Nathan Eckstein Middle School Window Replacement

Landmark Preservation Board

Marc A. Tegen, Project Manager

STEMPER ARCHITECTURE COLLABORATIVE

Presentation Agenda

-Project Intent
-Characteristics of historic steel windows
    -Window component profiles, components, and colors.
-Condition of historic steel windows
    -Steel frames, sashes, mullions, muntins, and glass
-Photos of typical and unique conditions
-Proposed replacement windows
    -Summary of intent
    -Description of replacement windows
-Existing and proposed window comparisons
-Rational for replacement rather than retrofit
-Questions

Project Intent

BRIEF:

Window replacement at Nathan Eckstein Middle School is being proposed as part of a larger exterior renewal project with the expressed purpose of bringing this school to a like-new exterior condition and ensure its continued use through the foreseeable future.

Window replacement is being undertaken in response to;

-Maintenance concerns, feasibility, and impacts associated with a school-wide window refurbishment project.

-Concerns brought forth by teachers and staff of Nathan Eckstein Middle School regarding the impacts to the learning environment due to thermal, air barrier, and acoustical performance of the Historic Steel framed windows, support frames, and rough openings.

-Safety concerns relating to glass breakage in and around operable windows.

With Landmarks Board Approval, a limited amount of historic window replacement and in-situ mock-ups will occur during the summer of 2023 followed by larger window replacement projects over the summers of 2024 & 2025.

Although not fully discussed within this presentation, the exterior renewal project will also include a school-wide roof replacement & recoating project, in-kind repairs or replacement of the school's reeded sheet metal parapet flashings, and roof top metal wall cladding, brick mortar joints repairs, exterior concrete crack repairs, refurbishment of exterior entry doors & hardware, and repairs/relocation/replacement of glass block masonry units.

Characteristics of Historic Steel Windows

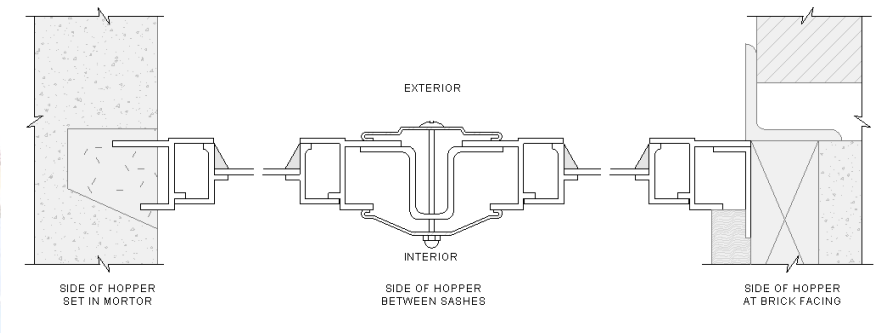
-There are seventeen (17) unique steel framed window types at Nathan Eckstein Middle School, ranging from fixed, to a combination of fixed and operable units.

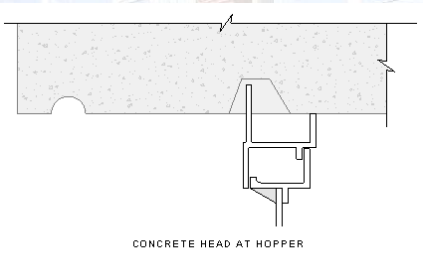
-The existing steel framed windows utilize a series of standard steel profiles (steel extrusions) for head, jamb, sill, muntin, mullion, and operable sash conditions.

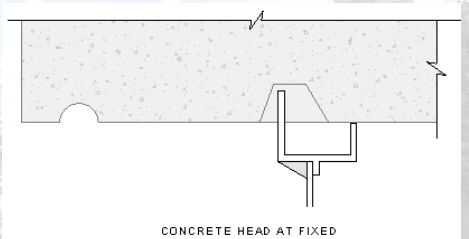
-The frames are secured by ~1/16-inch thick roll formed steel mullion plates (attached to brackets) embedded into concrete at the head & sills of the windows or by having the steel frame flanges cast (cement grouted) into the building's concrete structure.

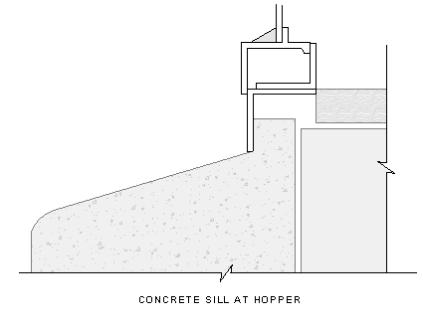
-The original windows are also secured to the building by a variety of painted steel plates and angles at head and jamb conditions, but these conditions are less common.

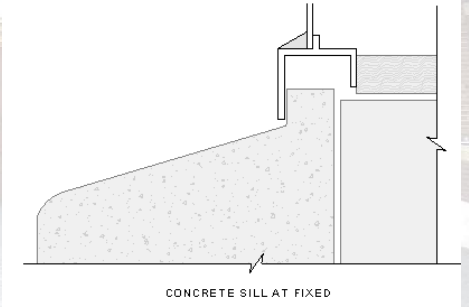
-The existing glazing is secured into the steel window frames & sashes with either a glazing putty, or where repaired, with a paintable silicone or urethane sealant.











Historic Steel Window Mullions

Photo above depicts four (4) office combination windows with the green dashed lines indicating the size of each window. The red dashed area indicates the location of the photo depicted on the right side of this page.

Close-up view of a typical painted steel mullion at the intersection of fixed and operable portions of the windows.

