ADDENDUM NUMBER 2 **Thursday, April 19, 2018**

PROJECT:
FAIRHOPE LIBRARY ENVELOPE REPAIRS
FAIRHOPE, ALABAMA
GMC PROJECT NO. AMOB170026

AD2-1 GENERAL:

A. The following revisions and/or additions to the Drawings and Project Manual are hereby made a part of same, and shall be incorporated in the Work of the Contract the same as if originally included in the Bid and Construction Documents.

B. Bidders shall acknowledge receipt of the Addendum in writing, as provided on the Acknowledgment Receipt.

C. When a revision and/or addition is called for to the Drawings or Project Manual, they shall be fully coordinated with and carried through all applicable Drawings and portions of the Project Manual.

AD2-2 CLARIFICATIONS:

A. Bid date has been changed to **Tuesday, May 8, 2018 at 2pm.**

B. Question:
Will you clarify, the print says to tear out wet insulation on low roof and replace with new, but spec says to replace all insulation on low?
Answer: Roof Area "A" – Remove areas of wet insulation only.

C. Question:
Please confirm for Roof D on the front wall, are you wanting to make a new coping for it, or do you want us to use a counter flashing front and back?
Answer: Provide and install new coping and counter flashing, and integrate with existing roofing systems to remains.

AD2-3 SPECIFICATIONS:

A. Add Section 08410 – Aluminum Entrances and Storefronts
B. Add Section 08800 – Glass and Glazing
C. Add Section 08920 – Glazed Aluminum Curtainwall System

AD2-4 ATTACHMENTS:

A. Addendum Acknowledgment Response

B. Section 08410 – Aluminum Entrances and Storefronts
C. Section 08800 – Glass and Glazing
D. Section 08920 – Glazed Aluminum Curtainwall System

END OF ADDENDUM

PREPARED BY

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FASCIMILE TRANSMITTAL COVER SHEET

DATE: **April 19, 2018**

TO: **Katie Fowler**

FROM: **Planholder**

PROJECT: **FAIRHOPE LIBRARY ENVELOPE REPAIRS**
For FAIRHOPE, ALABAMA
GMC PROJECT NO. AMOB170026

RE: **ADDENDUM NO. 2 AND ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM NO. 2**

ACKNOWLEDGEMENT OF RECEIPT:

PLEASE PRINT RECIPIENT'S NAME, FIRM, AND DATE RECEIVED.

THEN FAX BACK TO (251) 460-4423 or EMAIL Katie.Fowler@gmcnetwork.com
FOR OUR RECORDS AND TO ACKNOWLEDGE YOUR RECEIPT OF THIS ADDENDUM.

_____ _____

NAME *(PLEASE PRINT)*

_____ _____

FIRM *(PLEASE PRINT)*

_____ _____

DATE RECEIVED *(PLEASE PRINT)*

Pages to follow this page _____

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. Related work specified elsewhere includes:

1. Section 04200 - "Unit Masonry"
3. Section 06100 - "Rough Carpentry"
4. Section 07900 - "Joint Sealers"
5. Section 08710 - "Finish Hardware"
6. Section 08800 - "Glass and Glazing"
7. Section 08920 - "Glazed Aluminum Curtain Wall System"

1.2 SUMMARY:

A. This Section includes design and installation of the following types of prefinished, non-thermally broken aluminum entrance and storefront systems, which are of hurricane, wind, and wind-blown "large missile" resistant design and installation and outside glazed at exterior; and prefinished aluminum entrance and storefront systems inside glazed at interior:

1. Flush center-glazed aluminum entrances and storefront, with special beveled stops at doors only; Muntins (if any) only as indicated on the Drawings:

a. Hurricane, wind, and wind-blown "large missile" resistant, wide stile exterior entrance doors with continuous-type hinge design, and door frames (not thermally broken);

1) 9/16-inch laminated clear transparent Low-E glass, heat strengthened or fully tempered glass (as required by glass size and code) for exterior doors is specified in Division 8 Section "Glass and Glazing".

b. Hurricane, wind, and wind-blown "large missile" resistant, outside glazed transoms, sidelights and frames for entrances and storefront framing systems, at exterior; not thermally broken.

2. If indicated, prefinished aluminum faced insulated panels in storefront framing system.

3. Sub-Sill: At all sill locations (whether or not indicated on the Drawings) provide matching 0.040-inch (minimum) brake-metal, with hemmed edges, turned up at rear and ends, and angled down at extended front/exterior edge. Set in solid bed of silicone sealant.

B. The extent of aluminum entrances and storefront is indicated on the Drawings.

C. Glazing shall be as specified elsewhere, but no less than 1-5/16 inches over-all insulated units at exterior, 9/16-inch minimum thickness at exterior doors, and 1/4-inch minimum at interior frames and doors.

1.3 SYSTEM PERFORMANCE REQUIREMENTS:

A. General: Design and provide aluminum entrance and storefront assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock or custom assemblies according to test methods indicated; Hurricane, wind, and wind-blown "large missile" resistant at exterior locations.

B. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range.

1. The system shall be capable of withstanding a metal surface temperature range of 180 deg F (100 deg C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.

C. Design Requirements: Provide aluminum entrance and storefront systems that comply with structural performance (with reinforcing as necessary), air infiltration, and water penetration requirements indicated.

1. Wind Loads: Provide aluminum entrance and storefront assemblies capable of withstanding wind pressures of no less than 40 psf inward and 40 psf outward acting normal to the plane of the wall; **Design wind load at the project site is 160 mph** (minimum), unless greater loads are indicated on Structural Drawings or otherwise required by applicable building codes or authorities having jurisdiction.

D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E 330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2 percent of their clear span.

1. Deflection Normal to the Plane of the Wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the wind load specified above. Deflection shall not exceed 1/360 of the clear span, when subjected to uniform load deflection test.

2. Deflection Parallel to the Plane of the Wall: Test pressures required to measure deflection parallel to the plane of the wall shall be equal to 1.5 times the wind pressures specified above. Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75 percent of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 1/8-inch. The clearance between the member and an operable door or window shall be at least 1/16-inch.

E. Air Infiltration: Provide aluminum entrance and storefront framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at a static air pressure differential of 6.24 psf.

F. Water Penetration: Provide framing systems with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at a minimum static air pressure differential of 12 psf, as defined by AAMA 501.

G. Condensation Resistance: Where framing systems are of "thermal-break" construction, provide units tested for thermal performance in accordance with AAMA 1503 showing condensation resistance factor (CRF) of not less than 45.

1.4 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

1. Product data for each aluminum entrance and storefront system required, including:

   a. Manufacturer's standard details and fabrication methods.
   b. Data on finishing, hardware and accessories.
   c. Recommendations for maintenance and cleaning of exterior surfaces.

2. Shop drawings for each aluminum entrance and storefront system required, including:

   a. Layout and installation details, including relationship to adjacent work.
   b. Elevations at 1/4-inch scale.
   c. Detail sections of typical composite members.
   d. Anchors and reinforcement.
   e. Hardware mounting heights.
   f. Provisions for expansion and contraction.
   g. Glazing details, including in part, special beveled stops for doors, and any muntins.

