MOAKE PARK GROUP
ARCHITECTURE INTERIORS PLANNING

Addendum D1

re: **Fort Wayne Community Schools**
Renovations of Franke Park
111031.01

issue date: **November 6, 2025**

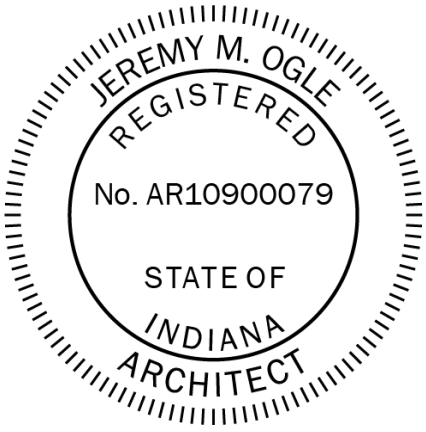
This Addendum forms a part of the Contract Documents for the above-referenced project and is issued in accordance with the Instructions to Bidders. Acknowledge receipt of this addendum by inserting its number in the space provided in the bid form.

ITEM	LOCATION	DESCRIPTION
A1.01	GENERAL Pre-Bid Meeting Memorandum	ADD: The attached Pre-Bid Meeting Memorandum dated November, 04, 2025 shall be included as an integral part of the project construction documents.
A1.02	GENERAL Pre-Bid Sign-In	ADD: The attached Pre-Bid Sign-In sheet dated November 04, 2025 shall be included as an integral part of the project construction documents.
A1.03	SPECIFICATIONS Table of Contents (**Spec not Reissued**)	ADD: Add Specification Section 085113 – Aluminum Windows to the Table of Contents dated October 27, 2025.
A1.04	SPECIFICATIONS Section 085113 Aluminum Windows **(New Specification)**	ADD: Add New Specification Section 085113 - Aluminum Windows issued via this Addendum as an integral part of the project construction documents.
A1.05	SPECIFICATIONS Section 088000 Glazing **(Specification Reissued)**	CHANGE: Specification Section 088000 - Glazing is being reissued to replace specification issued October 27, 2025 and shall become an integral part of the project construction documents.

7223 Engle Road | Suite 200 | Fort Wayne, IN 46804 | p: 260-424-6516 | f: 260-424-6309
www.moakepark.com

ITEM	LOCATION	DESCRIPTION

Submitted by:
The Moake Park Group, Inc.



Jeremy M. Ogle, AIA
Architect

attachments: Pre-Bid Meeting Memorandum
Pre-Bid Sign-In Sheet
Specification Section 085113
Specification Section 088000

copies: All Plan Holders
111031.01/670

Renovations at Franke Park
Pre-Bid

Pre-Bid Meeting
November 4, 2025

We Are Your Schools

Renovations at Franke Park
Pre-Bid

Natalie Cryer
FWCS
Project Manager
Natalie.Cryer@fwcs.k12.in.us

Zachary Evans
FWCS
Project Manager
Zachary.Evans@fwcs.k12.in.us

Alexa Snyder, Assoc. AIA
Project Architect
Moake Park Group, Inc
asnyder@moakepark.com

Jeremy Ogle, AIA
Project Manager
Moake Park Group, Inc
jogle@moakepark.com

Logan Dant
Mechanical Engineer
Primary Engineering, Inc.
ldant@primary-eng.com

Braxton Riley
Electrical Engineer
Primary Engineering, Inc.
briley@primary-eng.com

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ARCHITECTURE INTERIORS PLANNING

PRIMARY ENGINEERING INC

Renovations at Franke Park
Pre-Bid

- Bids will be due on November 19, 2025 at 2:00 pm. Deliver to 1519 Catalpa St, Fort Wayne, IN to the Facilities Reception Desk (Sarah) via the West Entry #1.

- Submit all bid forms in duplicate and include all forms filled out, including Form 96, E-Verify, E/M/W Owned Business, Subcontractor/Vendor List, Iran Certification

- 000126 – Background Check Requirement
- 004343 – Responsible Bidder Requirements
- 007300 – Supplementary Conditions
- 000131 – FWCS Document Management (Procore)
- 000127 – Smoking Policy
- 000129 – Dust Control
- 000133 – Liquidated Damages

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ARCHITECTURE INTERIORS PLANNING

PRIMARY ENGINEERING INC

Renovations at Franke Park
Pre-Bid

Construction	
Start Date:	**March 30, 2026**
Substantial	
Completion Date:	**July 31, 2026**
Bid Bond**:**	**5%**
Perf. Bond**:**	**100%**
Allowance:	**$75,000 (included in bid)**
Permits:	Include all construction permits in bid

Procedure for Visiting the Schools:

- Check in at main office

  Weekdays: November 3,2025 – November 18, 2025

  7:00am – 8:00am and 3:45pm – 5:00pm.