Securement between Windows at Mullions

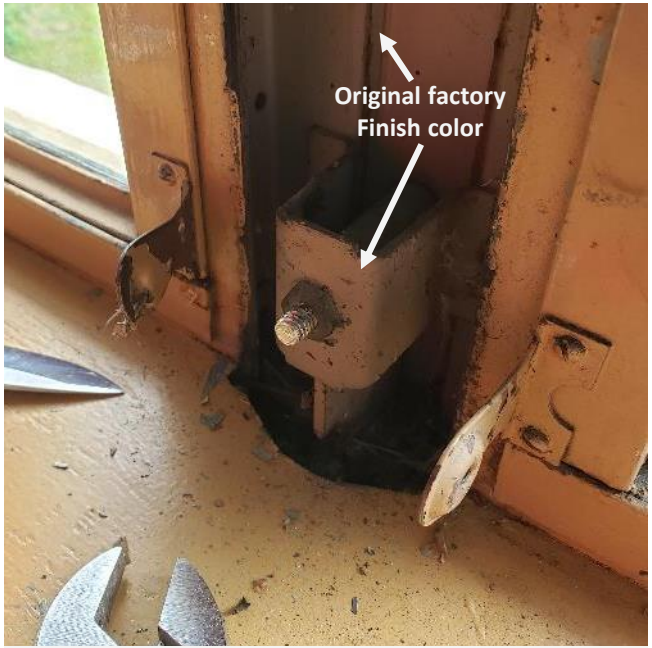
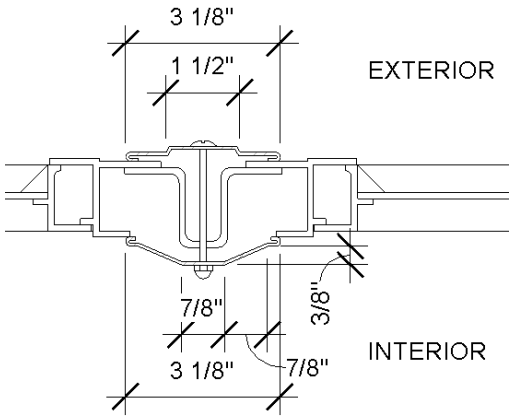


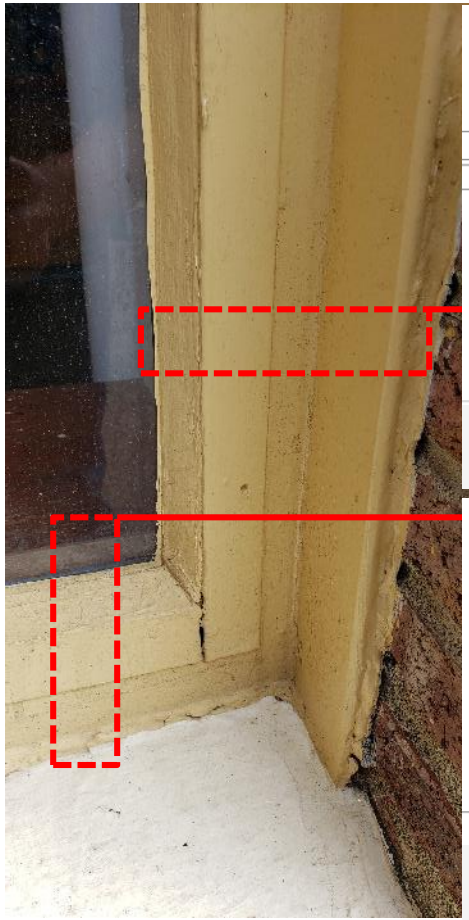
Photo above depicts the interior steel mullion temporarily removed and shows the typical steel bracket securement found at the sill of windows.

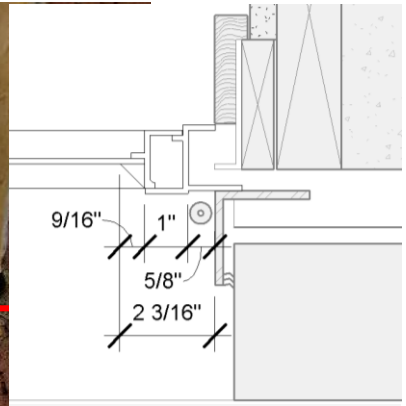


Drawing above depicts the difference in exterior and interior steel mullion profiles.

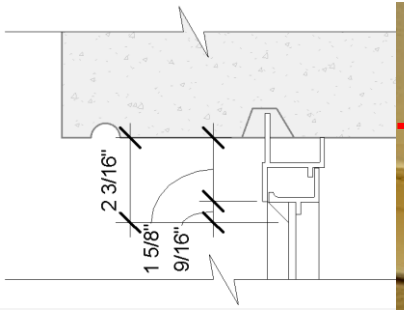
Photo above depicts the original smooth factory finish color on the back side of an interior steel mullion.

Securement at Window Perimeters

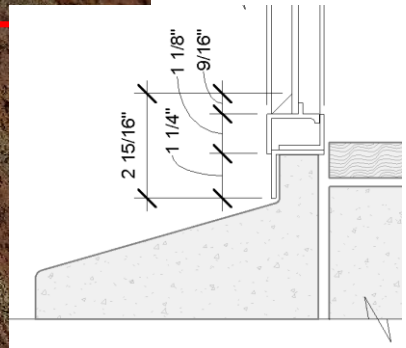




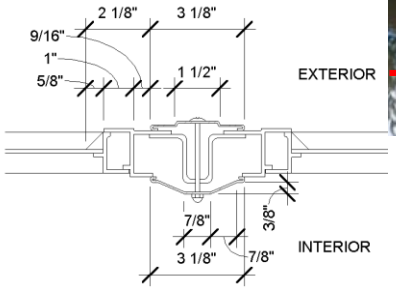
Jamb flange against steel L-angle



Head flange embedded in cement

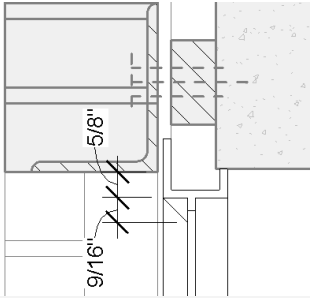


Sill flange nested on concrete sill

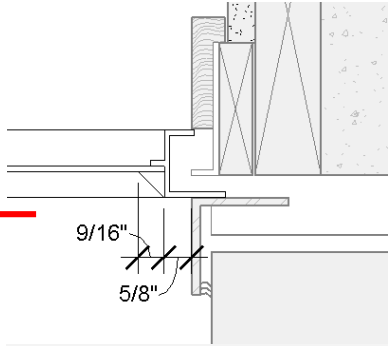


Jamb flanges secured by steel mullion and clamping bracket

Securement at Window Perimeters



Head flange against steel ledger angle



Jamb flange against steel L-angle

Operable Sashes

Photo above depicts the same four (4) previously shown office combination windows with the red dashed area indicating the location of the photos depicted on the right side of this page.