3. Hardware Schedule: Submit complete hardware schedule organized into sets based on hardware specified. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Include item name, name of the manufacturer and complete designations of every item required for each door opening.

4. Samples for Color Selection: Submit pairs of samples of each specified color and finish on 12-inch-long sections of extrusions or formed shapes. Where normal color variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of color variations.

5. Samples for Verification Purposes: The Architect reserves the right to require samples, that show fabrication techniques and workmanship, and design of hardware and accessories.

6. Test Reports: Provide certified test reports from a qualified independent testing laboratory showing that aluminum entrance and storefront systems have been tested in accordance with specified test procedures and comply with performance characteristics indicated.

1.5 QUALITY ASSURANCE:

A. Installer Qualifications: Engage an Installer with at least five (5) years experience in and who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer's Qualifications: Provide aluminum entrances and storefront systems produced by a firm with at least five (5) years experience in manufacturing systems that are similar to those indicated for this project and that have a record of successful in-service performance.

C. Single Source Responsibility: Obtain aluminum entrance and storefront systems, and structural sealants, from one source and from a single manufacturer.

D. Design Criteria: The drawings indicate the size, profile, and dimensional requirements of aluminum entrance and storefront work required and are based on the specific types and models indicated. Aluminum entrance and storefront by other manufacturers may be considered, provided deviations in dimensions and profiles are minor and do not change the design concept, as judged solely by the Architect. The burden of proof of equality is on the proposer.

E. Refer to Division 1 Section "Special Conditions", for additional information and minimum experience requirements.

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.

B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.

1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.7 PROJECT CONDITIONS:

A. Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.

1. Coordinate fabrication tolerances to ensure proper fit.

1.8 WARRANTY:

A. Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:

1. Structural failures including excessive deflection, excessive leakage or air infiltration.

2. Faulty operation.

3. Deterioration of metals, metal finishes and other materials beyond normal weathering.

B. Warranty Period: 3 years after the date of project Substantial Completion.

1. Finish Warranty: 10 years after date of project Substantial Completion.

C. The above warranty shall be in addition to, shall be in effect simultaneously with, and shall not alter other project or product warranties or guarantees, nor shall it serve as a limitation to other remedies available to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide entrance and storefront systems manufactured by one of the following:

1. Amarlite Architectural Products.
2. Atlas Architectural Metals, Inc.
3. EFCO Corporation.
4. Kawneer Company, Inc., an Alcoa company.
5. TRACO
6. United States Aluminum Corp.
7. Vistawall Architectural Products
8. YKK Architectural Products

B. Product/Manufacturer: Provide one (1) of the following systems, or pre-approved equivalent by one (1) of the above named manufacturers.

1. Exterior Entrances and Storefront: 2-1/2-inches x 5-inches nominal; flush center-glazed, and as indicated, with stiffeners and/or structural reinforcement as required to comply with project loads, and windload and large missile impact requirements:

a. EFCO Series 525.
b. Kawneer IR501.
c. U.S. Aluminum IG600.

2.2 MATERIALS:

A. Aluminum Members: Alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for aluminum extrusions, ASTM B 209 for aluminum sheet or plate, and ASTM B 211 for aluminum bars, rods and wire.

B. Carbon steel reinforcement of aluminum framing members shall comply with ASTM A 36 for structural shapes, plates and bars, ASTM A 611 for cold rolled sheet and strip, or ASTM A 570 for hot rolled sheet and strip.

C. Glass and Glazing Materials: Comply with requirements of Section 08800 - “Glass and Glazing” of these specifications.

D. Panel Core Material: Rigid, closed-cell polyurethane insulation.

E. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.

1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 0.125- inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.

2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.

F. Concealed Flashing: 0.0179-inch (26 gage) minimum dead-soft stainless steel, or 0.026-inch-thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

G. Brackets and Reinforcements: Provide high-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 123.

H. Concrete and Masonry Inserts: Provide cast iron, malleable iron, or hot-dip galvanized steel inserts complying with ASTM A 123.

I. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

J. Sliding Weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

2.3 HARDWARE:

A. Finish Hardware Schedule (per door): Equivalent to the following, **EXCEPT as modified and upgraded by the storefront supplier to comply with the required large missile impact rated exterior door assemblies and systems**.

1 Each Continuous Geared Hinge	Select Products #SL11HD - length as required, with custom paint finish to match specified storefront framing/door finish.
1 Closer (surface type)	LCN 4040 with adjustable hold-open, matching cover, and R.A.L. custom color paint finish to match framing/door finish.
1 Threshold	S405A x EID x LAR, or S245A x LAR, as required.
1 Push/Pull Bar	Kawneer Style C010, satin chrome finish (626). (exterior side)

1 Push Bar	Kawneer Style CP II, satin chrome finish (626). (interior side)
1 Deadlock	Adams-Rite 1850A (at exterior doors only; at active leaf only).
2 Flushbolts	555 - Radius Front (at exterior doors only, inactive leaf only).
1 Door Bottom	Manufacturer's standard EPDM blade gasket sweep strip.
1 Set Weatherstripping (single acting doors)	"Sealair" system in door and frame, with continuous dense, bulb polymeric material.
1 Set Weatherstripping (double acting doors)	Pile cloth system in door and frame, continuous.

B. Accessories: As required by project conditions.

2.4 COMPONENTS:

A. Storefront Framing System: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include subframes and other reinforcing members of the type indicated. Provide for flush glazing storefront from the interior on all sides without projecting stops. Shop-fabricate and preassemble frame components where possible. Provide storefront frame sections without exposed seams.

1. Mullion Configurations (if any mullions are indicated on the Drawings): Provide pockets at the inside glazing face to receive resilient elastomeric glazing. Mullions and horizontals shall be one piece. Make provisions to drain moisture accumulation to the exterior.

2. Infill Panels: Provide flush-laminated infill panels of thickness indicated, or if not indicated, insulated and same thickness of glazing in same frame; Fabricated with panel core material laminated with waterproof glue between two sheets of prefinished aluminum, equivalent to standard products of Mapes Architectural Products; Lincoln NE; Phone: 1-800-228-2391 or (402) 466-1985.

B. Entrance Door Frames: Provide tubular and channel frame entrance door frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce as necessary to support required loads, and reinforce at all door jambs.

C. Stile-and-Rail Type Entrance Doors (if any): Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts. Provide special beveled stops for doors; and muntins at locations where any muntins are indicated on the Drawings.

1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide beveled, snap-on, extruded aluminum glazing stops, with exterior stops anchored for nonremoval.

2. Design: Provide 1-3/4-inches-thick doors of design indicated.

a. Wide stile; 5-inch wide face, unless indicated otherwise.

b. Bottom Door Stile: 10-inches total height, MINIMUM, unless greater height is otherwise indicated on the Drawings.

2.5 FABRICATION:

A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes and profile requirements are indicated on the drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work.

B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.

1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.

2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.

C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.

1. Welding behind finished surfaces shall be performed in such a manner as to minimize distortion and discoloration on the finished surface.

