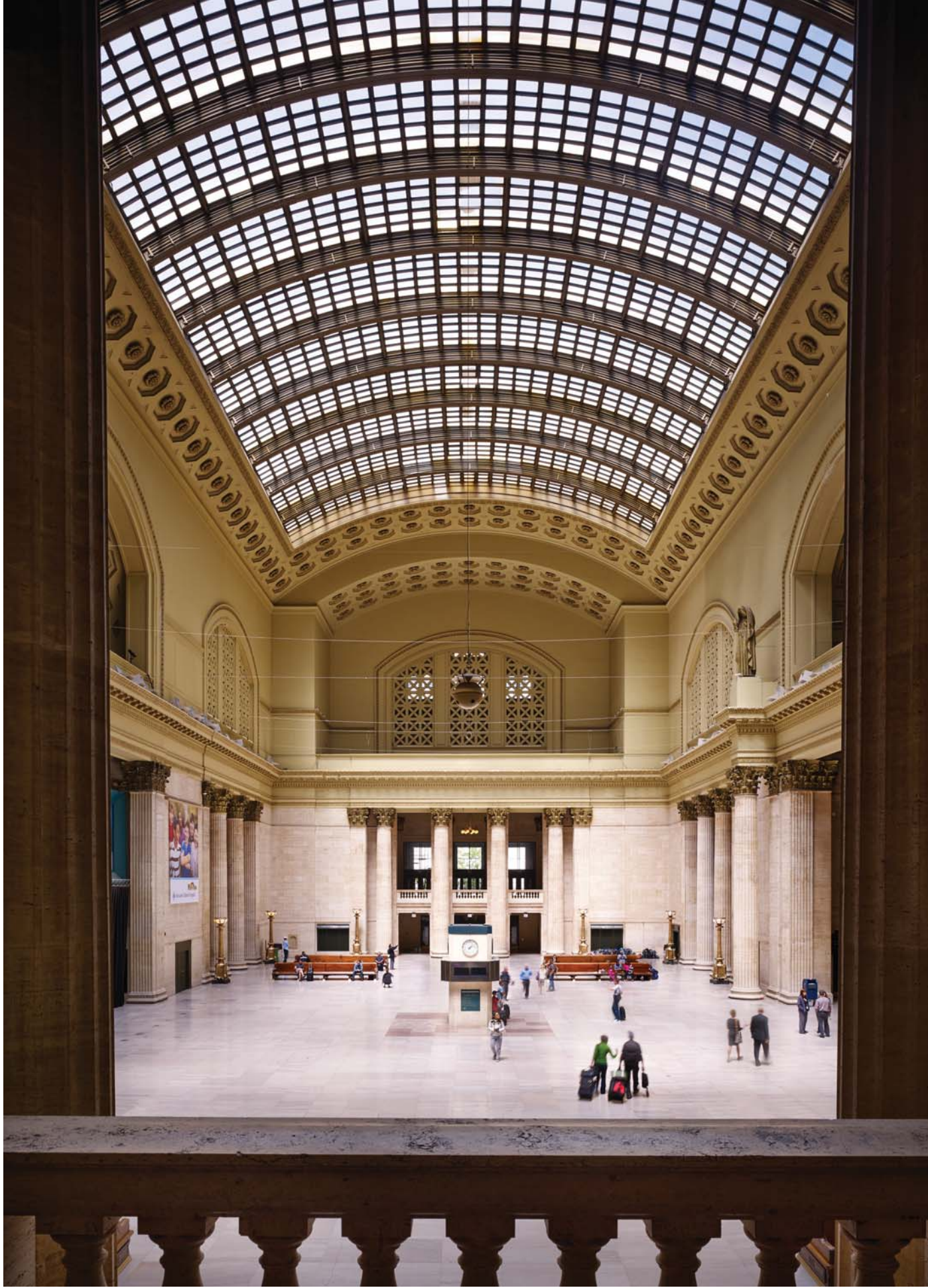


Great Hall Skylight Investigation

September 2015 - June 2016



GREAT HALL
2007



GREAT HALL CONSTRUCTION
OCTOBER 30, 1924

Completed in 1925, and designed by Daniel Burnham and successor firm Graham Anderson Probst and White, the Great Hall is the centerpiece of the Chicago Union Station Head House. This grand space, measuring over 200 feet long, 100 feet wide, and 100 feet tall was capped by a vaulted roof and skylight that was an engineering marvel of its time. The designers pushed the technologies of the time to their limit, but those technologies were no match for modern construction systems. The Great Hall skylight has been plagued with water problems since completion. Over the decades, the sealants around the glass and structural girders have leaked and the gutters and drains — which were buried in the masonry walls and plaster ceilings — have failed. A series of repairs and patches and repairs have been temporary fixes only, and at best have only delayed the infiltration of water into the building.

Looking up at the upper walls of the Great Hall today quickly reveals the flaws of the system. Wide flashing strips placed over the joints between glass on the mullions, beams, and girders to fend against leakage have marred the light airy

appearance of the skylight the designers intended. Further down, on the ceiling coffers and upper walls signs of deteriorated plaster are easily spotted from the floor, while staining on the travertine marble of the lower walls is also evident, both caused by the failed and leaking drains.

Earlier this year, Goettsch Partners (architect), Klein and Hoffman (structural and facade engineers/architects), and Berglund Construction completed an extensive investigation of the skylight, walls, and roof of the Great Hall in order to document the existing conditions, as shown on the following displays. Areas examined included the skylight, gutters and drainage path, structural conditions, masonry conditions, roofing, clerestory windows, interior stone, and interior plaster.

The investigation concluded that the skylight system as designed will not adequately keep water out, and the current wire glass — replaced in the early 1980s — does not meet current codes. Flashings are saturated with water and rusting,

gutters fail to direct water down from the roof, drain pipes have deteriorated due to galvanic action from dissimilar metals used in repairs, and lower roofs are saturated and beyond their service life. As a result the deterioration of interior plaster and stonework will continue and accelerate until a permanent solution is implemented.

In order to maintain the historic appearance of the skylight from within the Great Hall and to overcome the complications of the existing drainage system, this project will construct a new, energy efficient, modern skylight five feet above the historic skylight. The new skylight will include a new drainage scheme and maintenance system. Once the skylight and roof work has been completed, ensuring that the Great Hall will remain dry, the plaster and stone will be restored, including the return of the historic paint scheme for the walls and ceiling.