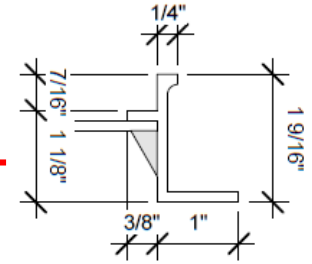
Photo above depicts an exterior view at the corner of in-swing hopper.

Photo above depicts an interior view of a in-swing hopper showing the windows pivot arm and the difference between exterior and interior paint colors.

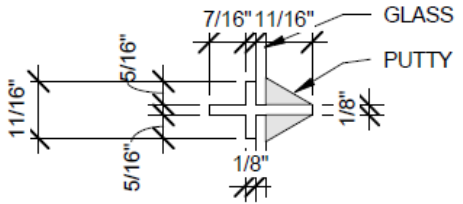
Mutins & Glazing Putty

Photo above depicts the same four (4) previously shown office combination windows with the red dashed area indicating the location of the photos depicted on the right side of this page.

Photo above depicts the intersection of a steel muntin at a fixed window frame.



Drawing above depicts typical fixed window & glazing putty profiles.



Drawing above depicts typical steel muntin & glazing putty profiles.

Existing & Historic Window Color

Red dashed area above indicates the location of the close-up photo shown to the right.

Close-up photo above depicts the various current and historic paint finishes.

Current acrylic latex paint color
-Exact Color
SW 6388

Original Factory Finish Lead Paint
-Very similar to
SW 6143

Original Factory Lead Primer
-Close to
SW 6143

General Window Conditions - Corrosion

Corrosion at corners of sashes

Corrosion at corner of sash and broken weld

Corrosion at frame

Rust scaling at frame beneath sash

Rust scaling at interior of fixed frame

Epoxy repair at corroded corner

General Window Conditions - Glass

Red = darker glass with green color

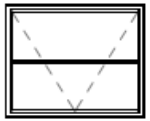
Glass on the left, fiberglass on the right

Red & blue = darker glass, purple = metal panel

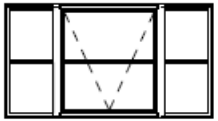
Window screens over glass

Variety of glass colors and types of fiberglass

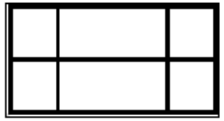
Typical Window Types / Configurations



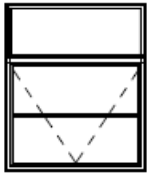
CLASSROOM SWING IN HOPPER



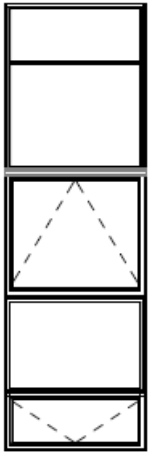
CLASSROOM SWING IN HOPPER W/ FIXED SIDES