- Scheduled Dates:

  The building was open to Contractors for field investigation on October 31, 2025 from 7:00am – 2:00pm.

- Project Management will be done using FWCS's Procore Online system to submit and track all submittals, RFI's, PR's, etc. If you are not familiar with it, there are training classes at FWCS periodically and you will need to use this tool.
- Dust control and housekeeping Spec Section 000129. You must use wet cutting methods, use dust control partitions, protect smoke detectors, seal doors/louvers/diffusers, and do not use FWCS trash cans/dumpsters.
- Disposal of scrap metal is the responsibility of the contractor.

- Install roof protection and maintain all existing roof warranties coordinate with drawings.
- Hot work permits are required for any grinding, welding, torching, etc. and must have a fire watch person observing. This is not another person in the room working, but another person observing the hot work and nothing else.
- Construction staging/storage allowed on site as long as it does not obstruct doors/corridors and is approved by FWCS project manager. C.O.I.'s are required for material stored off-site.
- Asbestos testing reports are available at each building. Abatement will be by Owner prior to demolition.
- Temperature controls by Owner (Automated Logic).

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PRIMARY ENGINEERING INC

Renovations at Franke Park
Pre-Bid

- All requests for clarification or material additions to specs shall be submitted via email to jogle@moakepark.com or asnyder@moakepark.com no later than noon on November 13, 2025. This is the cut off for questions that can be answered via addendum.

- Addendum #1: November 5, 2025
- Addendum #2: November 14, 2025 (If Required)
- Bids due: November 19, 2025 @ 2:00pm

Scope items:

- **<u>Improvements to Franke Park Elementary School:</u>** Including but not limited to improvements to the following scopes of work and further outlined in the project documents.
  - Office Addition & Renovation: Base Bid
  - Restrooms Renovation: Alt. #1
  - Media Center Renovation: Alt. #2

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ARCHITECTURE INTERIORS PLANNING

