Building Envelope Consulting
BIM Consulting
Structural Engineering
Forensic Engineering

ZS LLC
10501 W. Research Drive
Milwaukee, WI 53226

Phone 414.727.5000
Fax 414.727.6666
Web zsllc-us.com

Project Narrative for the Washington High School Window and Door Replacement
Submitted as part of the Certificate of Appropriateness Application Form on February 12, 2015.
Project Location: 2525 North Sherman Boulevard, Milwaukee, Wisconsin
Owner: Milwaukee Public Schools
Architect: ZS LLC

East Elevation (Sherman Boulevard): Photo taken January 19, 2015

Building History

Building: Washington High School
School Founding: 1911
Building Construction: 1914
Building Occupied: September 5th, 1916
Visible Addition #1: 1969
Visible Addition #2: 1982
Owner: Milwaukee Public Schools
Location: 2525 North Sherman Boulevard, Milwaukee, WI [Sherman Boulevard Historic District]
Architect: Van Ryn & DeGelleke

The original Washington High School of 1911 was a set of barracks in a field on 39th and Clarke Streets, which was transformed into a new Washington High School, located at 2525 North Sherman Boulevard. Construction on the present school building began in 1914 by Van Ryn & DeGelleke Architects, and opened for classes on September 5th, 1916. It was described by the Milwaukee Sentinel as “one of the finest and most modern in the northwest” and, according to the Milwaukee Journal of the same date, was “large enough to accommodate students in the rapidly-growing northwest side for many years.” The original building structure consisted of a four story limestone and brick masonry clad exterior, with double-hung wood windows and copper clad wood doors. At that time the school consisted of an assembly hall, various manual and home economic training rooms, two gyms with locker rooms, a bicycle room, a library, two study halls, an infirmary, lecture and laboratory rooms for the physical sciences, approximately 30 regular classrooms, and one office for the principal, counseling services, school paper, and miscellaneous offices combined. In the 17 years from the school’s conception, attendance skyrocketed from 88 at the barracks in 1911 to 2,499 in 1928 in the present structure of the “old main” building. The original building, once thought by some to be extravagant, no longer was large enough. In 1924, excavations were made to the east and south of the basement to provide a

cafeteria and team rooms. In the process, eight additional classrooms were obtained, and six other classrooms as well as two lavatories were gained by splitting the height of the two existing study halls, A and B, in half. The music annex, originally designed to be built on pillars with space underneath to house bicycles, was constructed in 1957. The subsequent (1969 to the North and 1982 so the South) additions followed along with the original exterior limestone clad theme; however the additions comprised the historical features of the original building and instead opted for aluminum windows and doors on the exterior of the building, as well as a replacement of all original wood doors with new aluminum doors. Washington High School contains approximately 200,000 SF and is one of the oldest schools in the Milwaukee Public Schools system. The building and football field stretch for the full block along Sherman Boulevard between Wright and Center Streets. In 2011 Washington High School and its remaining alumni celebrated the 100th anniversary of its founding.

Project Summary

Washington High School is located at 2525 North Sherman Boulevard in Milwaukee, Wisconsin and is scheduled for an exterior window and door replacement project. ZS LLC has been commissioned to assess the existing conditions, develop rehabilitation construction documents, provide bidding assistance, and perform construction administration.

From January 19, 2015 through January 27, 2015, ZS personnel performed an assessment of the existing conditions related to the original wood windows and existing door systems. Efforts included a hands-on inspection and documentation of the interior window conditions, site verification related to the existing conditions, as well as a review of all affected rooms and areas on site.

Following the completion of our initial fieldwork, ZS personnel have been engaged in the analysis of the collected data, review of original construction drawings, and the development of design criteria for the construction documents.

Existing Conditions

The existing conditions of the original wood windows in the 1916 portion of the school are in a deteriorated condition. The following conditions are present:

- Wood rot at window lower and upper sash frames.
- Wood rot at window sills.
- Broken glass.
- Inoperable units including broken weight and pulley systems and latches.
- Significant air leakage through window system.
- Presence of Hazardous Materials (no testing was performed however, MPS requirement include treating all conditions as hazardous materials are present, lead paint and asbestos in sealants or insulations is likely based upon the age of the structure).
- Water leakage staining present.
- Exterior paint is failing.