D. Reinforcing: Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.

E. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a nonabsorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead, or asbestos.

F. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.

G. Fasteners: Conceal fasteners wherever possible.

H. Weatherstripping: For exterior and vestibule doors, provide compression weatherstripping against fixed stops. At other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

1. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail (not face applied), adjustable for contact with threshold.

2. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

2.7 FINISHES:

A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Class 1 clear anodized finishes shall be included in color/finish selections for Architect's and Owner's selections Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Provide samples of final selected finishes for architect's verification; Refer to "Submittals" paragraph above.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates and supports, with the Installer present, for compliance with requirements indicated, installation tolerances, and other conditions that affect installation of aluminum entrances and storefronts. Correct unsatisfactory conditions before proceeding with the installation.

1. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION:

A. Comply with manufacturer's current written instructions and recommendations for installation, for each product and system.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines and grades indicated. Provide proper support and anchor securely in place.

C. Construction Tolerances: Install aluminum entrance and storefront to comply with the following tolerances:

1. Variation from Plane: Do not exceed 1/8-inch in 12 feet of length or 1/4-inch in any total length.

2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16-inch.

3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8-inch.

4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32-inch.

D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

1. Zinc or cadmium plate steel anchors and other unexposed fasteners after fabrication.

2. Paint dissimilar metals where drainage from them passes over aluminum.

3. Paint aluminum surfaces in contact with mortar, concrete or other masonry with alkali resistant coating.

4. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subject to wetting, with two coats of aluminum house paint. Seal joints between the materials with approved sealant.

E. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

F. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

G. Refer to "Glass and Glazing" Section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.

1. Refer to Drawings for locations of insulated panels which may occur in place of glazing and/or at interior side behind glazing in applied stops.

3.3 ADJUSTING:

A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.4 CLEANING:

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" Section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.5 PROTECTION:

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF ALUMINUM ENTRANCES AND STOREFRONTS

SECTION 08800

GLASS AND GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

B. Related work specified elsewhere includes:

1. Section 06400 - "Architectural Woodwork"
2. Section 07900 - "Joint Sealers"
3. Section 08410 – "Aluminum Entrances and Storefronts"

1.2 SUMMARY:

A. Extent of glass and glazing work is indicated on drawings and schedules.

B. Types of work in this section include glass and glazing, (**hurricane / large missile impact resistant rated and Low E at exterior**) for:

1. Steel and aluminum doors, frames, entrances, sidelites and view windows.
2. Wood doors, frames, sidelites and view windows.
3. Fiberglass doors and frames.
4. Ticket window.
5. Glazing accessories.

C. General Locations - Glazing Types:

1. Insulating Glass Assemblies shall be used at all exterior openings.

   a. Wind and wind-blown "large missile impact" resistant glass and glazing systems.

2. Single Pane Glass shall be used at all interior locations, and at interior doors.
3. Refer to Drawings and Specifications for locations where heat treated/tempered glass, etc., are required.

D. Insulting Glass Assemblies - Glass Colors:

1. Typical exterior glass shall be as follows:

a. Exterior Pane: 1/4-inch minimum thickness (color to match existing) glass, with pyrolytic coating on second surface; heat strengthened or fully tempered glass (as required by glass size and code), and as specified;
b. Air Space: 1/2-inch.
c. Interior Pane Assembly: 9/16-inch laminated clear transparent glass, heat strengthened or fully tempered glass (as required by glass size and code).

1) 1/4-inch (6-mm) clear transparent outboard pane, with "Solarban 60" Low E coating sputtered on No. 3 surface;
2) 0.300 interlayer of "Saflex HP" by Solutia;
3) 1/4-inch (6-mm) clear transparent inboard pane, and as specified.

2. Exterior glass indicated to be "frosted," "obscure," or "etched," shall be as specified at Paragraph 2.5-C2 "Etched Glass," which requires smooth, satin sandblasted finish on the exterior side of the inside pane, either the No. 3 surface if it will not interfere with the Low E coating, or on the No. 5 surface.

3. Where spandrel glass (opaque) is indicated, it shall be as specified and as follows:

a. Exterior Pane: Typical exterior pane (see above), and as specified.
b. Air Space: 1/2-inch.
c. Interior Pane: Typical interior pane (see above), with smooth, satin sandblasted finish on the exterior side of the inside pane, either the No. 3 surface if it will not interfere with the Low E coating, or on the No. 5 surface., and as specified.

Interior side of interior pane shall be a black opacifier ceramic frit, as approved by Architect.

d. No light shall be visible through opacifier.

E. Single Pane Glass Assemblies - Glass Colors:

1. Typical glass at exterior doors shall be as follows:

a. 9/16-inch laminated clear transparent glass, heat strengthened or fully tempered glass (as required by glass size and code).

1) 1/4-inch (6-mm) clear transparent outboard pane, with "Solarban 60" Low E coating sputtered on No. 3 surface;
2) 0.100 interlayer of "Saflex HP" by Solutia;
3) 1/4-inch (6-mm) clear transparent inboard pane, and as specified.

2. Typical interior glass and glass at interior doors shall be as follows:

a. 1/4-inch clear transparent glass, as specified.
b. Glass at doors shall be fully tempered.
c. Glazing at interior fire-rated doors and openings in fire-rated walls shall be clear transparent fire and impact resistant glazing.

3. Glass indicated to be "frosted," "obscure," or "etched," including any graphic logo (as indicated on the Drawings, if any), as specified in Paragraph 2.5-C2 "Etched" Glass, which requires smooth, satin sandblasted finish on one side.

1.3 SYSTEM DESCRIPTION:

A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

1. Normal thermal movement is defined as that resulting from an ambient temperature range of 120^{O}F (67^{O}C) and from a consequent temperature range within glass and glass framing members of 180^{O}F (100^{O}C), minimum. Modify as required for more extreme conditions.

2. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any, resulting from seal failure, and any other visual evidence of seal failure or performance.

3. Deterioration of coated glass is defined as the development of manufacturing defects including peeling, cracking or other indications of deterioration in metallic or other coating due to normal conditions of use.

1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.

B. Samples: Submit, when requested by Architect, for verification purposes, 12-inch square samples of each type of glass indicated except for clear single pane units, and 12-inches long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.

C. Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.

D. Certification data for glass manufacturers, fabricators, installers, testing agencies and similar firms which are required to be involved, as listed in part, in Quality Assurance article.

E. Warranty: Submit sample of manufacturer's warranty for each product for which a warranty is either required by these Specifications or otherwise available from the manufacturer.

1.5 QUALITY ASSURANCE:

A. General: All glass shall comply with FS DD-G-451, except where more stringent standard is indicated or required by authorities having jurisdiction.

1. At locations where glass size cannot be supplied as indicated, provide similar glass in better quality and/or greater thickness; Coordinate with glass framing.

2. Furnish each piece of glass with a label indicating type, quality, thickness, etc., and do not remove until after written approval is received from Architect and Owner's representative.

B. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

C. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

D. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

E. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

F. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual", and SIGMA TM-3000, "Vertical Glazing Guidelines", except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

G. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

H. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of the inspecting and testing organization indicated below:

1. Insulating Glass Certification Council (IGCC).

a. Certification: CBA.

I. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

J. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

K. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

L. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install glazing as a part of a 10' x 10' mockup specified in or to include wall construction components as indicated in Divisions 3, 4 and 8, and to match glazing systems required for Project, including glazing methods.
2. Accepted mock-ups are to be retained on site as examples of quality and finished appearance in the finished work. Mock-ups are to be taken down and legally disposed of off Owner's property when acceptable to or directed by the Architect.

M. Preinstallation Conference: Notify all parties required to attend at least 10-days prior to the date of the Preinstallation Conference. Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review all coordination issues with the work of other trades, each of whom is to be in attendance.
3. Review temporary protection requirements for glazing during and after installation.
4. Review any issues involved in completing the work, resolve those issues or set a date when they will be resolved.
5. Provide typed minutes of the Preinstallation Conference, and provide copies to the Owner's Representative, Architect and each Subcontractor and supplier for glass and glazing and contiguous work, each of whom are required to attend the preinstallation conference.

N. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 for **140 miles per hour Wind Zone** when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Large-Missile Test: For all glazing, regardless of height above grade.

O. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

P. Subcontractor Qualifications: Glazing Subcontractors shall comply with experience requirements for work on this project as stated in Section 01015 - "Special Conditions."

1.6 DELIVERY, STORAGE, AND HANDLING:

A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1. Where insulating glass units will be exposed to substantial altitude changes, avoid hermetic seal ruptures by complying with insulating glass fabricator's recommendations for venting and sealing.

1.7 PROJECT CONDITIONS:

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.8 WARRANTY:

A. General: Warranties shall run concurrently with other warranties made by the Contractor under requirements of the Contract Documents, and shall be in addition to and not a limitation of other rights the Owner may have under the Contract Documents or otherwise.

1. Manufacturer's Special Project Warranty on Coated Glass Products: Provide written warranty signed by manufacturer of each type of coated glass agreeing to furnish F.O.B. point of manufacture, with freight provided to project site, within specified warranty period indicated below, replacements and all installation costs and expenses for those coated glass units which develop manufacturing defects. Manufacturing defects are defined as peeling, cracking, wrinkling, discoloring, staining, or deterioration in metallic, or opacifier coating due to normal conditions

and not due to handling or installation or cleaning practices contrary to glass manufacturer's published instructions.

a. Warranty Period: Manufacturer's standard but not less than **10-years** after date of project substantial completion.

2. Manufacturer's Special Project Warranty on Insulating Glass: Provide written warranty signed by manufacturer of insulating glass agreeing to furnish F.O.B. point of manufacture, with freight provided to project site, within specified warranty period indicated below, replacements and all installation costs and expenses for those insulating glass units developing manufacturing defects. Manufacturing defects are defined as failure of hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.

a. Warranty Period: Manufacturer's standard but not less than **10-years** after date of substantial completion.

3. Manufacturer's Special Project Warranty on Laminated Glass: Provide written warranty signed by manufacturer of laminated glass agreeing to furnish F.O.B. point of manufacturer, with freight provided to project site, within specified warranty period indicated below, replacements and all installation costs and expenses for those laminated glass units which develop manufacturing defects. Manufacturing defects are defined as delamination, discoloring, staining, or deterioration in laminated glass units, due to normal project conditions and not due to handling or installation or cleaning practices contrary to glass manufacturer's published instructions.

a. Warranty Period: Manufacturer's standard but not less than **10-years** after date of entire project's substantial completion.

4. Replacements Under Warranties: Glass units replaced under Warranty provisions shall be required to carry the same warranty as original glass and glazing, beginning from the date of replacement completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Manufacturers of Clear and Tinted Float Glass:

a. AFG Industries, Inc.
b. Ford Glass Division.
c. Guardian Industries Corp.
d. LOF Glass, Inc.
e. Oldcastle Glass
f. PPG Industries, Inc.
g. Saint-Gobain/Euroglass.

2. Manufacturers of Fire-Rated and Impact Resistant Glass:

a. AFG Industries, Inc.
b. Blue Ridge.
c. Guardian Industries Corp.
d. Hordis Brothers, Inc.
e. **Pilkington Sales (North American) Limited**.

3. Manufacturers of Heat-Treated Glass:

a. AFG Industries, Inc.
b. Cardinal IG.
c. Environmental Glass Products.
d. Falconer Glass Industries.
e. Ford Glass Division.
f. Guardian Industries Corp.
g. Hordis Brothers, Inc.
h. LOF Glass, Inc.
i. Oldcastle Glass
j. PPG Industries, Inc.
k. Saint-Gobain/Euroglass.
l. Spectrum Glass Prod. Div., H. H. Robertson Co.
m. Viracon, Inc.

4. Manufacturers of Coated Glass:

a. Advanced Coating Technology.
b. Cardinal IG.
c. Environmental Glass Products.
d. Falconer Glass Industries.
e. Ford Glass Division.
f. Guardian Industries Corp.
g. Hordis Brothers, Inc.
h. Independent Insulating Glass.
i. Interpane Coatings, Inc.
j. LOF Glass, Inc.
k. Oldcastle Glass
l. PPG Industries, Inc.

m. Saint-Gobain/Euroglass.
n. Spectrum Glass Prod. Div.; H.H. Robertson Co.
o. Viracon, Inc.

5. Manufacturers of Insulating Glass:

a. Advanced Coating Technology.
b. AFG Industries, Inc.
c. Cardinal IG.
d. Environmental Glass Products.
e. Falconer Glass Industries.
f. Ford Glass Division.
g. Guardian Industries Corp.
h. Hordis Brothers, Inc.
i. Independent Insulating Glass.
j. Oldcastle Glass
k. PPG Industries, Inc.
l. Spectrum Glass Prod. Div.; H.H. Robertson Co.
m. Viracon, Inc.

2.2 GLASS PRODUCTS, GENERAL:

A. Primary Glass Standard: Provide primary glass which complies with FS DD-G-451 and ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.

B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable, form, finish, and pattern.

C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

D. Windborne-Debris-Impact Resistance: Refer to “Quality Assurance” Paragraph above.

2.3 PRIMARY GLASS PRODUCTS:

A. Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

B. Tinted Float Glass: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), in color acceptable to Owner and Architect, and as follows:

1. Gray: Equivalent to match existing glass as manufactured by PPG Industries, Inc.; Manufacturer's standard tint, with visible light transmittance of 54-55 percent and shading coefficient of 0.71-0.74 for 1/4-inch thick glass.

C. Fire-Rated Impact Resistant Glass: Type II, Class 1 (translucent), Quality q8 (glazing); complying with ANSI Z97.1 and testing standard indicated; of form indicated below:

1. "Firelite Plus Glass", 5/16" thick, clear premium polished, or preapproved and equivalent similar product or laminated intumescent product.
2. Location: Fire-rated doors, and otherwise as indicated or required.