PRIMARY ENGINEERING INC

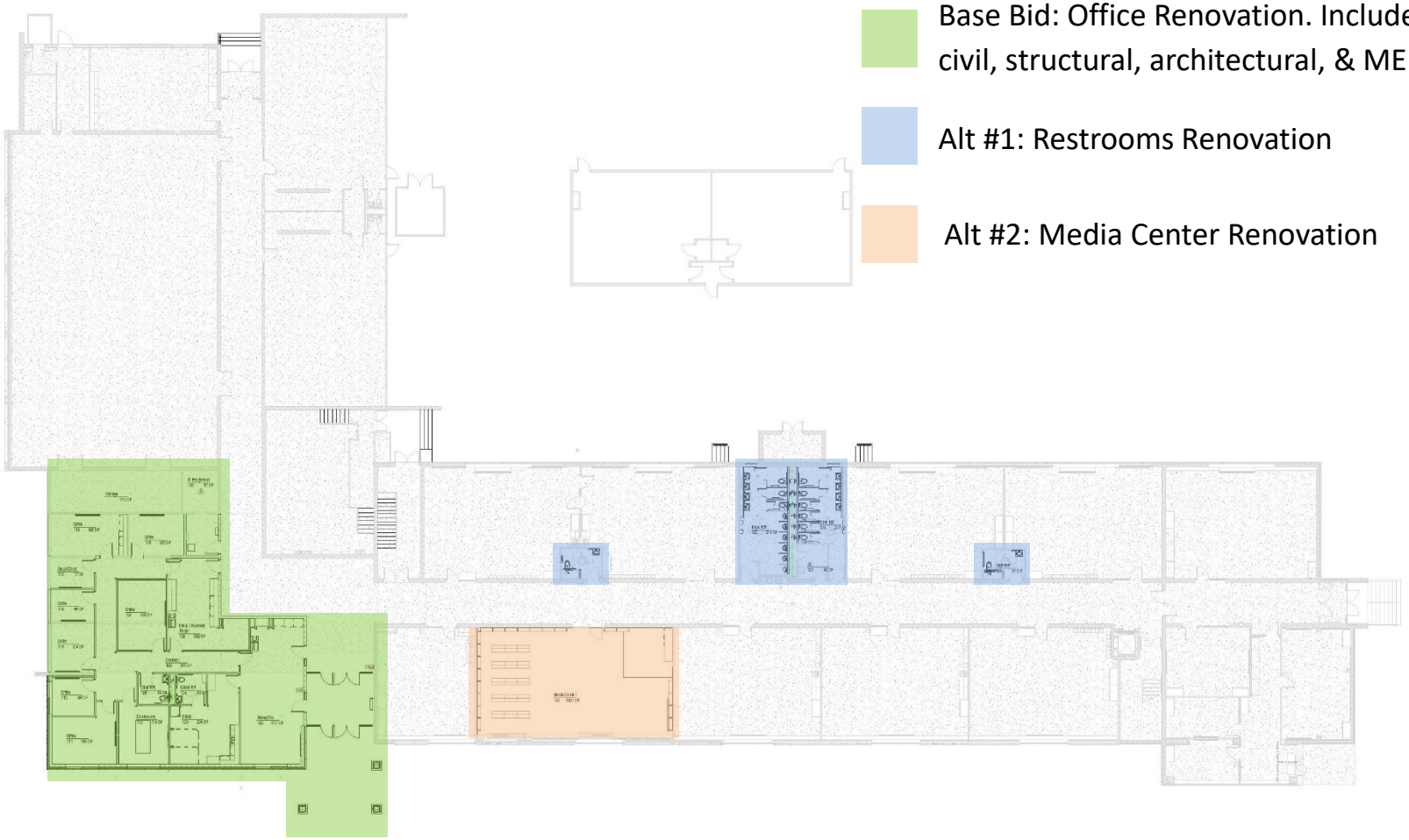
Renovations at Franke Park
Pre-Bid

1st Floor

Base Bid: Office Renovation. Includes all civil, structural, architectural, & MEP.

Alt #1: Restrooms Renovation

Alt #2: Media Center Renovation



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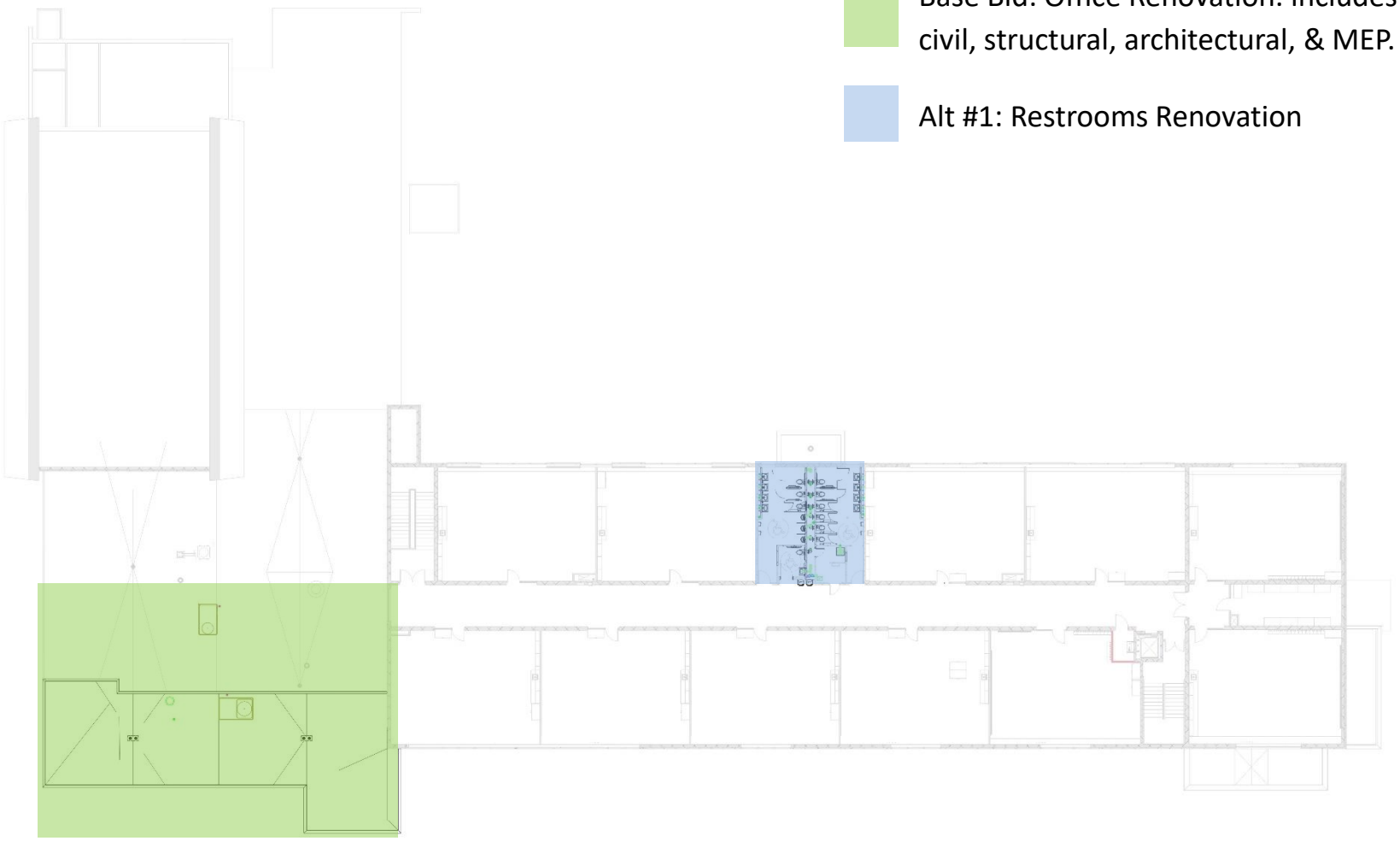
PRIMARY ENGINEERING INC