The doors throughout the school are identified for replacement due to deterioration and functionality.

Proposed Work Strategy

In addition to the deteriorated existing conditions the following consideration were made when determining the design strategy with MPS:

- There are security issues with existing single pane glass.
- Existing windows are energy inefficient.
- Existing windows are not functioning properly.
- Window replacement required while school is in session. Minimum site impact is required.
- High quality exterior finishes are required.

The window and door replacement will be performed in a historically sensitive manner to preserve the existing building character. The design of the exterior window and door replacement project will include specific criteria associated with the standards established by the Milwaukee Public Schools, applicable code compliance, proper building envelope design principles, considerations for the continued serviceability of the facility, and preservation of the integrity of the building architecture.

Proposed Materials and Systems

The following is a summary of the general design specifications for the different window replacement scenarios:

WINDOWS

Sherman Boulevard (Front) Elevation – Ground, 1st, 2nd, and 3rd Floor Locations

The windows in this area of the building represent the units that are the main focus of the Sherman Boulevard Historic District by their visibility from Sherman Boulevard. The existing units are a combination of original wood double hung and sash set fixed units with both square and radius upper sash/head configurations. The windows on this elevation are currently proposed to be designed to the following criteria:

Manufacturer: Kolbe & Kolbe Millwork Co., Inc., Wausau, WI, or approved equal

Product Line: Heritage Majesta Single Hung and Fixed Unit (Attachment A)

Glass Thickness: Double Glazed – Minimum ½" Airspace

Glass Type-Ground Floor Outside Pane: ¼" Laminated Clear

Glass Type-First, Second, Third Floor Outside Pane: ¼" Tempered Clear

Glass Type-All Areas Inside Pane: ¼" Tempered with H-K LoE 366 Coating Clear

Glass Spacer: Black Finish

Lite Division: True Divided Lites

Grid Pattern: Match Existing

Hardware: Top/Bottom Hoppe Locks, Rustic Umber Finish, Bottom Sash Handles

Sash Limit Stops: Offices: 24", Classrooms and all Other Areas: 12"

Insect Screens. No insect screens

Wood Species: Preservative Treated Pine

Exterior Finish: Urethane K-Kron Exterior Finish in Color Selected by MPS

Interior Finish: Stain with Double Coat Sealer to Match Existing

Exterior Wood Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing window frame, exterior brickmould, sill, and a portion of the interior extension jamb/trim as necessary. Interior trim will be left in-place as much as possible. The counterweights will be removed from the weight pockets.
b. Install new wood blocking and ancillary insulation as necessary to create a suitable rough opening for the new window unit.
c. Apply weather resistive barrier treatment to the existing components to remain as a building envelope redundancy to the new window unit.
d. Install new wood window unit in accordance with the window unit manufacturer's written instructions.
e. Install elastomeric sealant and/or spray polyurethane foam sealer as a means of creating an interior air seal between the window unit and surrounding rough opening.
f. Apply polyurethane sealant with backer rod to the exterior interface of the window unit and the surrounding construction as an exterior seal. Provide weeps at the sill condition to allow discharge of penetrating water.

Sherman Boulevard (Front) Elevation – Basement Locations

The windows in this area of the building represent the units that are in the lower level locker rooms and are not visible from Sherman Boulevard. The existing units are original wood double hung units. The windows at this location on this elevation are currently proposed to be designed to the following criteria:

Manufacturer: EFCO Corporation, Monett, MO, or approved equal

Product Line: Series 601 Single Hung Unit (Attachment B)

Glass Thickness: Double Glazed – Minimum ½" Airspace

Glass Type-Ground Floor Outside Pane: ¼" Laminated Clear

Glass Type-All Areas Inside Pane: ¼" Laminated with Arctic Snow Finish

Glass Spacer: Black Finish

Lite Division: Simulated Divided Lite

Grid Pattern: Match Existing

Hardware: Access Controlled Sweep Locks, White Bronze with US25 D Finish

Balance System: High Performance Torsion Spring – Class 5

Sash Limit Stops: 12”

Insect Screens. Multi-Strand Vinyl Coated Polyester Mesh with Aluminum Frame; Color to Match Window Frame