GYM FIXED W/ MUTINS

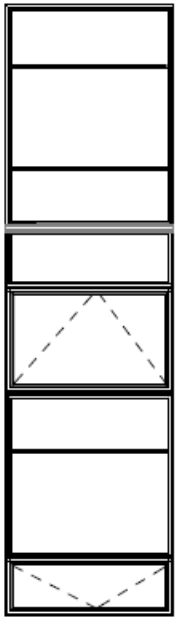


TOILET/ STORAGE SWING IN HOPPER W/ FIXED TOP

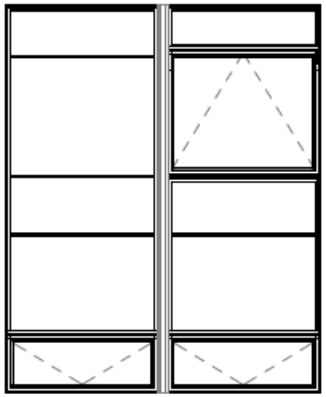


SHOP WDW

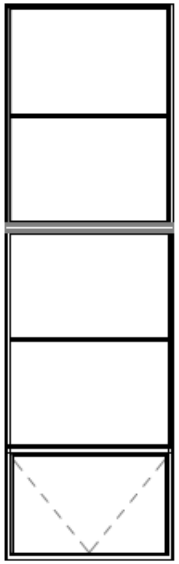
FIXED



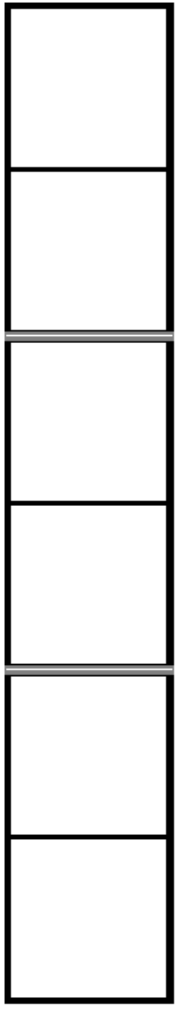
CAFETERIA WDW



OFFICE COMBINATION WDW



LIBRARY WDW

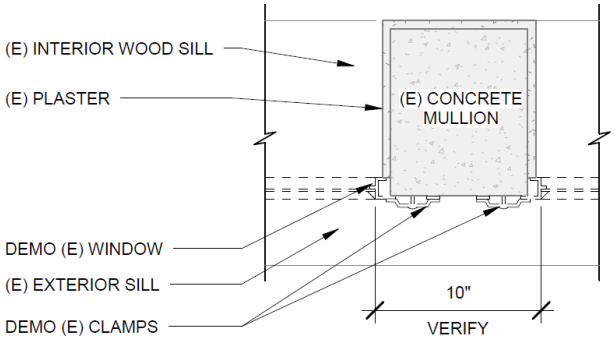


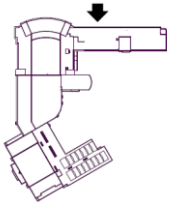
STAIRWELL WDW

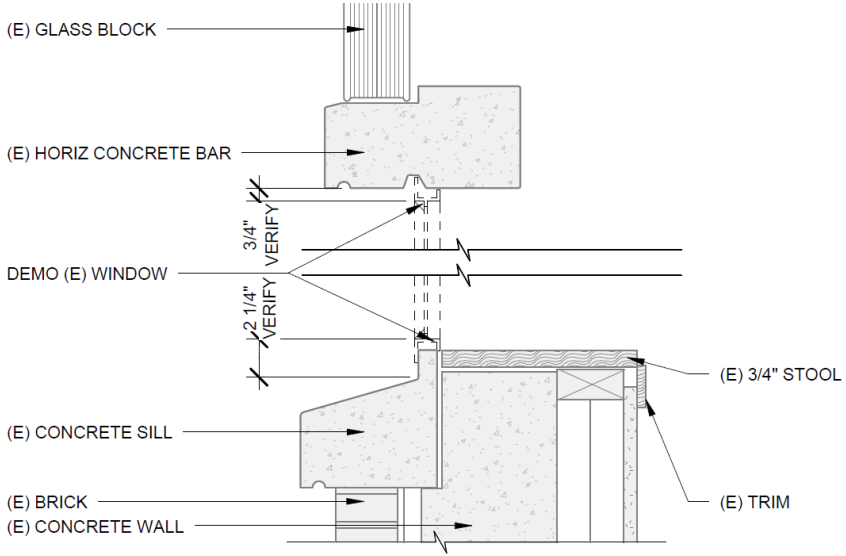
Typical Window Conditions

Classroom windows with combination in-swing hopper and fixed sides