Renovations at Franke Park
Pre-Bid

2nd Floor

Base Bid: Office Renovation. Includes all civil, structural, architectural, & MEP.

Alt #1: Restrooms Renovation



FWCS
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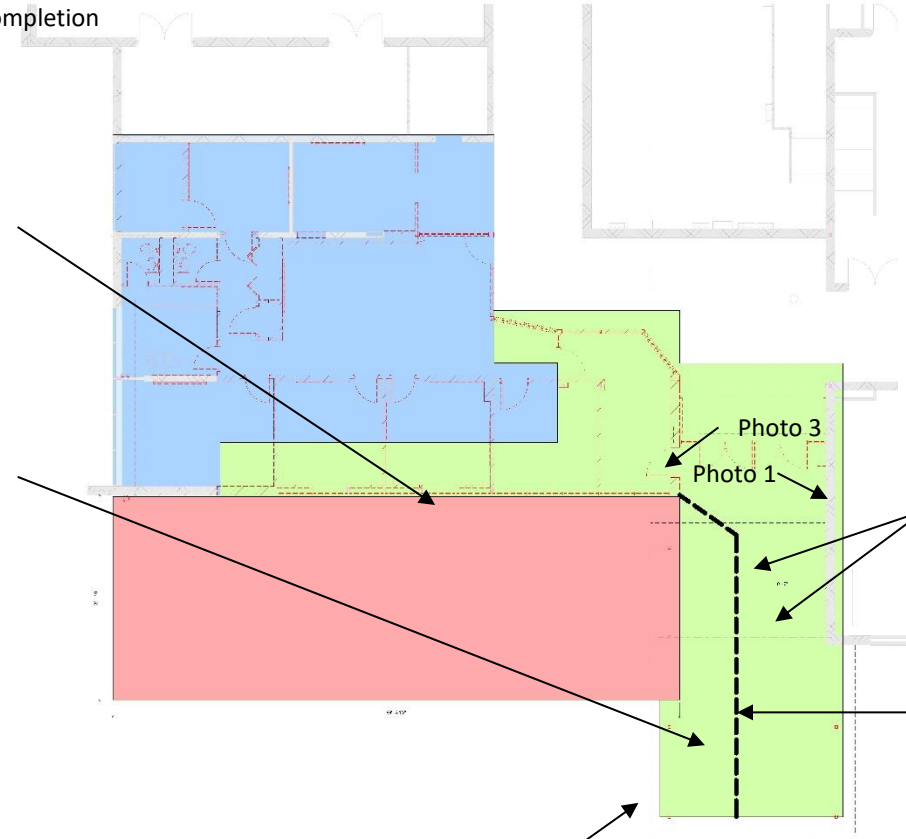
PRIMARY ENGINEERING INC

Renovations at Franke Park
Pre-Bid

Construction Phasing
- Door 1 shall remain open the spring until May 22, 2026.
- Canopy demolished during off school hours or during Spring Break (March 30-April 6, 2026)

Phase 1: Spring – July 17, 2026 Completion
Phase 2: May 22, 2026 – July 17, 2026 Completion
Phase 3: May 22, 2026 – July 31, 2026 Completion



Protect existing opening as required through May 22, 2026.

Existing canopy structure and foundation system shall be demolished after normal school hours or during spring break (March 30, 2026 through April 6, 2026). Entrance to door 1 shall be returned to school for operation during all normal school hours until May 22, 2026.

Remove existing 4x8 canopy beam pocketed into existing wall.

Contractor to construct construction barrier to allow door 1 to remain open during normal school hours. Contractor shall have access to door 1 beginning May 22, 2026.