D. Ceramic-Coated Spandrel Glass - General: ASTM C 1048, Condition B (spandrel glass, one surface ceramic coated), Type I (transparent flat glass), Quality-Q3, and complying with other requirements specified.

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
2. Products - At locations indicated on the Drawings:

a. Black, Lead-Free Spandrel Glass, sputtered on interior surface of interior pane.
b. No light shall be visible through opacifier.

E. Windborne-Debris-Impact Resistant Glass - General: 9/16-inch minimum, laminated clear transparent glass, heat strengthened or fully tempered glass (as required by glass size and code).

1. 1/4-inch (6-mm) clear transparent outboard pane, with "Solarban 60" Low E coating sputtered on No. 3 surface;
2. 0.300 interlayer of "Saflex HP" by Solutia;
3. 1/4-inch (6-mm) clear transparent inboard pane, and as specified.

F. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted and clear transparent glass, relative to visible light transmittance, U-values, shading coefficient and visible reflectance.

2.4 HEAT-TREATED GLASS PRODUCTS:

A. Manufacturing Process: Manufacture heat-treated glass as follows:

1. By horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.

B. Coated and Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below.

1. Types:

a. Fully Tempered at interior; Heat strengthened or fully tempered glass (as required by glass size and code) at exterior.

2. Thickness: 1/4-inch, unless indicated otherwise.

C. Windborne-Debris-Impact Resistant Glass: As indicated.

2.5 SEALED INSULATING GLASS UNITS:

A. General: All units shall be preassembled consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.

1. For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this section and in Sections where the materials are provided, applicable to types, classes, kinds and conditions of glass products indicated.
2. Provide heat-treated panes of type and at locations indicated or, if not indicated, provide heat-strengthened panes where recommended by manufacturer for application indicated and tempered where indicated or where safety glass is designated or required.
3. Performance characteristics designated for insulating glass are nominal values based on manufacturer's published test data for units with 1/4-inch thick panes of glass and 1/2-inch thick air space.

    a. U-values indicated are expressed in the number of Btu's per hour per square feet per degree F difference.

4. Performance Classification per ASTM E 774: Class A.

    a. Thickness of Each Pane: 1/4-inch minimum at exterior and 9/16-inch at interior, unless indicated otherwise.
    b. Air Space Thickness: 1/2-inch minimum, unless indicated otherwise.
    c. Sealing System: Manufacturer's standard, in compliance with referenced standards.
    d. Spacer Material: Aluminum, in compliance with referenced standards, same color as exposed framing where it occurs.
    e. Desiccant: Manufacturer's standard; either molecular sieve or silica gel or blend of both. Comply with requirements of referenced standards.
    f. Corner Construction: Manufacturer's standard corner construction.

B. Coated and Uncoated Insulating Glass Units: Manufacturer's standard units complying with the following requirements:

1. Typical Exterior Insulating Glass:

   a. Exterior Pane: 1/4-inch minimum thickness "Solargray" (cool gray tinted) glass, with pyrolytic coating on second surface; heat strengthened or fully tempered glass (as required by glass size and code), and as specified;
   b. Air Space: 1/2-inch.
   c. Interior Pane Assembly: 9/16-inch laminated clear transparent glass, heat strengthened or fully tempered glass (as required by glass size and code).

      1) 1/4-inch (6-mm) clear transparent outboard pane, with "Solarban 60" Low E coating sputtered on No. 3 surface;
      2) 0.100 interlayer of "Saflex HP" by Solutia;
      3) 1/4-inch (6-mm) clear transparent inboard pane, and as specified.

2. Exterior glass indicated to be "frosted," "obscure," or "etched," shall be as specified at Paragraph 2.5-C2 "Etched Glass," which requires smooth, satin sandblasted finish on the exterior side of the inside pane, either the No. 3 surface if it will not interfere with the Low E coating, or on the No. 5 surface.
3. Where spandrel glass (opaque) is indicated, it shall be as specified and as follows:

   a. Exterior Pane: Typical exterior pane (see above), and as specified.
   b. Air Space: 1/2-inch.
   c. Interior Pane: Typical interior pane (see above), with smooth, satin sandblasted finish on the exterior side of the inside pane, either the No. 3 surface if it will not interfere with the Low E coating, or on the No. 5 surface., and as specified.

      Interior side of interior pane shall be a black opacifier ceramic frit, as approved by Architect.

   c. No light shall be visible through opacifier.

4. Performance Characteristics: As specified herein and as indicated in specification sections where insulated glazing is provided.

2.6 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES:

A. General: Provide products of type indicated and complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.

3. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.
4. Colors: Provide color of exposed sealants indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.
5. Asbestos prohibited: Refer to Section 01015 - "Special Conditions," for requirements.

B. Glazing Sealant: Use only the following materials, or pre-approved substitutes:

1. One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A, and, as applicable to uses indicated, O; and complying with the following requirements for modules and additional joint movement capability.

   a. Low Modules: Tensile strength of 45 psi or less at 100-percent elongation when tested per ASTM D 412 after 14-days at 77°F (20°C) and 50-percent relative humidity.
   b. Additional capability, when tested per ASTM C 719 for adhesion and cohesion under maximum cyclic movement, to withstand the following percentage increase and decrease of joint width, as measured at time of application, and remain in compliance with other requirements of ASTM C 920.

2. Preformed Butyl-Polyisobutylene Glazing Tape: Provide manufacturer's standard solvent-free butyl-polyisobutylene formulation with a solids content of 100- percent; complying with AAMA A 804.1; in extruded tape form; non-staining and non-migrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without continuous spacer rod as recommended by manufacturers of tape and glass for application indicated.

C. Products: Subject to compliance with requirements, provide one of the following:

1. One-Part Non-Acid Curing Low-Modules Silicone Glazing Sealant:

   a. "Chem-Calk 1000"; Bostik Construction Products Div.
   b. "Dow Corning 790"; Dow Corning Corp.
   c. "864"; Pecora Corp.
   d. "Omniseal"; Sonneborn Div., BASF Building Systems
   e. "Spectrum 1"; Tremco, Inc.

2. Preformed Butyl-Polyisobutylene Glazing Tape Without Spacer Rod:

   a. "Chem-Tape 40"; Bostik Construction Products Div.
   b. "Extru-Seal"; Pecora Corp.
   c. "PTI 303" Glazing Tape; Protective Treatments, Inc.
   d. "Tremco 440 Tape"; Tremco Inc.

3. Preformed Butyl-Polyisobutylene Glazing Tape With Spacer Rod:

   a. "Chem-Tape 60"; Bostik Construction Products Div.
   b. "Shim-Seal"; Pecora Corp.
   c. "PTI 303" Shim Tape; Protective Treatments, Inc.
   d. "Pre-shimmed Tremco 440 Tape"; Tremco Inc.

2.7 GLAZING GASKETS:

A. Dense Elastomeric Compression Seal Gaskets: Molded or extruded neoprene or EPDM gaskets, complying with ASTM C 864, of profile and hardness required to maintain watertight seal.