Frame/Sash Material: 6063-T6 Aluminum Alloy

Exterior Finish: Factory Finish Selected by MPS

Interior Finish: Factory Finish to Match Exterior

Exterior Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing window sashes, sash stops, exterior brickmould, and possibly a portion of the exterior sill.
b. Apply weather resistive barrier treatment to the existing wood frame as a building envelope redundancy to the new window unit.
c. Install new extruded aluminum exterior trims matching the profile of the original exterior trim elements. Trims will be custom and match existing profiles exactly.
d. Install new aluminum window unit into the opening in accordance with the written instructions of the window manufacturer.
e. Install elastomeric sealant and/or spray polyurethane foam sealer as a means of creating an interior air seal between the window unit and surrounding rough opening.
f. Apply polyurethane sealant with backer rod to the exterior interface of the window unit and the surrounding construction as an exterior seal. Provide weeps at the sill condition to allow discharge of penetrating water.

44th Street (Back) Elevation – Classroom, Common Area, Auditorium, Gymnasium, and Other Miscellaneous Locations

The windows in these areas of the building represent the units that are on the 44th Street elevation. The existing units are original wood double hung units, original wood hopper units, original wood fixed units, and fixed aluminum units. The windows on this elevation are currently proposed to be designed to the following criteria:

Manufacturer: EFCO Corporation, Monett, MO, or approved equal

Product Line: Series 601 Single Hung Unit and 6740 Fixed Unit (Attachment B)

Glass Thickness: Double Glazed – Minimum ½” Airspace

Glass Type-Ground Floor Outside Pane: ¼” Laminated Clear

Glass Type-First, Second, Third Floor Outside Pane: ¼” Tempered Clear

Glass Type-All Areas Inside Pane: ¼” Tempered with H-K LoE 366 Coating Clear

Glass Spacer: Black Finish

Lite Division: Simulated Divided Lite

Grid Pattern: Match Existing

Hardware: Access Controlled Sweep Locks, White Bronze with US25 D Finish

Balance System: High Performance Torsion Spring – Class 5

Sash Limit Stops: Offices – 24", Classrooms and all Other Areas: 12"

Insect Screens. Multi-Strand Vinyl Coated Polyester Mesh with Aluminum Frame; Color to Match Window Frame

Frame/Sash Material: 6063-T6 Aluminum Alloy

Exterior Finish: Factory Finish Selected by MPS

Interior Finish: Factory Finish to Match Exterior

Exterior Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing window sashes, sash stops, exterior brickmould, and possibly a portion of the exterior sill.
b. Apply weather resistive barrier treatment to the existing wood frame as a building envelope redundancy to the new window unit.
c. Install new extruded aluminum exterior trims matching the profile of the original exterior trim elements. Trims will be custom and match existing profiles exactly.
d. Install new aluminum window unit into the opening in accordance with the written instructions of the window manufacturer.
e. Install elastomeric sealant and/or spray polyurethane foam sealer as a means of creating an interior air seal between the window unit and surrounding rough opening.
f. Apply polyurethane sealant with backer rod to the exterior interface of the window unit and the surrounding construction as an exterior seal. Provide weeps at the sill condition to allow discharge of penetrating water.

44th Street (Back) Elevation – Bathroom Window Locations

The windows in these areas of the building represent the units within bathrooms that are on the 44th Street elevation and are not visible from Sherman Boulevard. The existing units are original wood double hung units and original wood fixed units. The windows on this elevation are currently proposed to be designed to the following criteria:

Manufacturer: EFCO Corporation, Monett, MO, or approved equal.

Product Line: Series 601 Single Hung Unit (Attachment B)

Glass Thickness: Double Glazed – Minimum ½" Airspace

Glass Type-Ground Floor Outside Pane: ¼" Laminated Clear

Glass Type-All Areas Inside Pane: ¼" Laminated with Arctic Snow Finish

Glass Spacer: Black Finish

Lite Division: Simulated Divided Lite

Grid Pattern: Match Existing

Hardware: Access Controlled Sweep Locks, White Bronze with US25 D Finish

Balance System: High Performance Torsion Spring – Class 5

Sash Limit Stops: 12”