GREAT HALL CONSTRUCTION
MAY 29, 1924



GREAT HALL CONSTRUCTION
APRIL 3, 1924

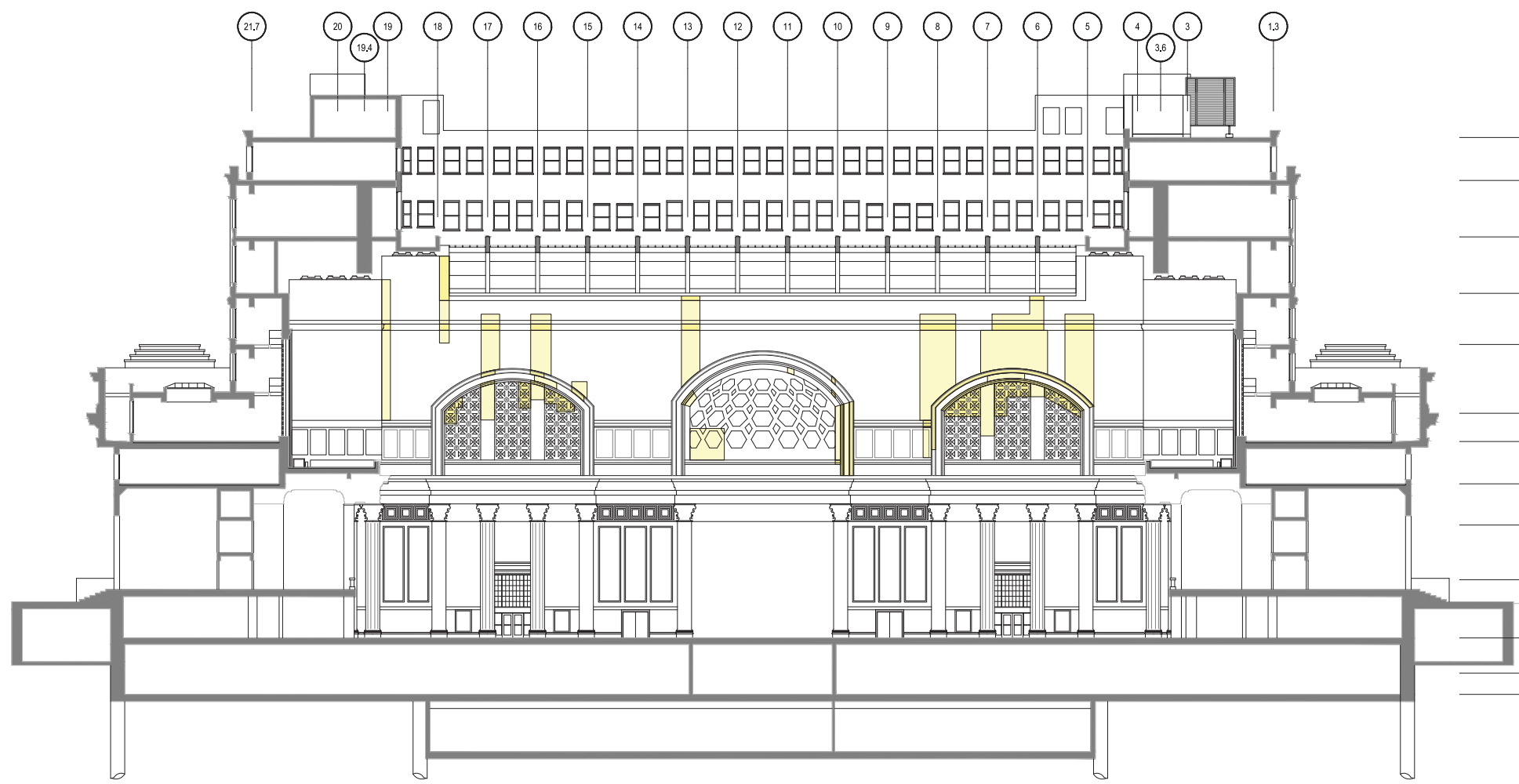


UNION STATION



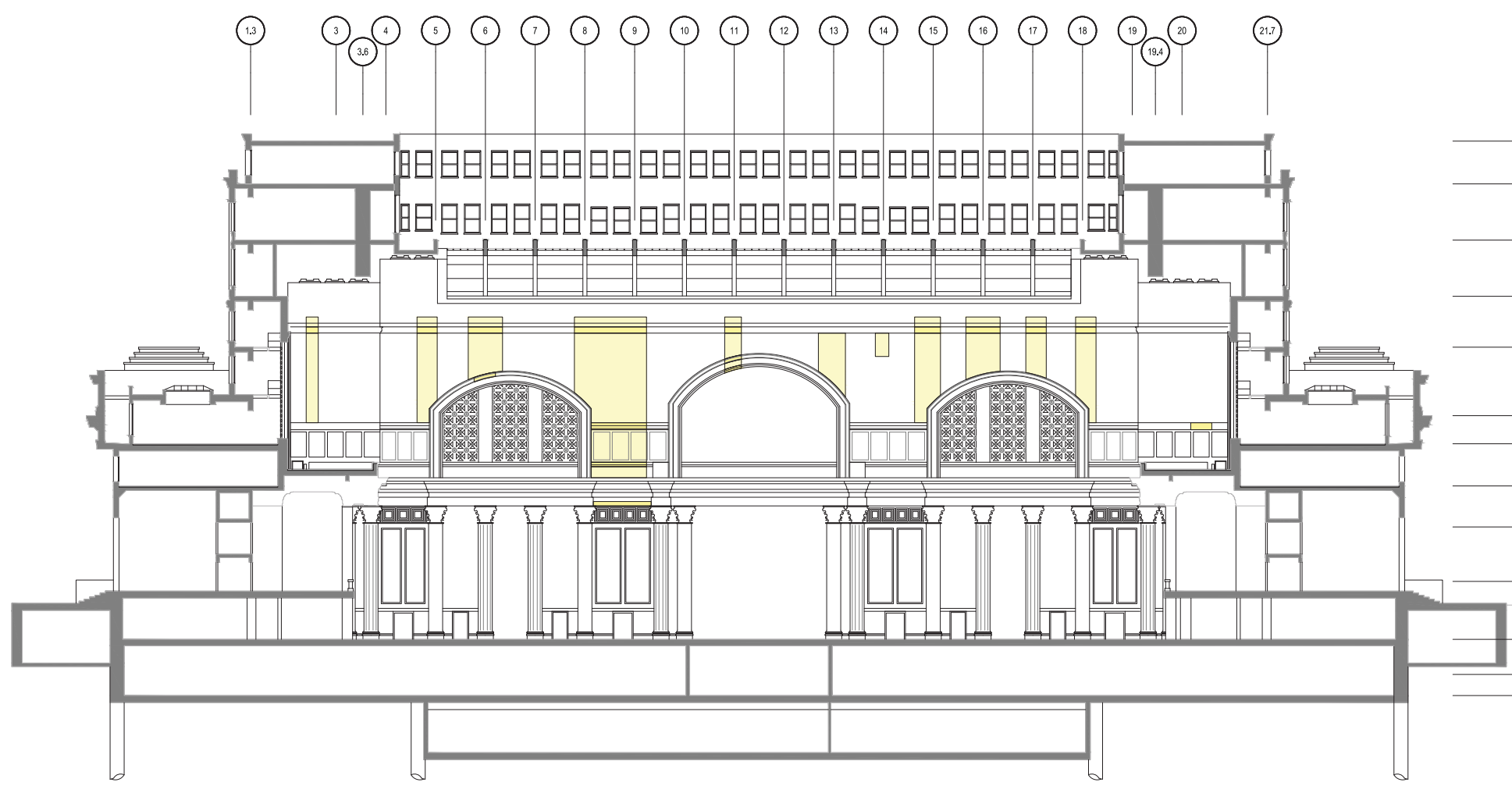
Great Hall Skylight Investigation

Plans and Elevations



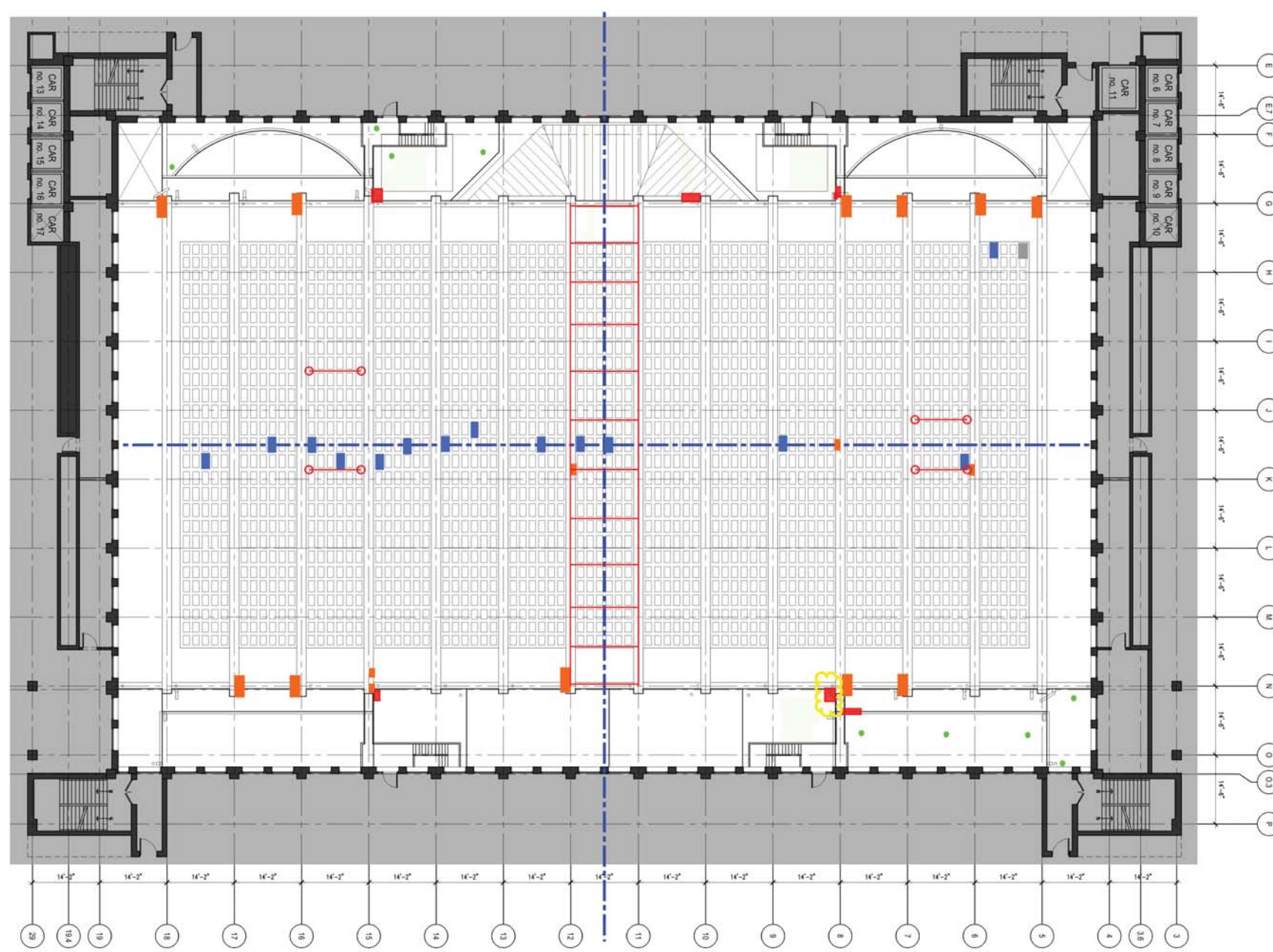
Water damaged plaster areas

WEST GREAT HALL ELEVATION



Water damaged plaster areas

EAST GREAT HALL ELEVATION



■ - Skylight Glass Removal Location. ○ - Alterations Observed at Existing Beam Connections to Girders
■ - Girder Cladding Openings
■ - Facade Opening at Exterior Drop.
■ - Low Roof Inspection Openings

