1. Section 084413
Glazed Aluminum Curtain Walls
	1. PART 1 GENERAL
		1. SECTION INCLUDES
			1. Aluminum-framed curtain wall, with vision glazing and glass, metal and stone infill panels.
			2. Aluminum-framed sloped curtain wall, self-supporting, with vision glazing.
			3. Associated louvers.
			4. Column covers.
		2. RELATED REQUIREMENTS
			1. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
			2. Section 088000 - Glazing.
		3. REFERENCE STANDARDS
			1. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications 2018.
			2. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015.
			3. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants 2005 (Reapproved 2017).
			4. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants 2018.
			5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
			6. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
			7. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants 2015.
			8. ASTM C1184 - Standard Specification for Structural Silicone Sealants 2018.
			9. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications 2018.
			10. ASTM C1401 - Standard Guide for Structural Sealant Glazing 2014.
		4. ADMINISTRATIVE REQUIREMENTS
			1. Coordinate with installation of other components that comprise the exterior enclosure.
			2. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
		5. SUBMITTALS
			1. See Section 013000 - Administrative Requirements, for submittal procedures.
			2. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, [\_\_\_and infill.
			3. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
			4. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.
			5. Samples: Submit two samples \_\_\_\_by\_\_\_\_ inches (\_\_\_\_by\_\_\_\_ mm) in size illustrating finished aluminum surface, glazing, infill panels, and glazing materials.
			6. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
			7. Design Data: Provide framing member structural and physical characteristics and engineering calculations and identify dimensional limitations; include load calculations at points of attachment to building structure.
			8. Structural Sealant Glazing (SSG): Submit product data and calculations showing compliance with performance requirements.
			9. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.
			10. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
			11. Designer's Qualification Statement.
			12. Manufacturer's Qualification Statement.
			13. Installer's Qualification Statement.
			14. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner 's name and registered with manufacturer.
		6. QUALITY ASSURANCE
			1. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.
			2. Full-Size Mock-up Testing: Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified thermal, structural, air infiltration, water penetration and sound attenuation criteria.
			3. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.
			4. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.
				1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

Insulating Glass Certification Council (IGCC).

Safety Glazing Certification Council (SGCC).

* + - 1. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
				1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.

North American Contractor Certification (NACC) for glazing contractors.

Equivalent independent third-party ANSI accredited certification.

* + 1. MOCK-UP
			1. See Section 014000 - Quality Requirements, for general requirements for mock-ups.
			2. Provide \_\_\_\_by\_\_\_\_ feet (\_\_\_\_by\_\_\_\_ mm) mock-up including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
			3. Locate on-site where directed by Architect; mock-up may remain as part of the Work.
			4. Locate off-site where directed and remove when directed.
		2. DELIVERY, STORAGE, AND HANDLING
			1. Handle products of this section in accordance with AAMA CW-10.
			2. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.
		3. FIELD CONDITIONS
			1. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).
		4. WARRANTY
			1. See Section 017800 - Closeout Submittals, for additional warranty requirements.
			2. Correct defective Work within a five years period after Date of Substantial Completion.
			3. Provide five years manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
			4. Provide five years manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.
	1. PART 2 PRODUCTS
		1. CURTAIN WALL
			1. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
				1. Structural sealant glazing (SSG) adhesive on four (4)-sides, with temporary glazing stops, where indicated on drawings.
				2. Fabrication Method: Shop/factory unitized system.
				3. Glazing Method: Field glazed system.
				4. Finish: Class I natural anodized.

Factory finish surfaces that will be exposed in completed assemblies.

Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

* + - * 1. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
				2. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
				3. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
				4. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
				5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
				6. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
			1. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
				1. Design Wind Loads: Comply with the following:

Positive Design Wind Load: [\_\_\_\_] lbf/sq ft (\_\_\_ Pa).

Negative Design Wind Load: [\_\_\_\_] lbf/sq ft (\_\_\_ Pa).

Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.

Member Deflection: For spans less than 13 feet 6 inches (4115 mm), limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch (19 mm), whichever is less and with full recovery of glazing materials.

Member Deflection: For spans over 13 feet 6 inches (4115 mm) and less than 40 feet (12.2 m), limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch (1/240 of span plus 6.4 mm), with full recovery of glazing materials.

* + - * 1. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with requirements of ASCE 7.
				2. Interstory Differential Lateral Movement: Meeting pass/fail criteria of AAMA 501.4 for Use Group I, Standard Occupancy, when tested at design displacement of 0.010 times greater adjacent story height, maximum, and 1.5 times design displacement, through three complete cycles.
				3. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection tested by independent agency in accordance with ASTM E1996 for Wind Zone [\_\_\_] - Enhanced Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
				4. Movement: Accommodate the following movement without damage to components or deterioration of seals:

Expansion and contraction caused by 180 degrees F (82 degrees C) surface temperature.

Expansion and contraction caused by cycling temperature range of 170 degrees F (77 degrees C) over a 12 hours period.

Movement of curtain wall relative to perimeter framing.

Deflection of structural support framing, under permanent and dynamic loads.