Up close view and conduit through glass

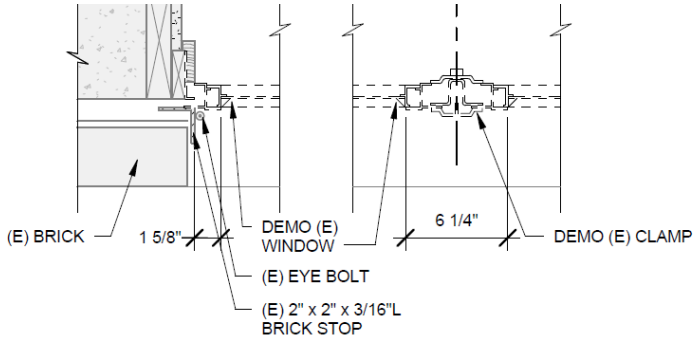


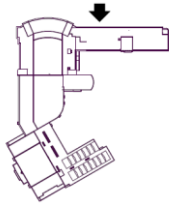


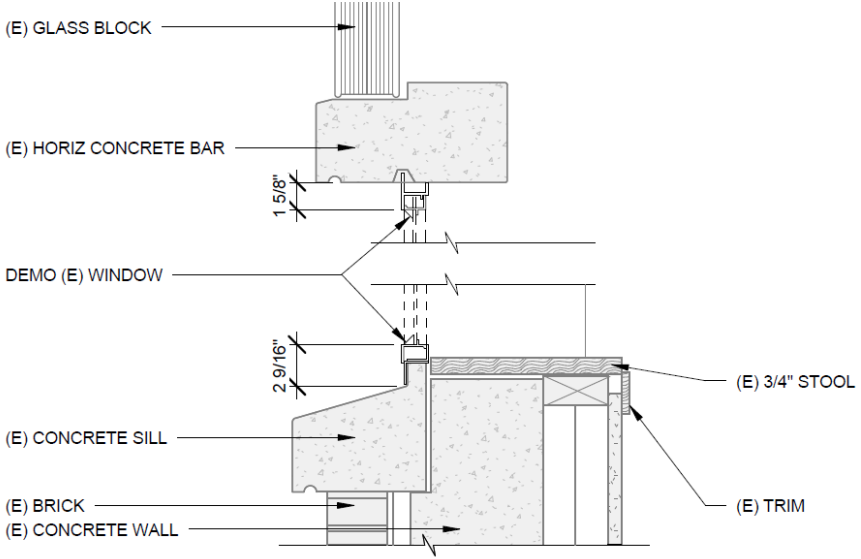


Typical Window Conditions

Classroom in-swing hopper windows



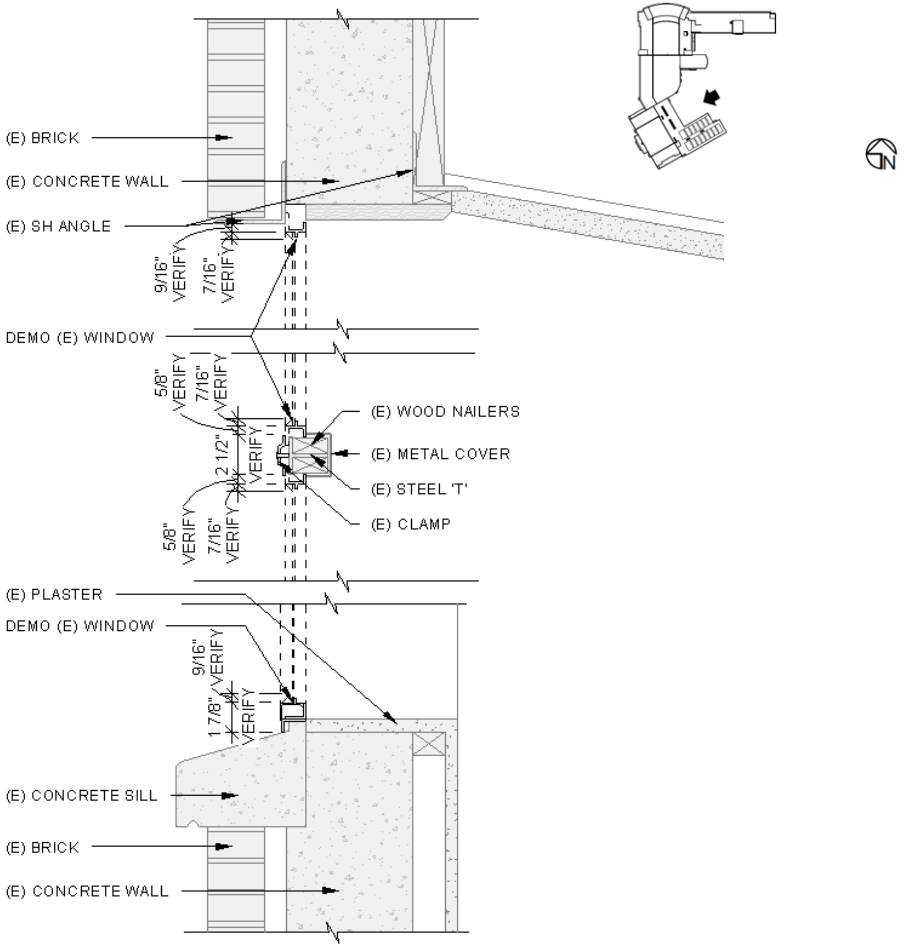




Typical Window Conditions

Typical shop windows

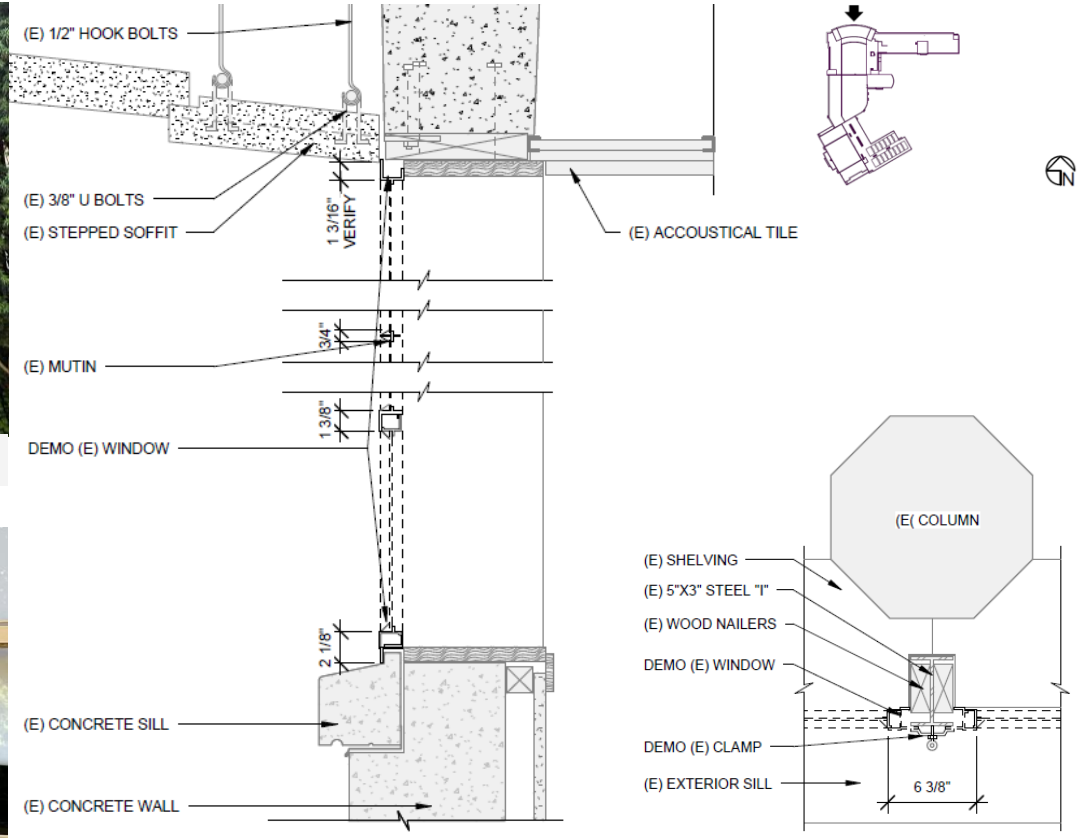
Typical cafeteria windows



Typical Window Conditions

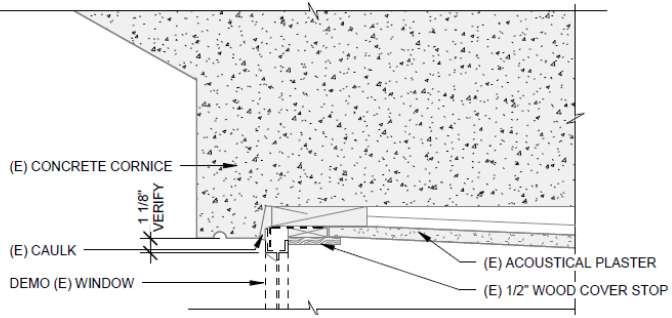
Office combination windows

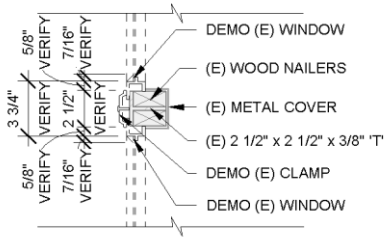
Close-up view of an office combination window