B. Cellular Elastomeric Preformed Gaskets: Extruded or molded closed cell, integral-skinned neoprene of profile and hardness required to maintain watertight seal; complying with ASTM C 509, Type II; black.

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

   1. Manufacturers of Preformed Gaskets:

      a. D. S. Brown Co.
      b. Maloney Precision Products Co.
      c. Tremco.

2.8 MISCELLANEOUS GLAZING MATERIALS:

A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.

D. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

E. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

F. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25- percent deflection.

2.9 GLAZING ACCESSORIES:

A. General: Provide accessories in quantities and at locations as indicated on the Drawings, including all components, templates, etc., required for complete and proper installation which is fully compatible with glazing at locations where accessories occur.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Require Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.3 GLAZING, GENERAL:

A. Comply with combined current printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

B. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.

C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Clean and trim excess glazing materials from glass, muntins, frames, etc., promptly after installation.

3.4 GLAZING:

A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6-inches from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50-united-inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.

F. Force sealants into glazing channels to eliminate voids and to ensure complete “wetting” or bond of sealant to glass and channel surfaces.

G. Tool exposed surfaces of sealants to provide a substantial “wash” away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.

H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not “walk” out when installation is subjected to movement.

I. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

J. Provide cut-outs, where required, install glazing accessories at locations indicated.

3.5 PROTECTION AND CLEANING:

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended in writing by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

E. Wash glass on both faces not more than 4-days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacturer.

END OF GLASS AND GLAZING

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SECTION 08920

GLAZED ALUMINUM CURTAIN WALL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Related work specified elsewhere includes:

1. Section 07600 - "Flashing and Sheet Metal"
2. Section 07900 - "Joint Sealers"
3. Section 08800 - "Glass and Glazing"

1.2 SECTION INCLUDES

A. Design and provide Exterior **Large Missile Impact rated Aluminum Curtain Wall System and assemblies**, with insulated large missile impact rated glazing to the exterior side, and entrances with wide-stile doors; 2-1/2" x 7" to 7-1/2" framing with clear anodized finish.

1. Exterior glazing is specified in Section 08800 - "Glass and Glazing", which is to be incorporated into the curtain wall system.
2. Prefinished insulated infill and spandrel panels shall be smooth, flush metal faced both sides in same premium metallic finish as curtain wall framing; Refer to Section 08800 - "Glass and Glazing".

B. Design and provide any Interior Vestibules indicated to be aluminum, as non-impact rated Aluminum Curtain Wall System, flush center-glazed, and interior entrances with wide-stile doors; 2-1/2" x 7" " to 7-1/2" framing; Matching exterior framing and finish.

1. Interior glazing shall be clear transparent tempered glass.

C. Storefront Doors and Frames:

1. Wide stile exterior entrance doors with continuous-type hinge design, door frames and Finish Hardware; **Large Missile Impact rated system and assemblies**.
2. Vestibule doors matching entrance doors, where vestibule doors are indicated (not thermally broken at interior).
3. All related hardware, hinges, closers, and accessories for a complete and properly functioning system as specified in this Section 08920, except for lock cylinders which are specified in Section 08710 - "Finish Hardware".

D. Sub-Sill: Matching 0.040-inch (minimum) brake-metal, with hemmed edges, turned up 1/2" at rear and angled down at extended front/exterior edge. Set in solid bed of silicone sealant.

E. Glazing Sealants shall be medium modulus silicone, colors as selected by Architect. Refer to Section 07900 - "Joint Sealers" for additional information and requirements.

1.3 REFERENCES

A. AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. AAMA 2605.2 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

C. AAMA SFM -1 - Aluminum Storefront and Entrance Manual.

D. ANSI A117.1 - Safety Standards for the Handicapped.

E. ANSI/ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

F. South Florida Building Code Test Protocols TAS 201, TAS 202 and TAS 203 and/or STM E-1886/E-1996.

G. For design reference, the wind speed at the location of this project is considered to be **130 mph**.

H. International Building Code, applicable to the project's locale.

1.4 SYSTEM DESCRIPTION

A. Aluminum Impact rated Curtain Wall system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory prefinished, vision glass, related flashings, anchorage and attachment devices. The system also will incorporate Heavy Duty impact resistant Entrance doors and framings. Refer to related specification sections for specific requirements, descriptions and hardware.

1.5 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Provide aluminum curtain wall systems that comply with performance requirements indicated, as demonstrated by testing manufacturer's assemblies in accordance with South Florida Building Code Test Protocols TAS 201, TAS 202 and TAS 203, or equivalent standards of ASTM E 1886/E 1996.

B. Wind Loads: Project design pressures are based on a **140 MPH** design wind load and design pressures as follows; **Fabricators shall be responsible for calculating their own loads and pressures based on their own design and materials**.

1. Refer to Structural Drawings for additional information and requirements. HOWEVER, **it is and remains the responsibility of each curtain wall supplier and installer to calculate their own loads and pressures** based on applicable codes and standards, and requirements of authorities having jurisdiction:

C. Deflection: Maximum allowable deflection in any member when tested in accordance with ASTM E 330-90 with allowable stress in accordance with AA Specifications for Aluminum Structures:

1. Without Horizontals: L/175 or 3/4" (19.1mm) maximum.
2. With Horizontals: L/175 or L/240 + 1/4" (6.4mm) for spans greater than 13'-6" (4.1m) but less than 40'-0" (12.2m).

D. Thermal Movement: Provide for thermal movement caused by 180 degrees F. (82.2 degrees C.) surface temperature, without causing buckling stresses on glass, joint seal failure, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or detrimental effects.

E. Air Infiltration: Completed curtain wall systems shall have 0.10 CFM/FT2 (0.18 m3/h·m2) maximum allowable infiltration when tested in accordance with ASTM E 283-91 at differential static pressure of 6.24 PSF (299 Pa).

F. Water Infiltration: No uncontrolled water, other than condensation, on indoor face of any component when tested in accordance with ASTM E 331-93 at test pressure differential of 12 PSF (958 Pa). Water test to be performed immediately after design pressure test.

1.6 SUBMITTALS

A Product Data: Submit complete product data for each type of curtain wall series and product specified or otherwise required. Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, hardware and hardware mounting heights, and expansion and contraction joint locations and details.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include Full size isometric details of each vertical to horizontal intersection of glazed aluminum curtain walls, showing at least the following:

a. Joinery, including concealed welds
b. Anchorage
c. Expansion provisions
d. Glazing
e. Flashing and drainage

C. Samples: For each type of exposed finish required

D. Delegated Design Submittal: For glazed aluminum curtain wall indicated to comply with performance requirements and design criteria, including analysis data signed, dated and sealed by the qualified professional engineer responsible for their preparation, who is currently registered in the State of Alabama.

E. Qualification Data: For qualified Professional Engineer, Manufacturer/Fabricator and Installer.

F. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

G. Product Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties, including impact testing as applicable.

H. Field Quality Control Reports.

I. Maintenance data.

J. Warranty: Submit samples of special warranties with language to be incorporated into the final close out warranty documents.