Insect Screens. Multi-Strand Vinyl Coated Polyester Mesh with Aluminum Frame; Color to Match Window Frame

Frame/Sash Material: 6063-T6 Aluminum Alloy

Exterior Finish: Factory Finish Selected by MPS

Interior Finish: Factory Finish to Match Exterior

Exterior Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing window sashes, sash stops, exterior brickmould, and possibly a portion of the exterior sill.
b. Apply weather resistive barrier treatment to the existing wood frame as a building envelope redundancy to the new window unit.
c. Install new extruded aluminum exterior trims matching the profile of the original exterior trim elements. Trims will be custom and match existing profiles exactly.
d. Install new aluminum window unit into the opening in accordance with the written instructions of the window manufacturer.
e. Install elastomeric sealant and/or spray polyurethane foam sealer as a means of creating an interior air seal between the window unit and surrounding rough opening.
f. Apply polyurethane sealant with backer rod to the exterior interface of the window unit and the surrounding construction as an exterior seal. Provide weeps at the sill condition to allow discharge of penetrating water.

DOORS

Sherman Boulevard (Front) Elevation – Original Main Entrance: Type A

The entrance system at this area of the building is the original main entrance to Washington High School. This is no longer used as the main entrance to the school. The existing doors and the transom above has been modified. It is the design intent to restore the system to its original configuration with a replacement aluminum door as follows:

Manufacturer: Special-Lite, Inc. Decatur, MI, No Substitutions

Product Line: Special-Lite Aluminum Flush Door SL-16 and Frame

Door Thickness: 1-3/4”

Frame Dimension: Match Original

Glass Thickness: 1" Insulated Glass: Tempered Interior, Laminated Exterior

Glass Spacer: Black Finish

Lite Division: Simulated Divided Lites

Grid Pattern: Match Original

Outside Trim Operation: Stainless Steel

Kick Plate: None

Threshold: 1/8" thickness

Hinges: Continuous hinge, clear anodized finish

Door Closers: Thru bolted

Exterior Finish: Kynar Exterior Finish in Color Selected by MPS

Exterior Aluminum Component Profile Detailing: Match Existing

Rehabilitation Sequence:

g. Remove the existing entrance system and ancillary components.
h. Install entrance in accordance with the written instructions of the manufacturer.
i. Apply polyurethane sealant with backer rod to the exterior interface of the entrance system and the surrounding construction as an exterior seal.

Sherman Boulevard (Front) Elevation – 1969 Addition Current Main Entrance: Type B

The entrance system at this area of the building represent the main entrance on the north end of Washington High School. The existing doors and transom are original to the 1969 construction. It is the design intent to change the door configuration to a new system as follows:

Manufacturer: Special-Lite, Inc. Decatur, MI, No Substitutions

Product Line: Special-Lite Aluminum Flush Door SL-16 and Frame

Door Thickness: 1-3/4"

Frame Dimension: To be Determined

Glass Thickness: 1" Insulated Glass: Tempered Interior, Laminated Exterior

Glass Spacer: Mill Finish

Grid Pattern: As shown on Elevations.

Outside Trim Operation: Stainless Steel

Kick Plate: Stainless steel, 12" height

Threshold: 1/8" thickness

Hinges: Continuous hinge, clear anodized finish

Door Closers: Thru bolted

Exterior Finish: Kynar Exterior Finish in Color Selected by MPS

Exterior Aluminum Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing entrance system and ancillary components.
b. Install entrance in accordance with the written instructions of the manufacturer.
c. Apply polyurethane sealant with backer rod to the exterior interface of the entrance system and the surrounding construction as an exterior seal.

All Elevations – Type C

The entrance doors at various location on the building of Washington High School. The existing doors and transom units are metal replacement. It is the design intent to change the door configuration to a new system as follows:

Manufacturer: Special-Lite, Inc. Decatur, MI, No Substitutions

Product Line: Special-Lite Aluminum Flush Door SL-16 and Frame

Door Thickness: 1-3/4”

Frame Dimension: To be Determined

Glass Thickness: 1” Insulated Glass: Tempered Interior, Laminated Exterior

Glass Spacer: Mill Finish

Grid Pattern: Narrow Side Lite

Outside Trim Operation: Stainless Steel

Kick Plate: Stainless steel, 12” height

Threshold: 1/8” thickness

Hinges: Continuous hinge, clear anodized finish

Door Closers: Thru bolted

Exterior Finish: Kynar Exterior Finish in Color Selected by MPS

Exterior Aluminum Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing entrance system and ancillary components.
b. Install entrance in accordance with the written instructions of the manufacturer.
c. Apply polyurethane sealant with backer rod to the exterior interface of the entrance system and the surrounding construction as an exterior seal.