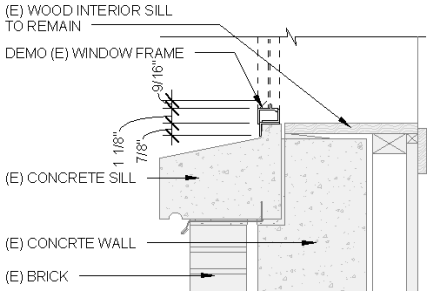


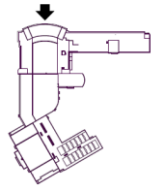
Typical Window Conditions

Red dashed area indicates library windows





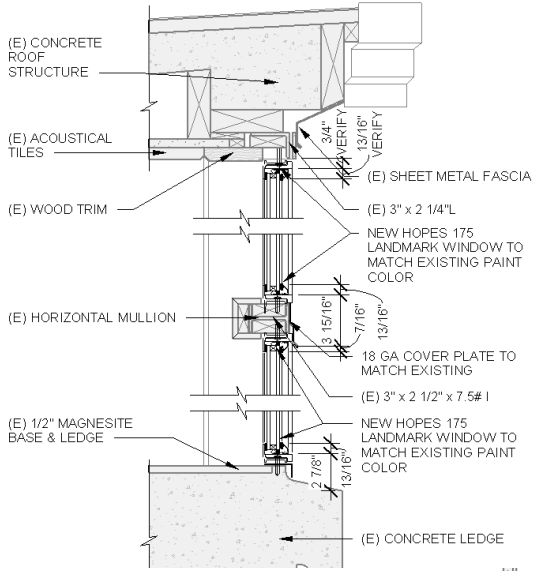


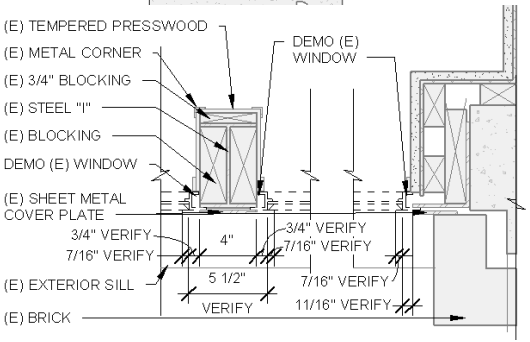


Typical Window Conditions

Fixed windows at stairwells

Wider steel mullions at stairwells

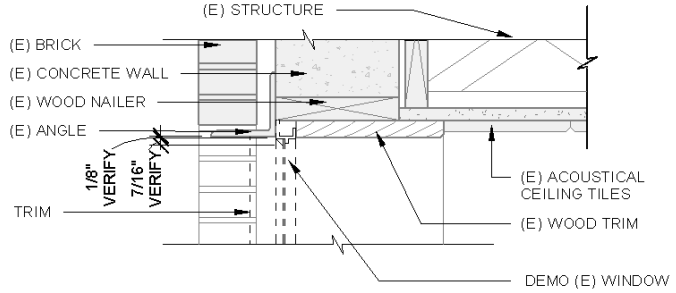


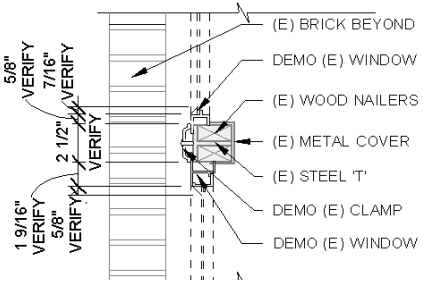


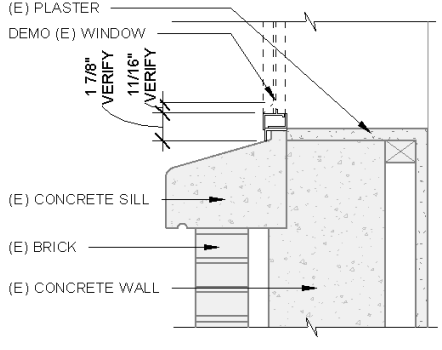
Typical Window Conditions

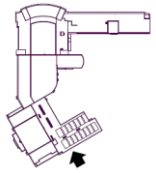
Shop windows and doors

Steel windows and doors









Unique Window Conditions

Fixed windows in glass block walls

Narrow fixed windows below missing glass block walls

Infill of glazing for ductwork and pipe penetrations

Narrow fixed windows

Unique Window Conditions

Failing asbestos sealant and steel angle corrosion

Window flange set against brick masonry without steel angle

Notched steel mullion around transition in concrete ledger

Proposed Replacement Windows

SUMMARY OF INTENT:

The proposed replacement windows seek to replace the existing steel-framed, single-glazed windows with new steel-framed thermally insulated models. Although thermally broken & insulated glazed windows cannot by their inherent nature provide an exact match for the historic windows, the model proposed seeks to:

-Maintain the historic windows painted steel material
-Return the steel windows to their original finish color
-Replicate the existing painted glazing putty via painted steel profile
-Maintain operable window locations and types
-To the greatest extent possible, provide an exact or near match to the:
  -historic window site lines
  -visible exterior profiles
  -areas of visible glass
  -Provide a consistent glass color and type removing the variety of glazing materials currently found around the school.

Proposed Replacement Windows

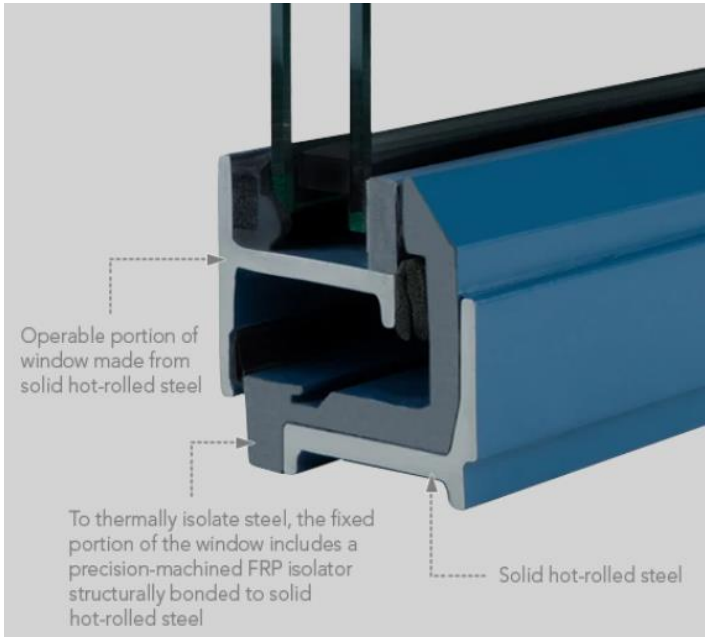
DESCRIPTION OF REPLACEMENT WINDOWS

-Profiles made from steel with flanges rolled integrally at the mill with composite frame and triple weather stripping.

-All steel profiles are a minimum of 1-3/4” in depth but in available widths allowing for exact or near match to the original steel windows; site lines, operable locations, areas & amounts of visible glass, and glass color.

-Exterior muntins are hot-rolled from stainless steel and can be factory welded and dressed smooth to perimeter framing or exterior applied with double adhesive tape after glazing.

-Three-coat factory finish high performance coating that can be custom colored to match the historic tan color.