GREAT HALL SKYLIGHT INVESTIGATION PLAN



Great Hall Skylight Investigation

Gutters and Drainage



LIGHT COURT
EAST SIDE



LIGHT COURT LOOKING
SOUTHWEST OVER SKYLIGHT



EAST GUTTER - STANDING WATER WHERE ORIGINAL DRAIN
FAILED AND EXTERNAL DOWNSPOUT WAS ADDED



EAST GUTTER - STANDING WATER
WHERE GUTTER HAS FAILED



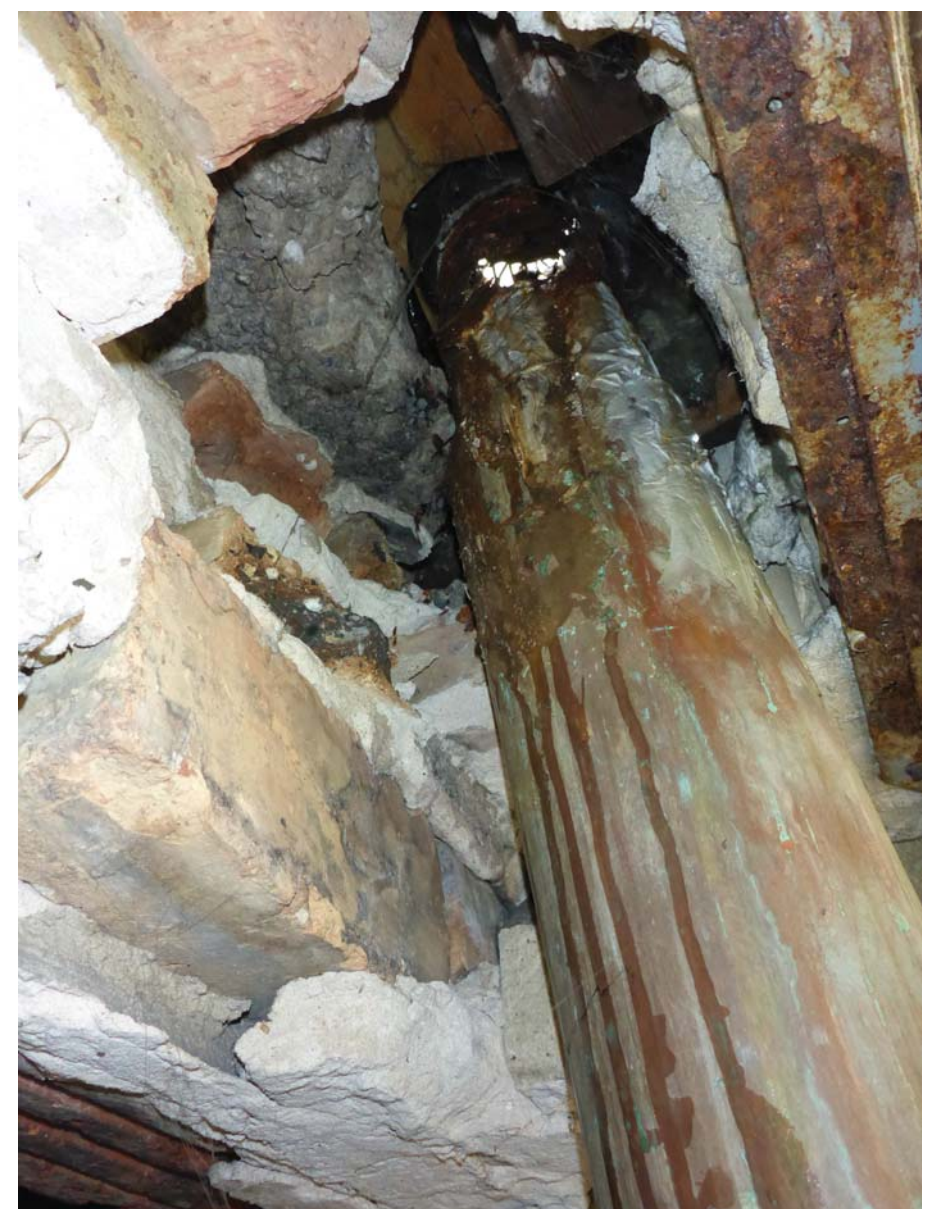
EAST GUTTER - STANDING WATER WHERE ORIGINAL DRAIN
FAILED AND EXTERNAL DOWNSPOUT WAS ADDED