All Elevations – Type D

The entrance doors at various location on the building of Washington High School. The existing doors and transom units are metal replacement. It is the design intent to change the door configuration to a new system as follows:

Manufacturer: Special-Lite, Inc. Decatur, MI, No Substitutions

Product Line: Special-Lite Aluminum Flush Door SL-16 and Frame

Door Thickness: 1-3/4"

Frame Dimension: To be Determined

Glass: No glass, peep hole selected locations

Outside Trim Operation: Von Duprin 996L Breakaway Lever, 06 Default Lever, US 32D Stainless Steel, Cylinders to sit flush with lockset face

Kick Plate: US 32 Stainless steel, 12" height, width to be door width minus 2", both sides of all doors.
Threshold: Zero, NPG or equal, minimum 1/8" thickness x ¼" height, and minimum 6" width.

Hinges: Special-Lite SL-120 Continuous hinge, standard Class 1 clear anodized finish

Door Closers: LCN Model 4040XP spring CUSH, thru bolted

Dead Bolt: Schlage B660P with 2 ¾" backseat, cylinder flush to door

Exterior Finish: Kynar Exterior Finish in Color Selected by MPS

Exterior Aluminum Component Profile Detailing: Match Existing

Rehabilitation Sequence:

d. Remove the existing entrance system and ancillary components.
e. Install entrance in accordance with the written instructions of the manufacturer.
f. Apply polyurethane sealant with backer rod to the exterior interface of the entrance system and the surrounding construction as an exterior seal.

West and South Elevations – Type E

There are existing opaque panels at transom windows at the West elevation Gym. In addition to a door at the pool on the south elevation. The existing doors and transom units are metal replacement. It is the design intent to change the pool door to a new system and replace the existing opaque panels with the following system as follows:

Manufacturer: Special-Lite, Inc. Decatur, MI, No Substitutions

Transom Product Line: Special-Lite Fiberglass Reinforced Polyester (FRP) SL-17 and Frame

Door Product Line: Special-Lite Fiberglass Reinforced Polyester (FRP) flush Door SL-17 and Frame

Door Thickness: 1-3/4"

Frame Dimension: To be Determined

Outside Trim Operation: Stainless Steel

Kick Plate: Stainless steel, 12” height

Threshold: 1/8” thickness

Hinges: Continuous hinge, clear anodized finish

Door Closers: Thru bolted

Exterior Finish: Exterior Finish in Color Selected by MPS

Exterior FRP Component Profile Detailing: Match Existing

Rehabilitation Sequence:

a. Remove the existing entrance system and ancillary components.
b. Install entrance in accordance with the written instructions of the manufacturer.
c. Apply polyurethane sealant with backer rod to the exterior interface of the entrance system and the surrounding construction as an exterior seal.

Ultra Series | Majesta® Double Hungs

Majesta Double Hung Standard Features

- 2-1/4" thick sash
- Overall jamb width is 6-9/16" (basic box width is 6-9/16")
- Frame thickness is 3/4" at side jambs and head
- Sill thickness is 1-3/16", slope is 14°
- Top rail is 3", stiles are 2-1/8" and bottom rail is 4-1/8"
- Constructed of pine with pine interior head parting stops and side stops
- Horizontal sash parts are constructed with LVL core for added strength
- 7/8" LoE²-270 insulating glass*
- Glazed to the interior with wood glazing beads
- .050" thick, 6063 extruded aluminum alloy is kerf mount, press fit and mechanically fastened onto wood sash with coped ends
- Accessory grooves are integral to the extruded frames for the easy addition of accessories
- 70% PVDF fluoropolymer finish on frame and sash exteriors (meets performance requirements of AAMA 2605-05)
- All exterior wood parts are preservative-treated
- Innovative, Bright Brass, heavy-duty sash locks; top lock eliminates sash drop and is located at the center of the top rail on the top sash; bottom lock is located at the center of the bottom rail on the bottom sash for operating convenience
- Class 5 balance system capable of carrying sash up to 200 lbs. makes sash installation and removal easier
- Concealed jambliners and balance system using a wood-wrapped jambliner closure on the interior and an aluminum closure on the exterior
- Double row of heavy duty weatherstripping around all sides of the sash for a tight seal
- Innovative design secures the sash in place allowing this unit to meet ratings up to CW-PG65 for certain units