MOAKE PARK GROUP
ARCHITECTURE INTERIORS PLANNING

Fort Wayne Community Schools
Renovations at Franke Park
MPG# 111031.01
FWCS PB# BD101852

November 4, 2025

PRE-BID SIGN IN SHEET

Name:	**Kenny Narramore**	Company:	**ASG**		
Address:	**7625 Disalle Blvd.**	Email:	**knarramore@advsysgrp.com**		
City/State/Zip:	**Fort Wayne, IN**	Phone:	**260.888.5258**	Fax:	
Name:	**Davis Shuler**	Company:	**PDP**		
Address:	**3615 Transportation Dr.**	Email:	**davis.shuler@waldinger.com**		
City/State/Zip:	**Fort Wayne, IN**	Phone:	**260.402.8084**	Fax:	
Name:	**Jeff Triser**	Company:	**Hamilton Hunter**		
Address:	**915 Lafayette**	Email:	**jtriser@hamiltonhunterbuilders.com**		
City/State/Zip:	**Fort Wayne, IN**	Phone:	**260.423.3577**	Fax:	
Name:	**Robb Fultz**	Company:	**ACB**		
Address:	**6527 IN-930**	Email:	**rfultz@acbgeneralcontractor.com**		
City/State/Zip:	**Fort Wayne, IN**	Phone:	**260.437.1774**	Fax:	
Name:	**Zach Evans**	Company:	**FWCS**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	
Name:	**Natalie Cryer**	Company:	**FWCS**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	
Name:	**John Hudson**	Company:	**FWCS**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	

Name:	**Heather Krebs**	Company:	**FWCS**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	
Name:	**Jeremy Ogle**	Company:	**MPG**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	
Name:	**Alexa Snyder**	Company:	**MPG**		
Address:		Email:			
City/State/Zip:		Phone:		Fax:	
Name:		Company:			
Address:		Email:			
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Name:		Company:			
Address:		Email:			
City/State/Zip:		Phone:		Fax:	

SECTION 085113 – ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Summary

A. Section includes Kawneer Architectural Aluminum Windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.

1. Types of aluminum windows include:

a. Kawneer GLASSvent™ UT Windows (Structural Silicone Glazed)
b. Project-Out Windows

1) 3-1/8" (79.4 mm); 3-7/8" (98.4 mm) Overall System Depth

B. Related Sections:

1. 079200 “Joint Sealants”
2. 084113 “Aluminum-Framed Entrances and Storefronts”

1.3 Definitions

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 Performance Requirements

A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Window Performance Requirements:

1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS). Performance Class and Grade;

a. Project-Out Windows:

1) 3-1/8" (79.4 mm); 3-7/8" (98.4 mm) Overall System Depth

2. Air leakage: The test specimen shall be tested in accordance with ASTM E283. Air leakage rate shall not exceed 0.10 cfm/ft^2 at a static air pressure differential of 6.2 psf (300 Pa). The test specimen shall meet the A3 rating of less than 0.55 (m^3/h)/m at 1.6 psf (75 Pa) when tested in accordance with CAN/CSA-A440-00 Windows.
3. Water Resistance: The test specimen shall be tested in accordance with ASTM E547 and ASTM E331. There shall be no leakage as defined in the test method at a static air pressure differential of 12 psf (575 Pa). The test specimen shall meet the B7 rating with no water leakage at 12 psf (575 Pa) when tested in accordance with CAN/CSA-A440-00 Windows;
4. Uniform Load Deflection: A minimum static air pressure difference shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member. The test specimen shall meet the C3, C4 or C5 rating when tested in accordance with CAN/CSA-A440-00 Windows.

    a. Project-Out Windows:

        1) CW-PG70-AP (with Roto Operator and Hook Lock); 70 psf (3552 Pa)

5. Uniform Load Structural: A minimum static air pressure difference of shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load with permanent set not to exceed 0.3% of span length.

    a. Project-Out Windows:

        1) 3-1/8" (79.4 mm); 3-7/8" (98.4 mm) Overall System Depth

            i. CW-PG70-AP (with Roto Operator and Hook Lock); 105 psf (5027 Pa)

6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 and AAMA 910.
7. Energy Efficiency:
    a. Thermal Transmittance (U-Factor): When tested to AAMA Specification 1503, AAMA Specification 507 or NFRC 100 the thermal transmittance (U-Factor) shall not be more than;

        1) 1" (25.4 mm) insulating glass:

i. Project-Out: U-Factor not more than .56 BTU/hr/ft^2/°F per AAMA 1503 with exterior 3/16" (4.76 mm) clear glass, aluminum spacer, and interior 3/16" (4.76 mm) glass.