ORIGINAL CAST IRON DRAIN PIPE WITH TRAP AND VENT - SECTIONS
REPLACED WITH COPPER AND GALVANIZED PIPE OVER TIME



GALVANIZED DRAIN PIPE DETERIORATION
DUE TO GALVANIC CORROSION



GALVANIZED DRAIN PIPE DETERIORATION
DUE TO GALVANIC CORROSION

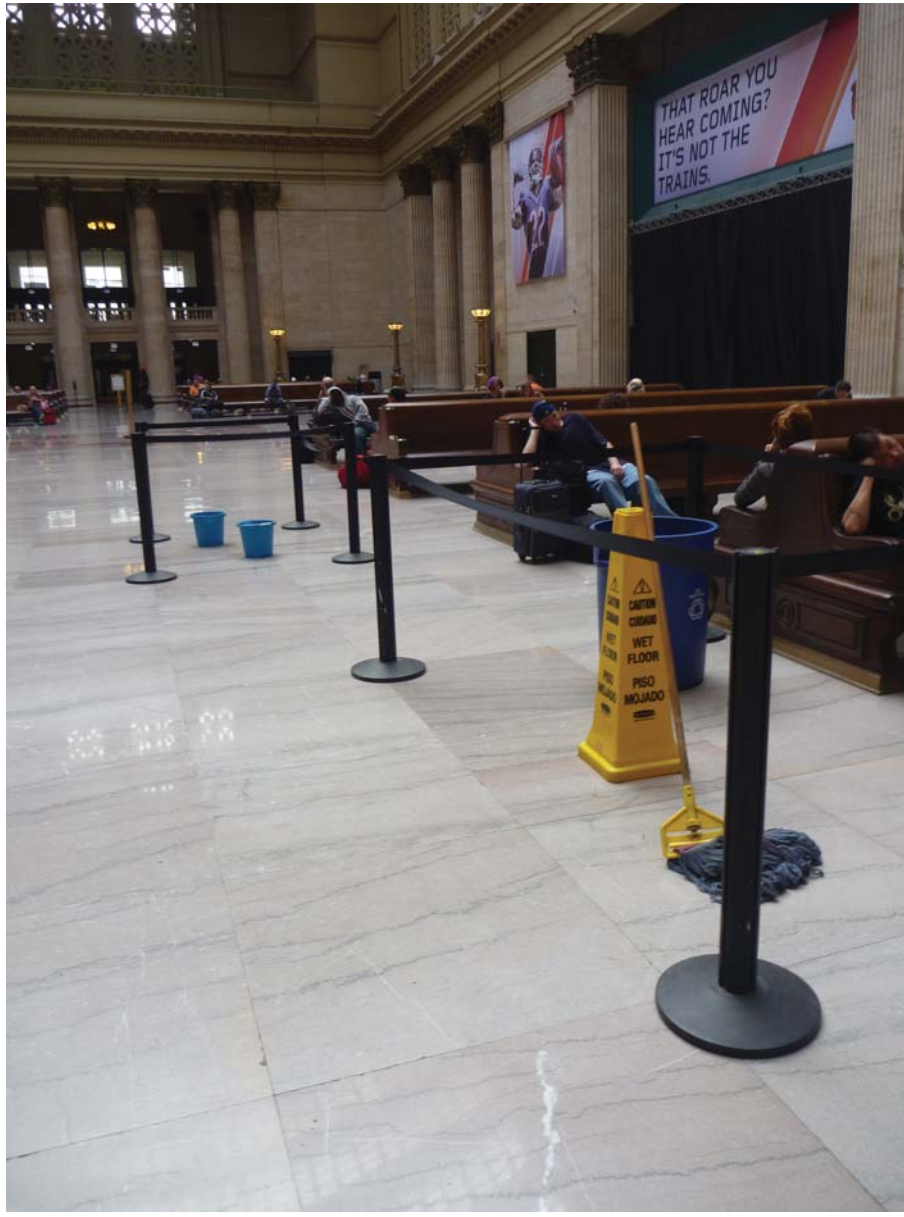


Great Hall Skylight Investigation

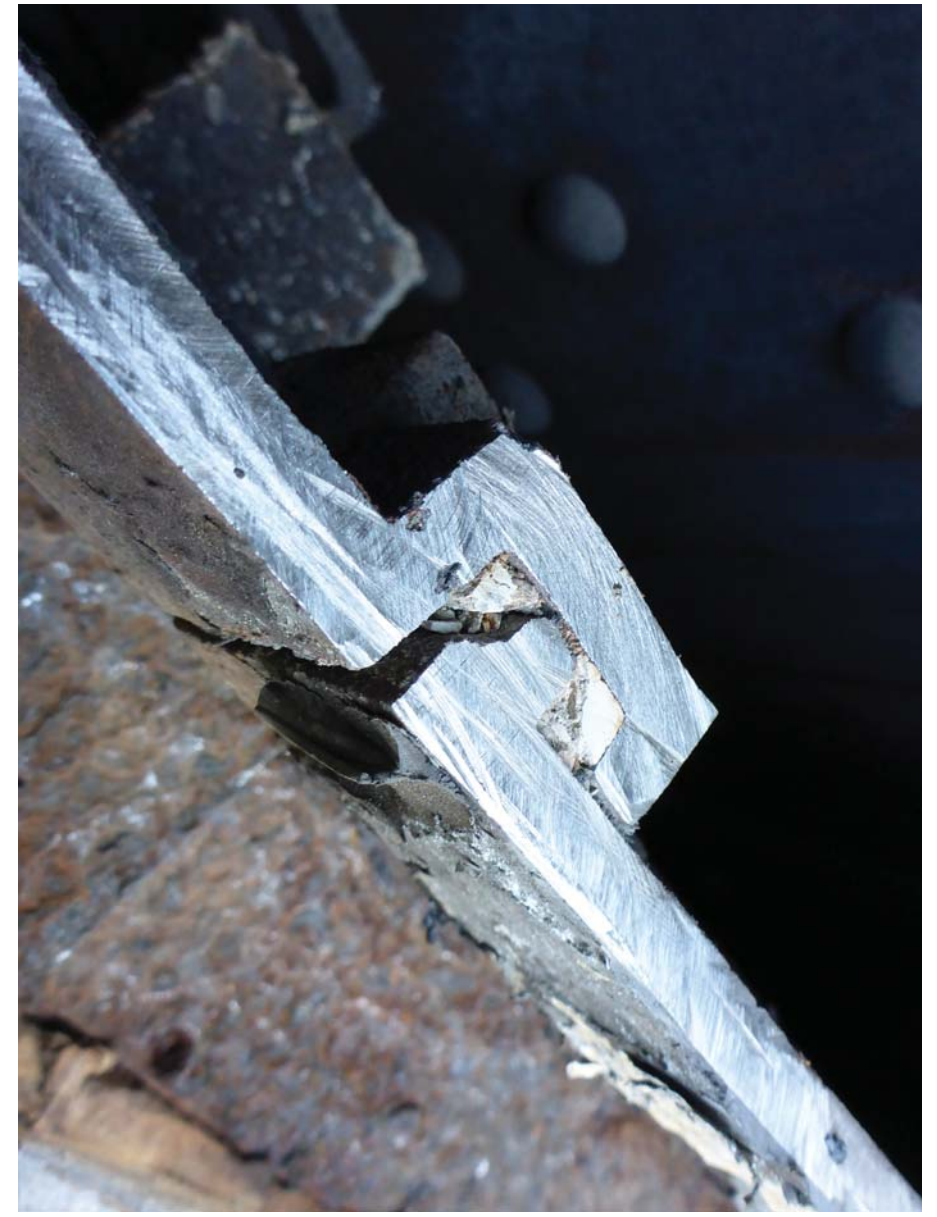