NOTES:
All measurements are nominal.
* Argon gas may not be included with units to be installed in or shipped through high altitude areas.

concealed wood jambliners provide a clean look

optional triple pane glazing for added energy efficiency

Hardware

The innovative design of the Majesta locking hardware provides both performance and security. The turn knob and locking pin on the bottom sash tightly secure the window, while the heavy duty locking hardware on the top rail of the top sash eliminates sash drop. Optional hardware includes a keyed custodial lock and sash lift handles. An optional hook and pole device to help unlock and lower the top sash is also available. All Majesta hardware is available in Bright Brass (standard), Rustic Umber and Satin Nickel finishes.

turn knob lock on the bottom rail of the bottom sash in the closed position

turn knob and locking pin on the bottom of the bottom sash in the open position

optional sash lift handle helps to raise the bottom sash

heavy duty locking hardware on the top rail of the top sash

Majesta Double Hung Optional Features

Glass (pgs. 6-7):

- LoE²-240*
- LoE³-366*
- ThermaPlus LoE
- Neat®
- Triple Pane
- Patterned-, bronze- or gray-lite
- Tempered or laminated
- Other options standard to the industry

Divided Lites (pgs. 8-9):

- Grilles-in-the-airspace
- PDL with 5/8", 7/8", 1-1/8", 1-3/4" or 2-1/4" bars
- Ovolo or square profile interior grille bars (pg. 9)

Other Options: (custom options are also available)

- Other wood species and FSC-certified wood (pg. 11)
- Interior prefinishing (pg. 11)
- Interior casing (pg. 13)
- Prep for stool
- Extruded aluminum accessories applied to accessory grooves on the exterior frame (pg. 12)
- Ovolo and square profile glazing beads (pg. 9)
- Projected sill nosing, extended sill horns or no nosing
- Standard locks in Rustic Umber and Satin Nickel finishes
- Keyed custodial locks
- Sash lift handles (two per sash); will match other hardware
- Hook pole device to help unlock and lower the top sash
- Half screens with BetterVue® fiberglass screen mesh and aluminum frames that match the exterior color of the unit
- Sash limiters for safety
- Extension jambs (up to 12" applied, over 12" shipped loose for field application)
- Galvanized steel installation clips
- High performance or K-Force® impact performance modifications

NOTES:

All measurements are nominal.

* Argon gas may not be included with units to be installed in or shipped through high altitude areas.. Argon gas may also not be included depending on lite size.

Attachment B

Series 601 Single Hung • Series 6615 Fixed • 6740 Fixed 3 7/8" Heavy Commercial Hung Thermal Window

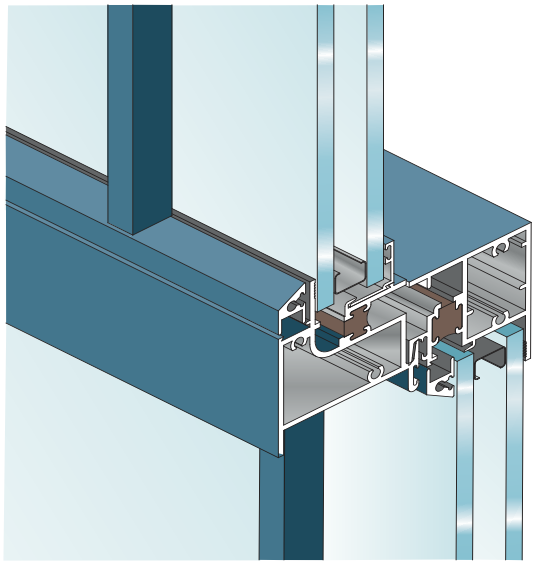
CONFIGURATIONS

Single Hung • Fixed

This product family of hung windows retains a heavy commercial and architectural rating to meet the most demanding specifications and is designed for projects ranging from historical replication to new construction. This hung window series is an attractive and economical product for a wide range of applications. Multiple glazing options offer flexibility to meet specific design requirements. With removable putty glaze frame and snap-in-grid outside of the glazing pocket. A thermal barrier in the frame and sash improves thermal performance enhancing energy saving potential. Offered with a complete line of sub frames, mullions and architectural sills, this product family provides the complete solution for fenestration needs.