Proposed Replacement Windows

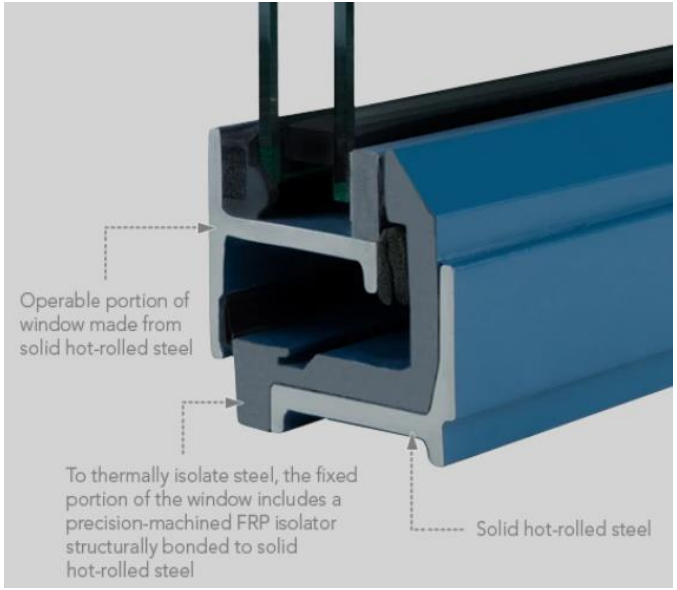
DESCRIPTION OF REPLACEMENT WINDOWS - CONTINUED

-In-swing windows hung on non-ferrous heavy duty stainless steel four bar hinges, having friction maintained by sliding brass shoe and screw adjustment, allowing for easier maintenance and adjustment of operation.

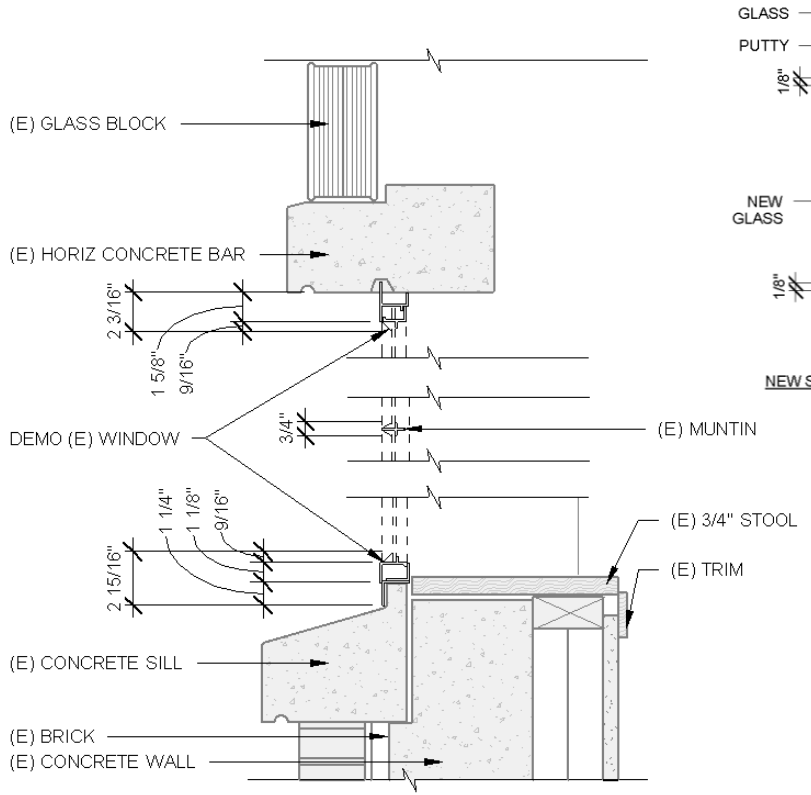
- Clear glass with thickness to meet minimum Seattle Energy Code U-value with coatings on glass faces as required to meet Seattle Energy Code SHGC depending on building elevation. 2018 SEC SHGC requirements will necessitate a Low-E coating on at least on glass face #2 regardless of elevation. Min. of Low-E272 on north windows and Low-E270 all others

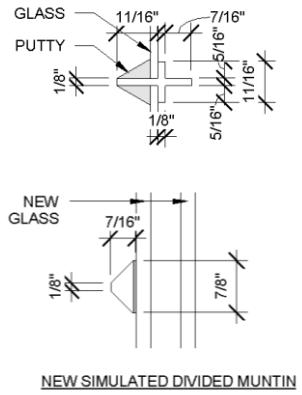
-Tempered glass as required by code.

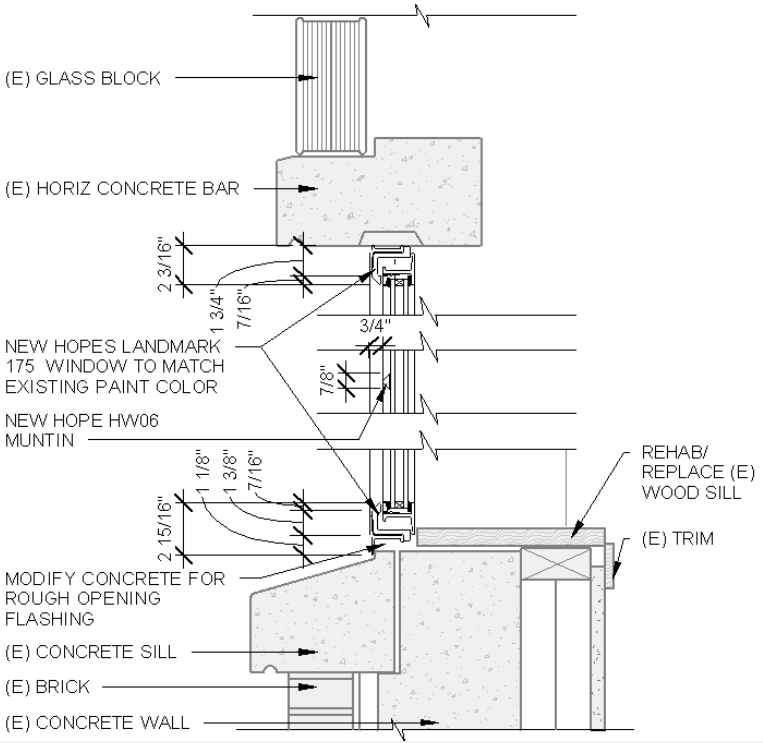
-Laminated glass for clerestory windows and locations where falling through glass is a concern.