Glass and Cast Iron Frame



EXISTING SKYLIGHT FROM BELOW SHOWING EFFECTS OF WATER PONDING AND ADDED FLASHING BANDS



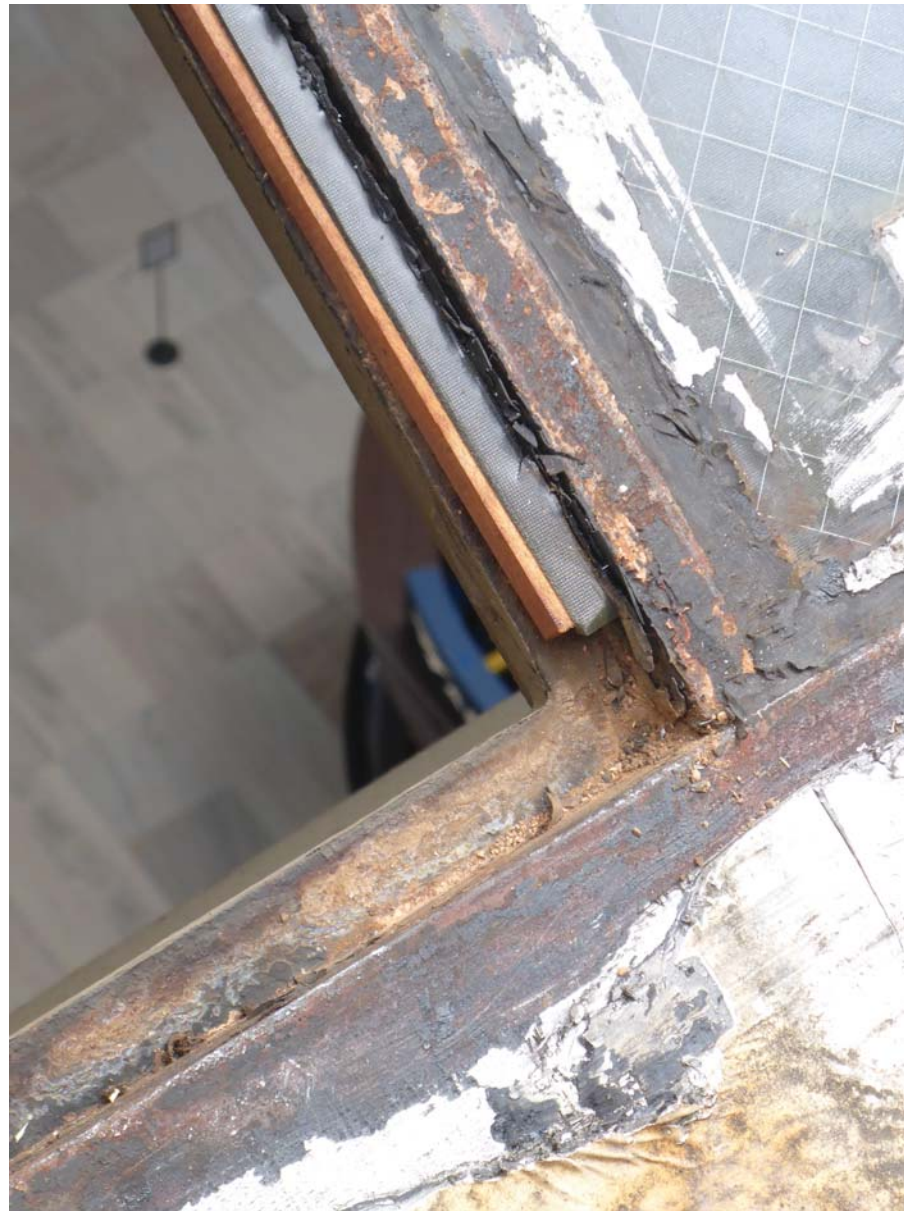
SIGNS OF CONTINUED SKYLIGHT LEAKAGE



TYPICAL GIRDER CLADDING JOINT



INITIAL GLASS REMOVAL



TYPICAL GLAZING POCKET WITH WOOD BLOCKING



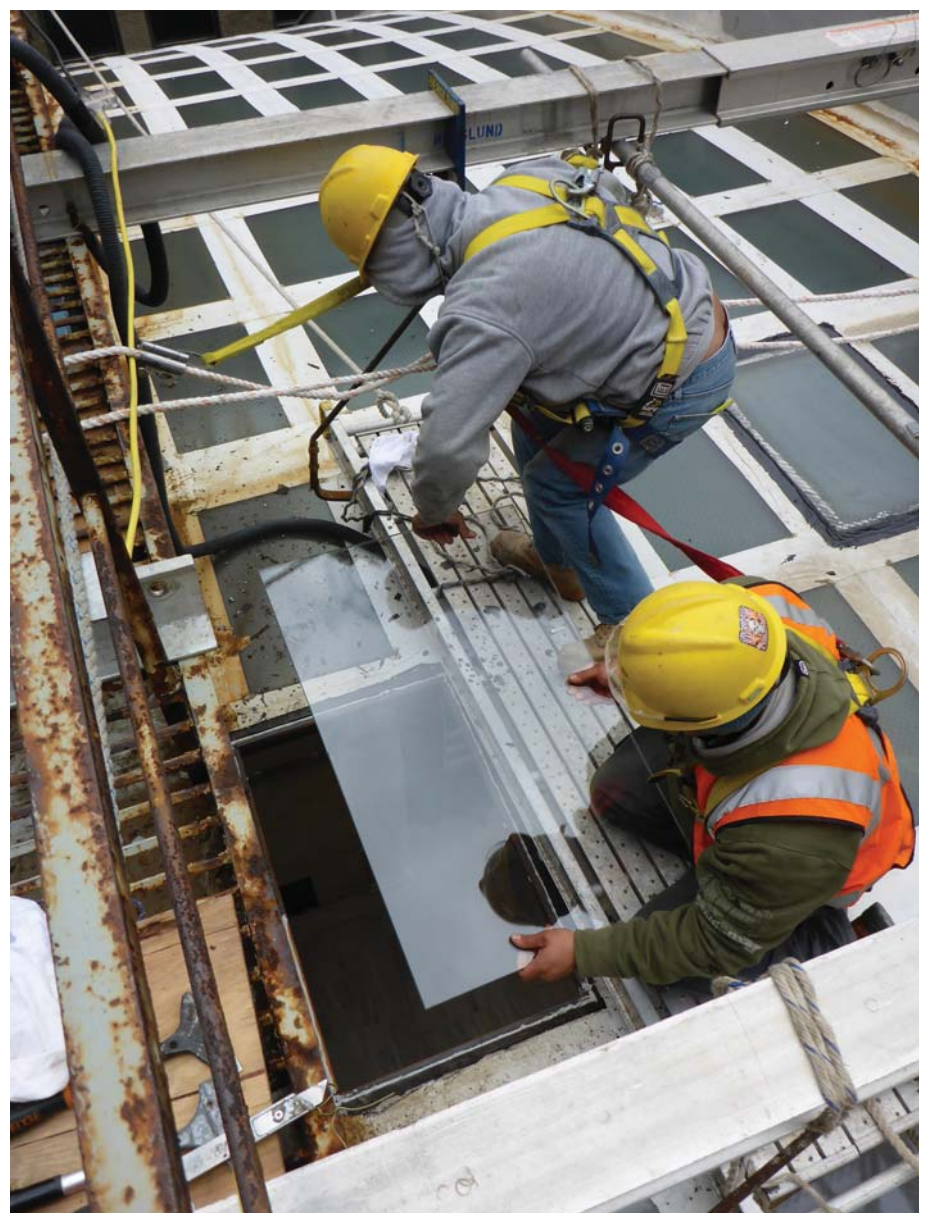