Features	Benefits
Thermal barrier in vent and frame	Improves U-Factor performance Enhances energy saving potential
Weather-stripped sash and sill	Provides superior air and water performance
Continuous interlock meeting rails	Improves air infiltration resistance
Accommodates glazing from 1/8" to 1" depth	Expands design and energy saving options
Inside or outside glazed sash	Flexibility in design requirements for glazing
Exterior snap-in-grid	Easily removable grid for glass cleaning
Automatic sash locks available	Increased convenience
Screen frames of extruded aluminum alloy are available	Stronger, more durable screens
Trim-All™ panning available	Allows matching of existing sight lines in restoration projects
Accessory line of subframes, mullions, and architectural sills	Allows custom designs with standard product
Anodized or painted finishes available	Multiple options to answer economic and aesthetic concerns

Series 601 Single Hung • Series 6615 Fixed • 6740 Fixed
3 7/8" Heavy Commercial Hung Thermal Window



PERFORMANCE DATA

601 SINGLE HUNG

AAMA RATING H-AW55
AIR INFILTRATION ..... <.10 CFM/SF @ 6.24 PSF
WATER ..... NO LEAKAGE @ 11.3 PSF
STRUCTURAL ..... ±112.5 PSF
CRF-FRAME 44
CRF-GLASS 74

Note: All performance data is subject to change based on testing recertification and/or revised AAMA testing protocol. Please contact EFCO for latest performance values.

601 THERMAL U-FACTORS*		
CENTER OF GLASS U-FACTOR	CONFIGURATION AND SIZE	
	SINGLE HUNG** 47" X 59"	SINGLE HUNG 66" X 82"
0.48	0.68	0.63
0.34	0.59	0.53
0.28	0.55	0.48
0.24	0.52	0.45
0.20	0.49	0.42

* Based on NFRC 100
**NFRC Gateway size

S-601 SINGLE HUNG HARDWARE CHART	SWEEP LOCK	AUTO SILL LOCK	POLE RING SWEEP LOCK	POLE SOCKET	ACCESS CONTROLLED SWEEP HANDLE	2 OR 4 BLOCK & TACKLE BALANCES	2 OR 4 CLASS 5 BALANCES
SINGLE HUNG	S	O	O	O	O	S	O

Some size restrictions may apply depending on hardware selected.

O -Optional
S -Standard
Blank - N/A

FIXED UPPER INSIDE GLAZED S-601 SINGLE HUNG GLAZING CHART	GLASS OR PANEL											
	1/8"	.156"*	3/16"	.200"*	1/4"	1/4"**	1/2"	9/16"	5/8"	3/4"	7/8"	1"
MONOLITHIC & INSULATED GLASS	A	A	A	A	A	A	A	A	A	A		A

O.G. SASH OUTSIDE GLAZED S-601 SINGLE HUNG GLAZING CHART SASH	GLASS OR PANEL WITH SNAP-IN-GRID											
	1/8"	.156"*	3/16"	.200"*	1/4"	1/4"**	1/2"	9/16"	5/8"	3/4"	7/8"	1"
MONOLITHIC & INSULATED GLASS												A

*****-Obscure glass thickness
******-Laminated glass thickness

A-available glazing option
I-internal blinds can be used with this type of dual glazing
Blank - N/A

FIXED S-6615 GLAZING CHART	POLYCARBONATE			GLASS OR PANEL															
	1/8"	3/16"	1/4"	1/8"	.156"*	3/16"	.200"*	1/4"	1/4"**	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"	1-1/2"	1-3/4"	2"
MONOLITHIC & INSULATED GLASS		A	A			A	A	A	A	A	A	A		A	A	A	A	A	A
DUAL GLAZING				A	A	A	A	A	A										