Existing and Proposed Window Comparison



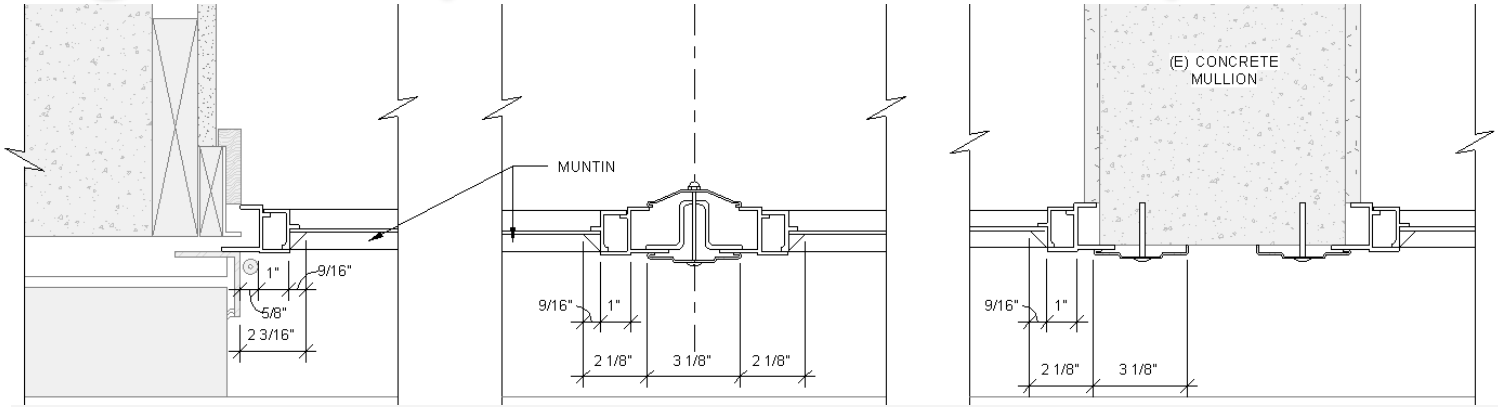




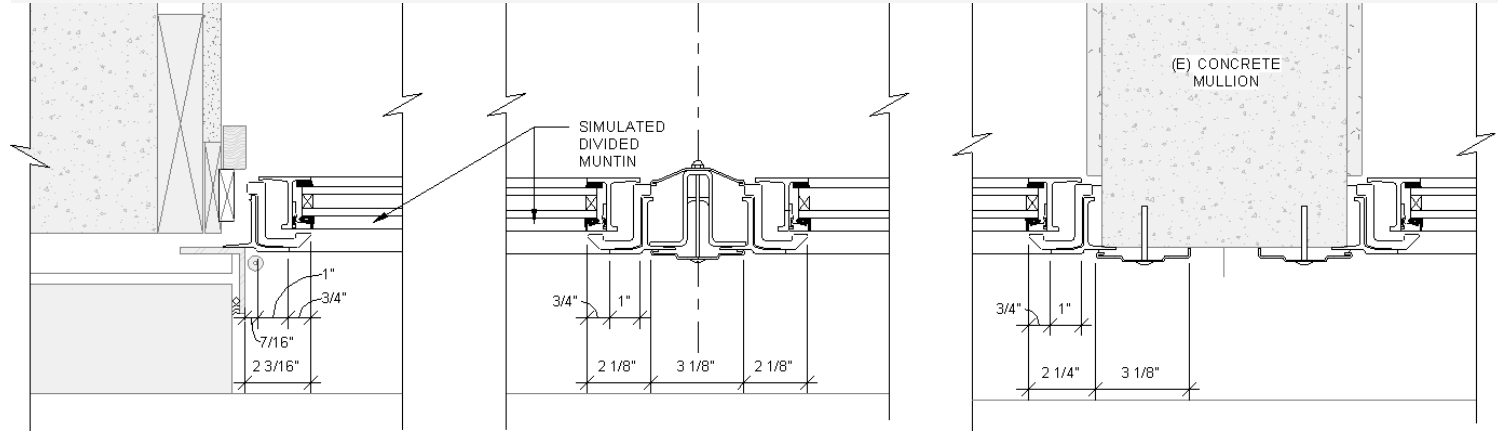
Existing Operable Window Head & Sill

Proposed Operable Window Head & Sill

Existing and Proposed Window Comparison



Existing Operable Window Jamb at Brick, Vertical Mullion, and Jamb at Concrete Column



Proposed Operable Window Jamb at Brick, Vertical Mullion, and Jamb at Concrete Column

Existing and Proposed Window Comparison

Photo above depicts a corner sample of Landmark 175 in operable profile adjacent to an existing operable window. ***Note: The red arrow points to the location of steel flange that is missing on this sample, but will be included in the installed product to match existing conditions.***

Photo above depicts a sample of the proposed SDL "simulated divided lite" that will be used match the existing steel muntin profile. On operable windows the new muntins will be milled to rest flush against the thermal glazing bead.

Photo above depicts a sample of the proposed SDL "simulated divided lite" that will be used match the existing steel muntin profile.

Existing and Proposed Glass Comparison

The comparison photo above was taken in direct sunlight and depicts the preferred insulated glazing consisting of an exterior 6mm (1/4”) Cardinal CG with LowE2-270 on face #2, a 1/2” gap 90% argon filled, and interior 6mm Cardinal CG with LoE-i89 on face #4. *Note: If approved this glazing is proposed for all windows to maintain consistency.*

The comparison photo above was taken in the shade and depicts the same preferred insulated glazing.

Rationale for Window Replacement vs Retrofit

WINDOW REFURBISHMENT IS NOT PREFERRED:

-Simply painting the windows would have the lowest expected life span, greater maintenance, and further reduce the ability to open and close the existing windows.
-Refurbishment in-place would prevent repairs to rough openings and known but concealed steel corrosion.
-Abatement of asbestos and lead paint will be challenging and intrusive if done on-site.
-Window removal, abatement, and Refurbishment off-site would be more impactful to school operation than a full window replacement.
-Most if not all of the existing operable hardware needs to be repaired if not replaced.
-The existing steel-on-steel operable window design prevents the successful installation of weather stripping.
-Refurbishment would not address the existing windows poor thermal and acoustical performance.
-Providing a consistent glass color and type would require school wide glazing replacement.
-Although available, low-E coated single-pane glazing is easily damaged.
-Window refurbishment would take far longer to complete.

WINDOW REPLACEMENT IS PREFERRED:

-New steel thermally broken windows are available in near matching profiles.
-Thermal, air-leakage, and acoustical concerns could be addressed.
-Severe solar heat gain issues could be fully addressed for south facing classrooms.
-Long-term maintenance would be far simpler.
-Window replacement could be implemented in significantly less time.

QUESTIONS?

THANK YOU FOR YOUR TIME AND CONSIDERATION OF THIS PROJECT.