SATURATED EDGE FLASHINGS BETWEEN GIRDER AND SKYLIGHT GLASS



BROKEN WIRE GLASS



EXISTING WIRE GLASS WITH IMPACT DAMAGE



INSTALLING TEMPORARY REPLACEMENT GLASS

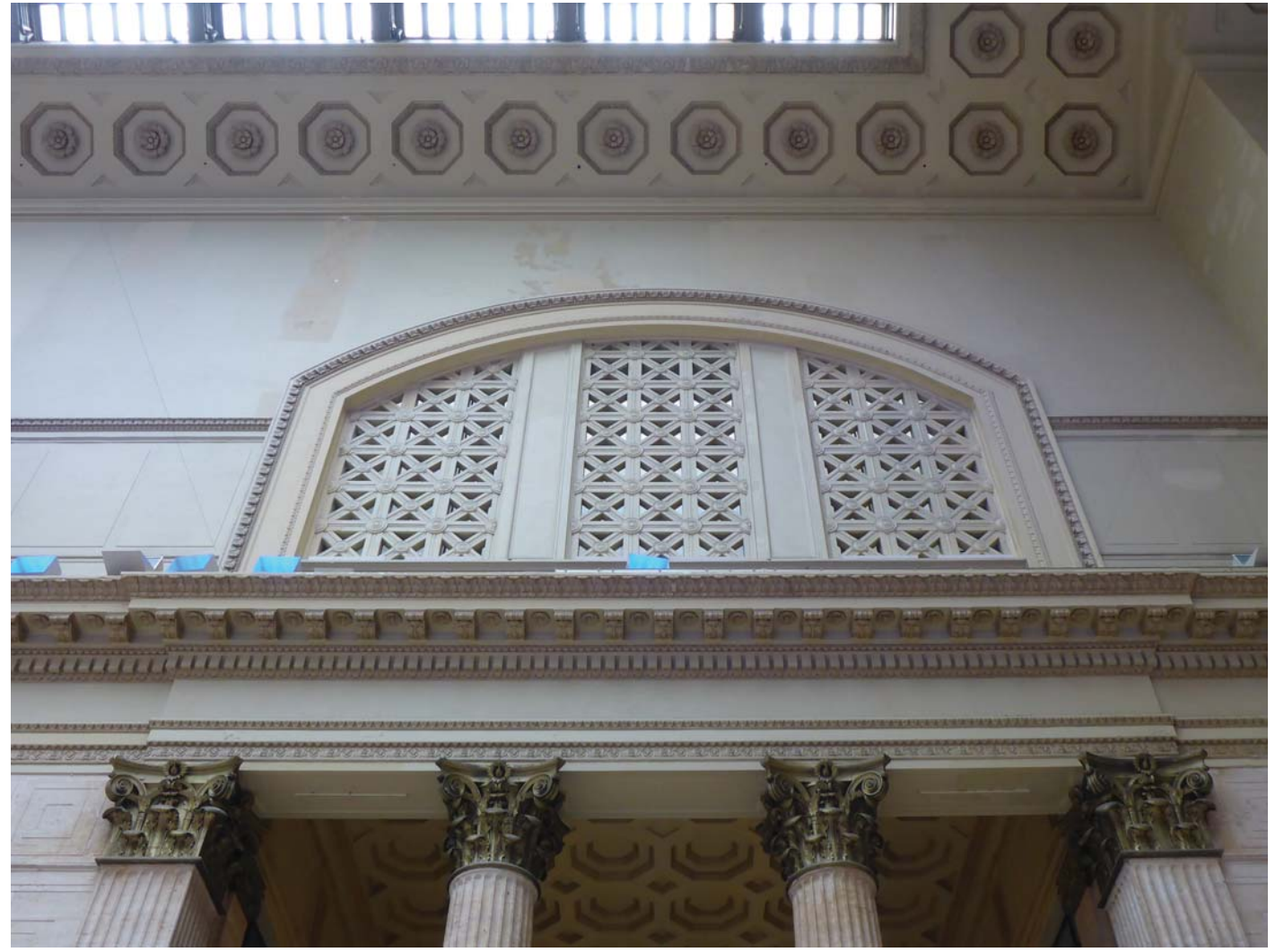


Great Hall Skylight Investigation

Water Infiltration



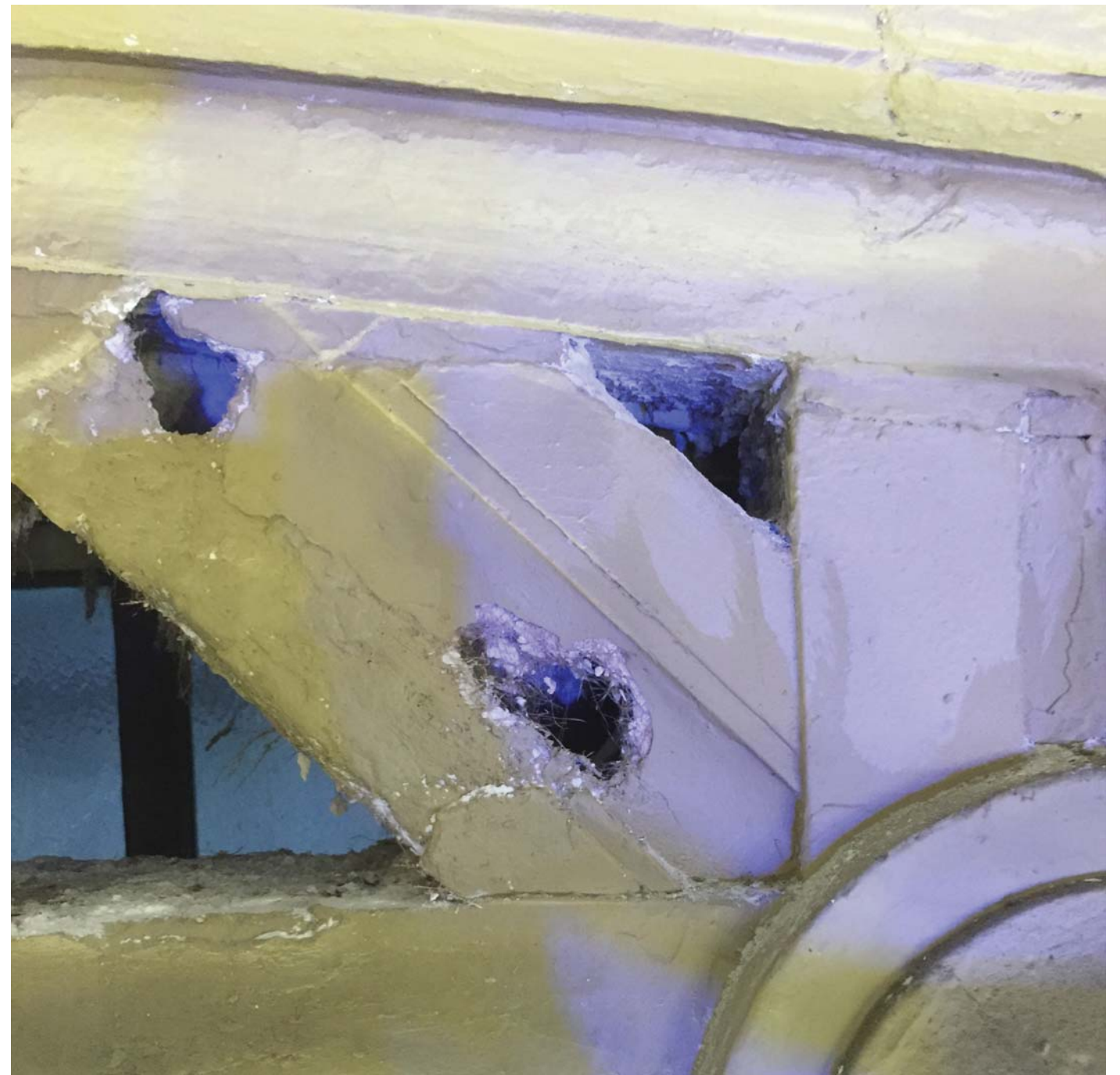
GREAT HALL INTERIOR
NORTHWEST CORNER



