for 72 hours minimum. Light traffic without footwear for the first 7 days. Game line paint will take 7-10 days to fully cure.
   b. Do not scrub the floor for a minimum of 30 days after application of the game lines.
   c. Cleaning solution shall be a non-abrasive, phosphate free, biodegradable type diluted to manufacturers instructions.
7. Surface material- Rubber flooring
   a. Primer: Endura Prime-Lock with Prime-Lock Additive
   b. 1st Coat: Endura EX-2C
   c. 2nd Coat: Endura EX-2C

O. Paint 30 (P30) Exterior ferrous and non-ferrous metal
   1. Two-component, waterbased acrylic urethane enamel
   2. Topcoat- Sherwin Williams Pro Industrial Water Based Acrolon 100 Urethane
   3. Sheen- Flat, Satin, Semi-Gloss and Gloss
   4. Surface preparation-Follow manufacturers written recommendation.
   5. Surface material- Ferrous and non-ferrous metal
      a. Primer: SW Pro Industrial Pro-Cryl Universal Primer
      b. 1st Coat: SW Pro Industrial Water Based Acrolon 100 Urethane
      c. 2nd Coat: SW Pro Industrial Water Based Acrolon 100 Urethane
P. Paint 31 (P31) Exterior Gypsum Board, Plaster or EIFS
   1. Acrylic

2. Topcoat- Sherwin Williams A-100 Exterior Latex
3. Sheen- Flat, Satin or Gloss
4. Surface preparation-Follow manufacturers written recommendation.
5. Surface material- Gypsum Board, Plaster or EIFS
    a. Primer: SW Loxon Concrete and masonry Primer Sealer
    b. 1st Coat: SW A-100 Exterior Latex
    c. 2nd Coat: SW A-100 Exterior Latex

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Surface Preparation

1. Existing painted walls, ceilings and floors.
    a. Clean and prime all existing painted surfaces prior to applying new paint.
    b. Primer must be as recommended by paint manufacturer for adhesion to existing surface.

2. Existing hollow metal frames: SSPC-SP3 Power Tool Clean:
    a. Power tool cleaning removes all loose mill scale, loose rust and other detrimental foreign matter. Before power tool cleaning, remove visible oil, grease, soluble welding residues and salts by methods outlined in SSPC-SP1. For complete instructions, refer to Steel Structures Paint Council Surface preparation Specification No. 3.

C. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime.
2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

    a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
    c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
    c. If transparent finish is required, backprime with spar varnish.
    d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
    e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

    a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

E. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

F. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
    a. Refer to Mechanical Specifications.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
    a. Refer to Electrical Specifications.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 9100