1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing aluminum Impact Rated curtain wall glazing systems with minimum 10 years verifiable experience and which has completed at least 10 verifiable projects within the past 5 years of similar extent, scope and complexity, with a successful record of in-service performance, and responsiveness to any maintenance and warranty issues.

1. Refer to Division 1 Section “Special Conditions” for additional information and minimum experience requirements.

B. Installer Qualifications: Manufacturer's authorized representative who has specialized in and is trained and approved for installation of units required for this project, with at least 10 verifiable years experience and which has completed at least 10 verifiable projects within the past 5 years of similar extent, scope and complexity, with a successful record of in-service performance, and responsiveness to any maintenance and warranty issues.

1. Refer to Division 1 Section "Special Conditions" for additional information and minimum experience requirements.

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

1. Unless otherwise indicated, the cost of testing shall be paid by the Owner.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. 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.

E. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories and fabrication. Comply with more stringent requirements if indicated.

F. Pre-Installation Meetings: Conduct pre-installation meeting at project site to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

G. Perform work in accordance with AAMA SFM 1 and AAMA-Metal Curtain Wall, Window and Storefront and Entrance-Guide Specifications Manual.

H. Products and installation under the work of this Section shall be in compliance with, in part, at least the more stringent provisions of the following, either the latest edition or latest adopted edition of the locality, and all revisions and amendments thereto:

1. Uniform Federal Accessibility Standards (UFAS).
2. Americans With Disabilities Act of 1990 (ADA) "Accessibility Guidelines" (ADA-AG), and all revisions and amendments thereto.
3. U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA "Accessibility Guidelines" (ADA-AG), Published in the Federal Register July 23, 2004, and revisions and amendments thereto.
4. American National Standards Institute (ANSI), ANSI A 117.1, 2003.
5. International Building Code, as applicable at the project locale.
6. Where this requires any substitution of products specified herein, advise Architect in writing for necessary approvals.

I. Mock-Ups (Field Constructed): Build mockups at project site at location as directed, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Utilize acceptable products and manufacturer approved installation methods, incorporating glass and glazing specified in Section 08800, and to match glazing systems required for Project, including glazing methods, and all components intended or otherwise required in the completed work.

1. Obtain Owner's and Architect's acceptance of finish color, and workmanship standard.
2. Mock-Up Size: As part of required 10' x 10' mock-up representative of exterior wall construction and materials which is called for in several Sections of the Project Manual.
3. Maintenance: Maintain mock-up during construction for workmanship comparison; Remove mockups when directed to do so.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C) during and 48 hours after installation.

1.9 FIELD MEASUREMENTS

A. Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.10 COORDINATION

A. Coordinate Work under provisions of General Conditions, and Section 01015.

B. Curtain wall and fabricator for any entrances shall be responsible for all machining and preps required for installation of any hardware.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect pre-finished aluminum surfaces with shrink-wrap packaging material or other means of providing adequate protection of the aluminum finish and glass to be removed prior to final closeout. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

B. Refer to Division 1 Sections "Summary of Work" and "Special Conditions" for additional information and requirements regarding stored materials.

1.12 WARRANTY

A. Aluminum Curtain Wall Special Warranty: As part of the project closeout documents, submit a written warranty, executed by the curtain wall manufacturer, agreeing to repair or replace system components, doors, window units, etc., that fail in materials or workmanship within the specified warranty period; Include coverage for complete system for failure to meet specified requirements; Failures include but are not necessarily limited to:

1. Structural failures including, excessive deflection, water leakage, air infiltration and/or condensation.
2. Delamination or failure of any laminated glass lites, and seal failure of insulated glass.
3. Deterioration of metals, metal finishes and other materials beyond normal weathering.

B. Deterioration of finishes includes, but is not limited to, the following:

1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

C. Warranty Period - From the date of Project Substantial Completion:

1. Curtain Wall and Components: **3 years**.
2. Insulated Glass and Glazing: **10 years**; Refer to Section 08800 - "Glass and Glazing".
3. Laminated Glass and Glazing: **10 years**; Refer to Section 08800 - "Glass and Glazing".
4. Kynar 500 Finishes: **20 years**.
5. Anodized Finishes (if any): **10 years**.

D. Provide manufacturers warranties from finish hardware supplier as follows:

1. Closers: **Ten years**
2. Exit Devices & Locksets: **Three years**
3. Locksets: **Three Years**.
4. All other Hardware: **One year**.

E. The warranties shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents, and shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contact Documents or otherwise.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, design and provide equivalent to large missile impact rated, 2-1/2" x 7" to 7-1/2" dimensions, aluminum curtain wall system and components by one of the following:

1. Arch Aluminum & Glass Co., Inc.
2. Architectural Metal Fabricators
3. CMI Architectural.
4. Kawneer North America; an Alcoa company.
5. Tubelite.
6. United States Aluminum.
7. Vistawall Architectural Products; division of Oldcastle Glass.
8. Wausau Window and Wall Systems.
9. YKK AP America Inc.

B. Subject to compliance with requirements, provide Large Missile Impact Rated Curtain doors and entrances, as Heavy Duty Aluminum Wide Stile Impact Rated Entrance Door and Frame assemblies and systems, by one of the above named manufacturers.

C. The drawings indicate the size, profile, and dimensional requirements of aluminum Curtain Wall system required and are based on the specific types and models indicated. Curtain wall by other manufacturers may be considered, provided deviations in dimensions and profiles are minor and do not change the design concept, as judged solely by the Architect.

1. Substitutions: Except for the basis of design product, to be considered for approval, the proposed product(s) must be properly submitted to the Architect for review not later than 10 days prior to the published bid date. Submittal shall include samples of the product(s) proposed, including the impact glazing, current independent test reports and certifications that the product complies with the requirements of this specifications. The burden of proof of equivalency is solely that of the proposer, and any subsequent acceptance for bidding shall only be in the form of Architect's written addendum. *NO VERBAL APPROVALS WILL BE ISSUED BY THE ARCHITECT.*
2. Refer to General Conditions and Division 1 Section "Special Conditions" for additional information and requirements regarding substitutions and submittals.

2.2 MATERIALS

A. Extrusions: ASTM B 221(ASTM B221M), 6063-T5 Aluminum Alloy.

B. Aluminum Sheet:

1. Anodized Finish: ASTM B 209 (ASTM B 209M) 5005-H14 Aluminum Alloy 0.050" minimum thickness

C. Manufacturer's Standard Accessories:

1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color. Joint fasteners may be concealed.
2. Sealant: Silicone sealant Non-Skinning type, AAMA 803.3 as recommended by Dow Corning, GE, or Equivalent for any Impact rated products. Refer to Division 7 Section "Joint Sealers" for additional information and sealant requirements.

    a. Single Component Medium Modulus Silicone: Type S, Grade NS, Class 100/50, Uses NT, M, G, A and, as applicable to joint substrates indicated, O.
    b. Products: Subject to compliance with requirements, provide one of the following:

        1) Dow Corning Corporation, 795.
        2) Pecora Corporation, 895.
        3) Tremco, Inc., Spectrum 2.

    c. Locations for Use: For metal panels, windows, curtainwall, and elsewhere as indicated on the Drawings.