8. Condensation Resistance Test (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, the condensation resistance factor (CFR) shall not be less than;
   a. 1" (25.4 mm)clear insulating glass with aluminum spacer:
      1) Project-Out: CRF not less than 73 (frame) and 60 (glass).
9. Temperature Index (I): Provide aluminum windows tested for thermal performance according to CSA-A440 with a Temperature Index (I) not less than:
   a. 1" (25.4 mm) clear insulating glass with aluminum spacer:
      1) Project-Out: (I) not less than 68 (frame) and 61 (glass).
10. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested in accordance with AAMA Specification 1801, the STC and OITC shall not be less than;
    a. 1" (25.4 mm) insulating glass made with exterior 3/16" (4.76 mm) clear glass, 3/8" (9.52 mm) aluminum spacer, and interior 7/16" (11.11 mm) laminated clear glass:
       1) Project-Out: STC not less than 37; OITC not less than 30.
11. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
12. Blast Mitigation performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA-TS01, and UFC 04-010.01 performance criteria.

    To meet UFC 04-010-01, B-3.1 Standard 10 for Windows and Skylights, the following options are available:
    a. Section B-3.1.1 Dynamic analysis
    b. Section B-3.1.2 Testing
    c. Section B-3.1.3 ASTM F2248 Design Approach
13. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and TAS 201/203.

    a. Large – Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade (Outswing Casement only).
    b. Small – Missile Impact: For aluminum-framed systems located above 30 feet (9.1m) of grade (Outswing Casement only).

1.5 Submittals

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

1. Recycled Content:

a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
b. Once product has shipped, provide project specific recycled content information, including:

1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
3) Indicate location recovery of recycled content.
4) Indicate location of manufacturing facility.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

1.6 Quality Assurance

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 Project Conditions

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 Warranty

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Product:
1. Kawneer Company Inc.
2. GLASSvent™ UT Windows (Project-Out)

a. Project-Out Windows

1) 3-1/8" (79.4 mm); 3-7/8" (98.4 mm) Overall System Depth

i. CW-PG70-AP (with Roto Operator and Hook Lock)

3. Substitutions may be submitted in accordance with these documents prior to bid and must be approved by Architect via addendum. Substitutions must be compatible with specification section 084113 – Aluminum Framed Entrances and Storefronts.

B. Substitutions: Refer to Substitutions Section for procedures and submission requirements.

1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid window installation and construction delays.
3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)
5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

C. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 Materials

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" (2.3 mm) wall thickness at any location for the main frame and sash members.

B. Thermal Barrier: The thermal barrier shall be Kawneer consisting of low conductive polymer full depth of infill.

C. Fasteners: Nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

D. Anchors: Nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 Window System

A. GLASSvent™ UT Windows - Project-Out.

2.4 Glazing

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable for four sided structural silicone glazed aluminum window units.

B. Glazing System: Glazing method shall be four sided structural silicone glazed in accordance with manufacturer's standards.

2.5 Hardware

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.

B. Project-Out / Outswing Casement Windows: Provide the following operating hardware:

1. Stainless Steel 4-Bar Hinges
2. Cast White Bronze Cam Locking Handles
3. Cast White Bronze Access Control (Custodial) Locks with Removable Handle

2.6 Accessories

A. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

B. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

C. Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section "Joint Sealants".

D. Insect Screens: Extruded aluminum frames, 6063-T5 or 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh **aluminum wire** screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening. **Glass fiber mesh is not acceptable.** **NO WICKETS.**

2.7 Fabrication

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fit joints; make joints flush, hairline and weatherproof.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Window Vent and/or Vent Frame Joinery: Mitered and Mechanically clipped and/or staked. Factory sealed vent and /or vent frame and corner joints.

C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

2.8 Aluminum Finishes

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color to be selected by Architect from manufacturer's full range).

PART 3 - EXECUTION

3.1 Examination

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76.2 mm) of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.

E. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

3.3 Field Quality Control

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

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

1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.

a. Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 6.2 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.

b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.

2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
3. Test Reports: Shall be prepared according to AAMA 502.

3.4 Adjusting, Cleaning, And Protection

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Glazed curtain walls.
3. Storefront framing.
4. Glazed entrances.
5. Interior borrowed lites.
6. Security glazing for secure doors and windows. School Guard Glass, SG4 and SG4 IGU.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Basic Wind Speed: 90 mph (40 m/s).
    b. Exposure Category: C.

2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

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

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of the following products; 12 inches (300 mm) square.