* + - * 1. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4 inch (19 mm) maximum, and a deflection parallel to the wall of L/360 with 1/8 inch (3.2 mm) maximum, whichever is less.
			1. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
				1. Test Pressure Differential: 10 psf (480 Pa).
				2. Test Method: ASTM E331.
			2. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.
			3. Thermal Performance Requirements:
				1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
				2. Overall U-value Including Glazing: [\_\_\_\_\_] Btu/(hr sq ft deg F) ([\_\_\_\_\_] W/(sq m K)), maximum.
				3. Thermal Resistance of Framing: [\_\_\_\_\_] (deg F hr sq ft)/Btu ([\_\_\_\_\_] (K sq m)/W), minimum.
				4. Thermal Resistance of Vision Areas: [\_\_\_\_\_] (deg F hr sq ft)/Btu ([\_\_\_\_\_] (K sq m)/W), minimum.
		1. COMPONENTS
			1. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
				1. Framing members for interior applications need not be thermally broken.
				2. Cross-Section: As indicated on drawings.
				3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

\_\_\_\_by\_\_\_\_ inch (\_\_\_\_by\_\_\_\_ mm) nominal dimension.

* + - 1. Glazing: As specified in Section 088000.
			2. Column Covers: Aluminum, 20 gage, 0.032 inch (0.81 mm) minimum thickness, full contact pressure bonded to [\_\_\_\_\_] for flat surface, finish to match curtain wall framing members.
			3. Beam Covers: Aluminum, 20 gage, 0.032 inch (0.81 mm) minimum thickness, full contact pressure bonded to [\_\_\_\_\_] for flat surface, finish to match curtain wall framing members.
			4. Louvers: Extruded aluminum blades and frame, 4 inches (100 mm) deep; fabricated to eliminate blade flutter.
				1. Blades: 45 degrees slope with storm-proof shape.
				2. Finish: Same as curtain wall mullion sections.
				3. Aluminum blank-off panel, black color, at rear for field cutting and sizing to suit mechanical duct attachment.
		1. MATERIALS
			1. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.
				1. SSG adhesive in compliance with ASTM C920; Type S - Single-component, Grade NS, Class 50, Use NT, G, and A.
				2. Ultimate Tensile Strength: Minimum of 50 psi (345 kPa) as determined by test method ASTM C1135 under the following conditions.

Exposure to air temperatures of 190 degrees F (88 degrees C) and minus 20 degrees F (minus 29 degrees C).

Water immersion for seven (7) days, minimum.

Exposure to weathering for 5,000 hours, minimum.

* + - * 1. Sealant Design Tensile Strength: 20 psi (139 kPa), maximum.
				2. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.
				3. Shelf Life: Six (6) months, minimum.
				4. Color: Black.
				5. Volatile Organic Compound (VOC) Content: Less than 250 g/L.
				6. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793, and in compliance with insulating glass secondary sealant design standards of ASTM C1249.
				7. Manufacturers:

**ADFAST Corporation; ADSEAL Structural 4940 Series**: [www.adfastcorp.com](file:///C%3A%5CUsers%5Cjpstdenis%5CDownloads%5Cwww.adfastcorp.com)

* + - 1. Weatherseal Sealant: **ADFAST; ADSEAL DWS 4580 Series**, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
			2. Sill Flashing Sealant: **ADFAST; ADSEAL DWS 4580 Series** compatible with flashing material.
			3. Non-bleeding setting block: **ADFAST; ADEAL SETTING BLOCK** compatible with **ADSEAL** silicone sealants.
			4. Back-up material: **ADFAST; ADSEAL BACKER ROD SR-2600 or ST-2400** compatible with ADSEAL silicone sealants.
			5. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
			6. Glazing Accessories: As specified in Section 088000.
	1. PART 3 EXECUTION
		1. EXAMINATION
			1. Verify dimensions, tolerances, and method of attachment with other related work.
			2. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
			3. Verify that anchorage devices have been properly installed and located.
		2. INSTALLATION
			1. Install curtain wall system in accordance with manufacturer's instructions.
			2. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
			3. Provide alignment attachments and shims to permanently fasten system to building structure.
			4. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
			5. Provide thermal isolation where components penetrate or disrupt building insulation.
			6. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water-tight dam.
			7. Install firestopping at each floor slab edge.
			8. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
			9. Install operating sash.
			10. Install louvers and associated flashings.
				1. Fit blank-off plates tight to ductwork.
			11. Pressure Plate Framing: Install glazing and infill panels in accordance with Section 088000, using exterior dry glazing method.
			12. Sloped Glazing with External Horizontal Mullions: Place sealant on the upslope side of the pressure plate cover caps; finish the surface with a slope for drainage over the cap.
			13. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weatherseal sealant in accordance with manufacturer's instructions.
			14. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
		3. CLEANING
			1. Remove protective material from pre-finished aluminum surfaces.
			2. 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, and wipe surfaces clean.
			3. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.
		4. PROTECTION
			1. Protect installed products from damage until Date of Substantial Completion.
	2. END OF SECTION