3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer: Glazing gaskets in accordance with ASTM C 864.
4. Concealment: Provide extruded trim matching curtain wall and sloped glazing to conceal any and all construction gaps, firesafing, and firestopping, adjacent to curtain wall and sloped glazing, under this Section 08920, whether or not indicted on the Drawings.

D. Weatherstripping:

1. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
2. Sliding Weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

E. Finish Hardware Schedule (per door): Equivalent to the following, **EXCEPT as modified and upgraded by the curtain wall supplier to comply with the required large missile**

impact rated exterior door assemblies and systems.

1 Each Continuous Geared Hinge	Select Products #SL11HD - length as required, with custom paint finish to match specified storefront framing/door finish.
1 Closer (surface type)	LCN 4040 with adjustable hold-open, matching cover, and R.A.L. custom color paint finish to match framing/door finish.
1 Threshold	S405A x EID x LAR, or S245A x LAR, as required.
1 Push/Pull Bar	Kawneer Style C010, satin chrome finish (626). (exterior side)
1 Push Bar	Kawneer Style CP II, satin chrome finish (626). (interior side)
1 Deadlock	Adams-Rite 1850A (at exterior doors only; at active leaf only).
2 Flushbolts	555 - Radius Front (at exterior doors only, inactive leaf only).
1 Door Bottom	Manufacturer's standard EPDM blade gasket sweep strip.
1 Set Weatherstripping (single acting doors)	"Sealair" system in door and frame, with continuous dense, bulb polymeric material.
1 Set Weatherstripping (double acting doors)	Pile cloth system in door and frame, continuous.

C. Accessories — As required by project conditions.

2.3 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: Insulated Laminated Vision and spandrel panels as required for this project and compliance with large missile impact rated requirements, and as specified in Section 08800 - “Glass and Glazing” and Section 07900 - “Joint Sealers”.

2.4 SEALANT MATERIALS

A. Sealant and Backing Materials: Refer to Paragraph 2.2 above, and Section 07900 - “Joint Sealers”.

2.5 FABRICATION

A. Shop assembly: Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secure, and sealed in accordance with manufacturer’s recommendations.

1. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members

showing welding bloom or discoloration on finish or material distortion will be rejected.

2. Steel reinforcement: Curtain wall manufacturer shall provide, fabricate and install any internal steel reinforcement as may be required to comply with the design wind loads as determined by engineered calculations.

B. Fabrication Tolerances:

1. Material Cuts: Square to 1/32" (0.8 mm) off square, over largest dimension; proportionate amount of 1/32" (0.8 mm) on the two dimensions.
2. Maximum Offset: 1/64" (0.4 mm) in alignment between two consecutive members in line, end to end.
3. Maximum Offset: 1/64" (0.4 mm) between framing members at glazing pocket corners.
4. Joints (between adjacent members in same assembly): Hairline and square to adjacent member.
5. Variation (in squaring diagonals for doors and fabricated assemblies): 1/16" (1.6 mm).
6. Flatness (for doors and fabricated assemblies): +/- 1/16" (1.8 mm) of neutral plane.

2.6 FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Class 1 clear anodized finishes shall be included in color/finish selections for Architect's and Owner's selections Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Provide samples of final selected finishes for architect's verification; Refer to "Submittals" paragraph above.

2.7 ACCESSORY MATERIALS

A. Perimeter Fire-Containment Systems (Safing Insulation): As specified herein, including in part, darkened charcoal colored safing insulation, and covered with flush extruded aluminum trim matching curtain wall and any sloped glazing framing where safing insulation would otherwise be exposed to view. Refer to Division 7 Section "Firestopping" and Section "Building Insulation," for additional information and requirements.

1. Safing Insulation Systems: Provide U.L. or equivalent listed and fire-rated systems, designed to remain permanently in place, and to prevent the passage of fire and smoke, equivalent to standard products/systems of "Thermafiber" Company; Wabash, IN.; Phone: 1-888-834-2371.

B. Insulating Materials: Specified in Division 7 Section "Building Insulation."

C. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site opening conditions under provisions of this Section 08920, General Conditions and Section 01015.

B. Verify dimensions, tolerances, and method of attachment with other work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section 08920.

3.2 INSTALLATION

A. Install Curtain wall system in accordance with manufacturer's current written instructions and recommendations, AAMA Metal Curtain Wall, Window, Store Front and Entrance Guide Specifications Manual, applicable codes and standards, and reviewed submittals and shop drawings; And within specified tolerances.

B. Shim and brace aluminum system before anchoring to the structure.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings and other flashings as applicable.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install glass in accordance with Section 08800, to glazing method required to achieve performance criteria.

J. Install perimeter sealant to method required to achieve performance criteria.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3-feet, non-cumulative or 1/16 inches per 10-feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust work under provisions of Section 01700. Adjust any swing doors and operating hardware for operation in accordance with manufacturer's current written instructions and recommendations.

3.5 CLEANING

A. The General Contractor shall clean installed products in accordance with provisions of General Conditions, Section 01700 and in accordance with manufacturer's current written instructions and recommendations, prior to Owner's acceptance, and remove construction debris from project site. Legally dispose of any construction debris off Owner's property.

B. Remove any protective material from prefinished aluminum surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage and pay for a qualified independent testing and inspecting agency to perform initial field tests and inspections and to prepare test reports. Additional testing due to failures shall be at the Contractor's expense. Refer to Division 1 Section "Special Conditions" for additional information and requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing methodology: Field Testing of Glazed curtain wall for air infiltration and water infiltration shall be performed according to AAMA 503-08, and in accordance with AAMA/WDMA 101/I.S.2/NAFS in part 1 "Performance Requirements" article and as referenced in AAMA 503-08 "Voluntary Specification for Field Testing of Newly Installed Storefront, Curtain Walls and Sloped Glazing Systems" Part 4 – Test Procedures.

    a. Maximum Air infiltration rate for field tests shall be not greater than 1.5 times the maximum allowable rate for laboratory tests or as indicated in Section 1.5 SYSTEM PERFORMANCE REQUIREEMNTS.
    b. Field tests for Water infiltration shall be performed at 2/3 of the designated design water test pressure as referenced in section 1.5 SYSTEM PERFORMANCE REQUIREMENTS.

2. Testing of Mock-up: Upon initial installation of curtain wall, perform field test on owner or architect selected job installed mock-up prior to installation of additional curtain wall openings.
3. Testing of installed Curtain Wall Openings: Two (2) additional openings as selected by the owner or Architect and a qualified independent testing and inspecting agency. Openings shall be tested immediately after installation.
4. In the event of failure, immediate corrective action shall be performed and the opening shall be re-tested, plus an additional 2 openings for each failure, as selected by the owner or architect.
5. Test Reports: Shall be prepared in according to AAMA 503-08.

3.7 PROTECTION OF FINISHED WORK

A. Advise General Contractor on provisions necessary to protect the finished Work.

B. The General Contractor shall protect installed and finished Work from physical damage, including in part, all finishes.

END OF SECTION