1. Coated glass.
2. Insulating glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass and glazing products, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass, coated glass, insulating glass, glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

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

B. 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.

C. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.

D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

F. 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.

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

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

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

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 2 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 glazing located within 30 feet (9.1 m) of grade.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:

1. Guardian Industries Corporation
2. Vitro (PPG) Industries, Inc. (PPG)
3. Viracon
4. Old Castle

D. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Vitro (PPG) Optigrray.

   a. Vitro (PPG) Optigray. Spandrel panel to match insulating glass panel units.

2. Tint Color: Gray or Bronze for Bronze Framing.

2.3 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 SECURITY GLAZING FOR SECURE DOORS AND WINDOWS

A. Security Glass for interior lites: School guard Glass, SG4. – **Reference Exhibit A at end of this specification section**.

B. Security Glass for exterior applications: School guard Glass, SG4 IGU. – **Reference Exhibit B at end of this specification section.**

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from **one of** the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, provide the following:

a. Dow Corning Corporation; 790.
b. Pecora Corporation; 890.
c. Sika Corporation, Construction Products Division; SikaSil-C990.
d. Tremco Incorporated; Spectrem 1.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

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

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Grind smooth and polish exposed glass edges and corners.

2.10 MONOLITHIC-GLASS TYPES

A. Glass Type ■: Clear fully tempered float glass.

1. Thickness: 1/4 inches, 1/2 inches at Reception Desk and Display Cases with polished edges.

2. Provide safety glazing labeling.

2.11 INSULATING-GLASS TYPES

A. Glass Type ●■: Low-e-coated, tinted insulating glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Tinted fully tempered float glass.
4. Interspace Content: Air.
5. Indoor Lite: Clear fully tempered float glass.
6. Low-E Coating: Pyrolytic on third or Sputtered on third surface.
7. Visible Light Transmittance: 45 percent minimum.
8. Winter Nighttime U-Factor: 0.28 maximum.
9. Summer Daytime U-Factor: 0.26 maximum.
10. Solar Heat Gain Coefficient: 0.29 maximum.
11. Provide safety glazing labeling.
12. Shading Coefficient: 0.33
13. Glazing to be PPG Optigray + Solarban 70xl (3) Clear.

B. Glass Type ●: Insulating Spandrel Glass.

1. Overall Unit Thickness: 1 inch (25 mm).
2. Thickness of Each Glass Lite: 6.0 mm.
3. Oudoor Lite: Tinted, fully tempered float glass.
4. Indoor Lite: Fully tempered float glass.
5. Coating Location: Fourth surface.
6. Winter Nighttime U-Factor: 0.28 maximum.
7. Summer Daytime U-Factor: 0.28 maximum.
8. Interspace Content: Air

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

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

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding

into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

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

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

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

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

School Guard Glass' products are manufactured by:

LTI Smart Glass, Inc.

14 Federico Drive / Pittsfield, MA 01201 /

PRODUCT NAME: **SG4™ (PATENT PENDING)**

PRODUCT DESCRIPTION: SG4™ is a laminated glass product consisting of outer layers of glass with a custom security strengthened substrate core. It is specifically designed to slow down intruders but is not bullet resistant to certain ballistic threats. When shot, it will not shatter like ordinary tempered glass and is far stronger than laminated glass or glass reinforced with security film. SG4™ remains in the frame blocking the intruder from entry.

CONSTRUCTION: Proprietary

STANDARD DIMENSIONS: Up to 60" x 96"

MAXIMUM DIMENSIONS: 72" x 144" (Up to 50 sq. ft.)

NOMINAL THICKNESS: Designed to replace tempered and laminated glass with thicknesses ranging from ¼" to ⅜".

WEIGHT (SQ/FT): 4.1 lbs.

WARRANTY: 10 Years against delamination. Please refer to the warranty information sheet.

INSTALLATION INSTRUCTIONS: Notify a School Guard Glass representative and request installation instructions pertaining to the glazing system(s) being used.

COMPLIANCE:
- ASTM C1036 - Standard Specification-Flat Glass
- ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass
- ANSI Z97.1 Safety Materials Used in Buildings
- CPSC 16 CFR 1201

RATINGS: UL 972
5-aa1 rated for 6 minutes.