FIXED S-6740 GLAZING CHART	POLYCARBONATE			GLASS OR PANEL															
	1/8"	3/16"	1/4"	1/8"	.156"*	3/16"	.200"*	1/4"	1/4"**	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"	1-1/2"	1-3/4"	2"
MONOLITHIC & INSULATED GLASS	A	A		A		A	A	A	A	A	A	A	A	A					

Series 601 Single Hung • Series 6615 Fixed • 6740 Fixed 3 7/8" Heavy Commercial Hung Thermal Window

Main Frame Construction
The frames have a depth of 3 7/8" and are constructed of 6063-T6 aluminum alloy. The nominal material wall thickness for the frame is .080", and the sill has a minimum wall thickness of .094". Corners are of screw spline construction and sealed. See Illustration 1.

Sash Frame Construction
The sash consists of aluminum members with .080" nominal material wall thickness of 6063-T6 alloy. Corners are of screw spline construction and sealed. Dual weather-stripped, continuous interlock at the sash meeting rail(s) offers superior weathering and structural performance. See Illustration 2.

Weather Stripping
All sash are weather-stripped with FIN-SEAL® or equal. Two holes or slots per sash through the window frame facilitate weepage.

Screens
Screen frames are extruded 6063-T6 aluminum alloy. Screens are easily removed by retracting two plungers located on the interior face of the screen frame near the sill at each jamb. Full or half screens are available. 18 x 16 mesh screens are available in fiberglass and .011" diameter aluminum. 18 x 18 mesh screens are available in .009" diameter stainless steel.

Thermal Barrier
Sills are thermally isolated with two thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. All other frames and sash are thermally broken using the latest technology in two-part high density polyurethane. See Illustration 3.

Hardware
Sweep locks, access controlled sweep locks, pole ring sweep locks, and keepers are of cast white bronze with a US25D finish. Automatic head and sill locks are fabricated of aluminum alloy and finished to match the window. Two types of balance systems are available. A spring loaded block and tackle balance rated Class 1 with a .70 MAF* ratio is standard. A high performance torsion spring and extension spring balance rated Class 5 with a .30 MAF* ratio is optional. EFCO reserves the right to substitute a higher performance balance as project conditions dictate, i.e., large, heavy sash requiring minimum operating force. See the Hardware Chart for available hardware types.

Glazing
Sash is inside or outside glazed with an extruded aluminum snap-in glazing bead. Glazing of 1/8" to 1" can be accommodated. Dual glazing is also available in 1/8", 3/16", and 1/4" glass. Series 6615 fixed frame windows accommodate glass or panels from 1/8" to 3 1/2" thick. Series 6740 windows accommodate glass or panels from 1/8" to 1" thick. See the Glazing Chart for the exact size.

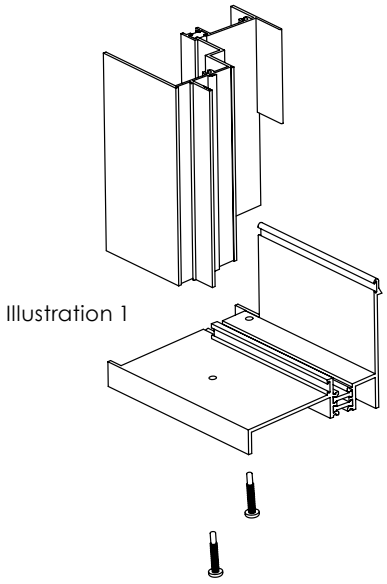


Illustration 1

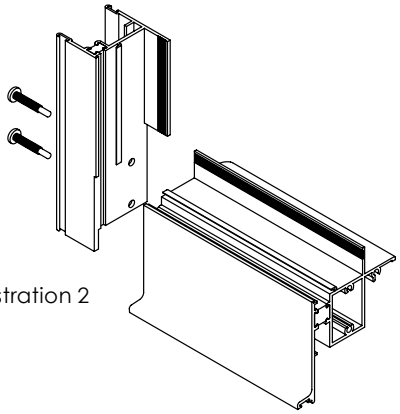


Illustration 2