	Ballistic Impact	Concentrated Assault		Forced Entry (sequentially tested)			
Product	**5 shots with a .762 round**	**Brick**	**Steel Toed Boots**	**Tools[1] 2 min. test**	**3lb. Hammer & Bat 3½ min. test**	**Sledge hammer 6 min. test**	**Total Time to Failure**
1/4" Tempered	Fail - 1 shot	Fail	Fail	Fail	Fail	Fail	0 seconds
1/4" Tempered w/12 mil. Blast Film	Pass[2]	Fail - 4 impacts	Pass	Fail - 8 seconds	Fail - 2 impacts/2 seconds	N/A	4 seconds
5/16" Annealed Laminated Glass w/ 0.060 SGP® Interlayer by DuPont ®	Pass[2]	Fail - 20 impacts	Fail	Fail	Fail	N/A	16 seconds
5/16" Annealed Laminated Glass w/ 0.090 PVB Interlayer	Pass[2]	Pass	Pass	Fail - 40 seconds	Fail	N/A	40 seconds
3/8" Glass Clad Polycarbonate	Pass[2]	Pass	Pass	Fail - 1 min. 12 sec.	Fail	N/A	1 min. 12 sec.
SG4™	Pass[2]	Pass	Pass	Pass	Pass	N/A	6 mins. 10 sec.
Test failure occurs when a 4" object can pass through the glass or frame material.							
[1] See testing methods for tools list. [2]Bullets penetrate but glass stays in place.							

Independent Testing Completed by H.P. White Laboratory, Inc. 3114 Scarboro Road, Street, MD 21154-1822

School Guard Glass' products are manufactured by:

LTI Smart Glass, Inc.

14 Federico Drive / Pittsfield, MA 01201 /

PRODUCT NAME: **SG4™ IGU (PATENT PENDING)**

PRODUCT DESCRIPTION: SG4™ IGU is a hermetically sealed make up consisting of SG4™ on the interior lite and tempered or laminated glass on the exterior lite. SG4™ IGU combines the forced entry attributes of SG4™ while also complying with strict energy codes. Our IGU make up can be combined with almost any glass coating for an aesthetically pleasing and energy efficient window or entrance.

CONSTRUCTION: SG4™ on interior lite, tempered or laminated glass on exterior lite.

STANDARD DIMENSIONS: Up to 60" x 96"

MAXIMUM DIMENSIONS: 72" x 144" (Up to 50 sq. ft.)

NOMINAL THICKNESS: 1" - 1 ½"

WEIGHT (SQ/FT): 7.4 lbs.

WARRANTY: 10 year warranty against delamination and 10 year warranty against seal failure. Please refer to the warranty information sheets.

INSTALLATION INSTRUCTIONS: Notify a School Guard Glass representative and request installation instructions pertaining to the glazing system(s) being used.

COMPLIANCE:

- ASTM 1048 – Standard Specification-Heat Strengthened & Fully Tempered Flat Glass
- ASTM C1036 - Standard Specification-Flat Glass
- ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass
- ANSI Z97.1 Safety Materials Used in Buildings
- CPSC 16 CFR 1201

RATINGS: 5-aa1 rated for 6 minutes.
BR Level 2 low spall in certain configurations.
UL 972

PERFORMANCE CRITERIA/VALUES: Values vary.
Please refer to the performance criteria sheets.

	Ballistic Impact	Concentrated Assault		Forced Entry (sequentially tested)			
Product	**5 shots with a .762 round**	**Brick**	**Steel Toed Boots**	**Tools[1] 2 min. test**	**3lb. Hammer & Bat 3½ min. test**	**Sledge hammer 6 min. test**	**Total Time to Failure**
1/4" Tempered	Fail - 1 shot	Fail	Fail	Fail	Fail	Fail	0 seconds
1/4" Tempered w/12 mil. Blast Film	Pass[2]	Fail - 4 impacts	Pass	Fail - 8 seconds	Fail - 2 impacts/2 seconds	N/A	4 seconds
5/16" Annealed Laminated Glass w/ 0.060 SGP® Interlayer by DuPont ®	Pass[2]	Fail - 20 impacts	Fail	Fail	Fail	N/A	16 seconds
5/16" Annealed Laminated Glass w/ 0.090 PVB Interlayer	Pass[2]	Pass	Pass	Fail - 40 seconds	Fail	N/A	40 seconds
3/8" Glass Clad Polycarbonate	Pass[2]	Pass	Pass	Fail - 1 min. 12 sec.	Fail	N/A	1 min. 12 sec.
SG4™ IGU	Pass[2]	Pass	Pass	Pass	Pass	N/A	6 mins. 10 sec.
Test failure occurs when a 4" object can pass through the glass or frame material.							
[1] See testing methods for tools list. [2]Bullets penetrate but glass stays in place.							

Independent Testing Completed by H.P. White Laboratory, Inc. 3114 Scarboro Road, Street, MD 21154-1822