GREAT HALL INTERIOR
SOUTHEAST CORNER



PLASTER DETERIORATION
DETAIL AT NORTHWEST CORNER



PLASTER DETERIORATION
DETAIL AT SOUTHWEST CORNER



PLASTER DETERIORATION
DETAIL AT NORTHWEST CORNER



PLASTER DETERIORATION AT
EAST WALL CORNICE

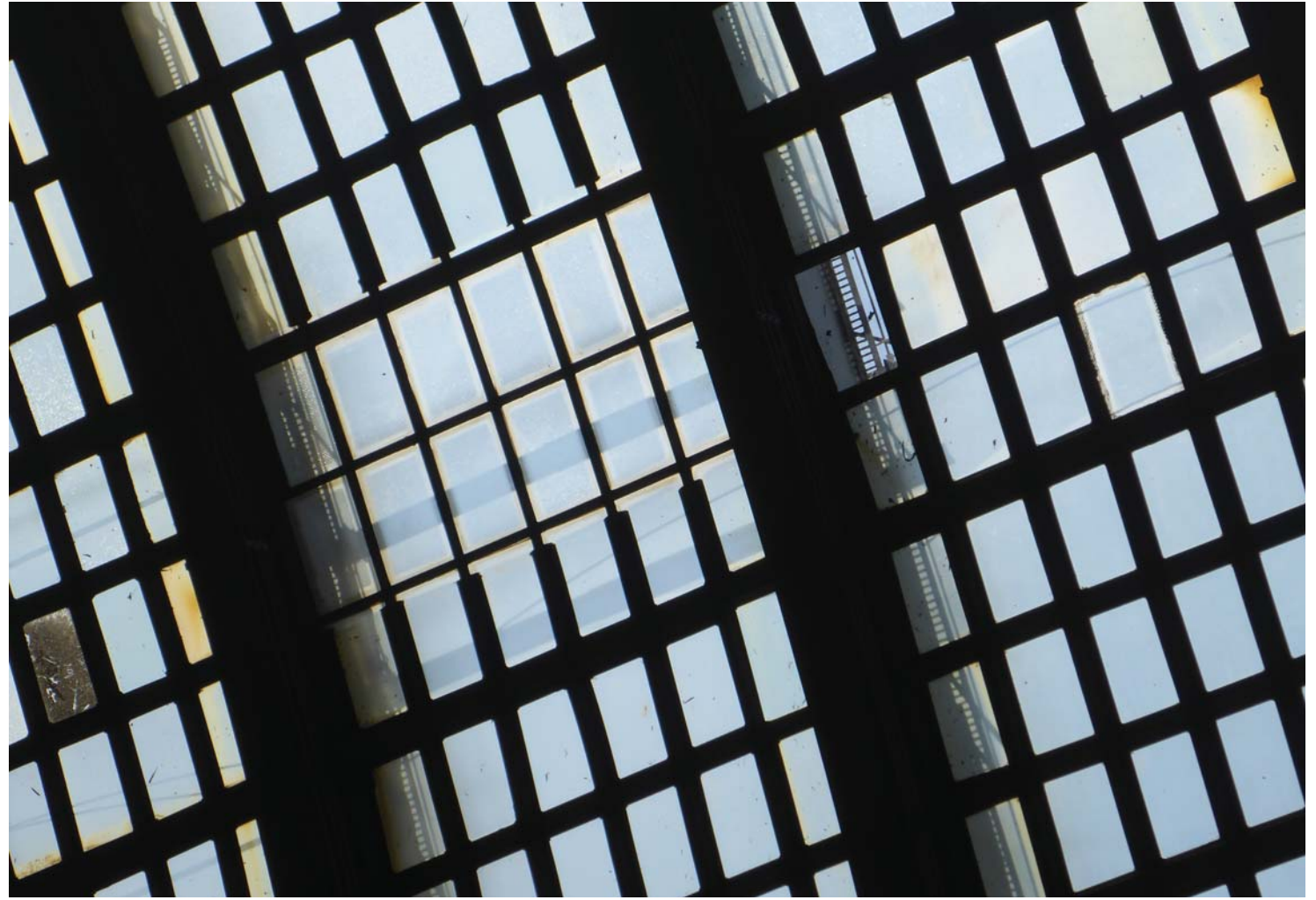


Great Hall Skylight

Proposed Restoration and Upgrade

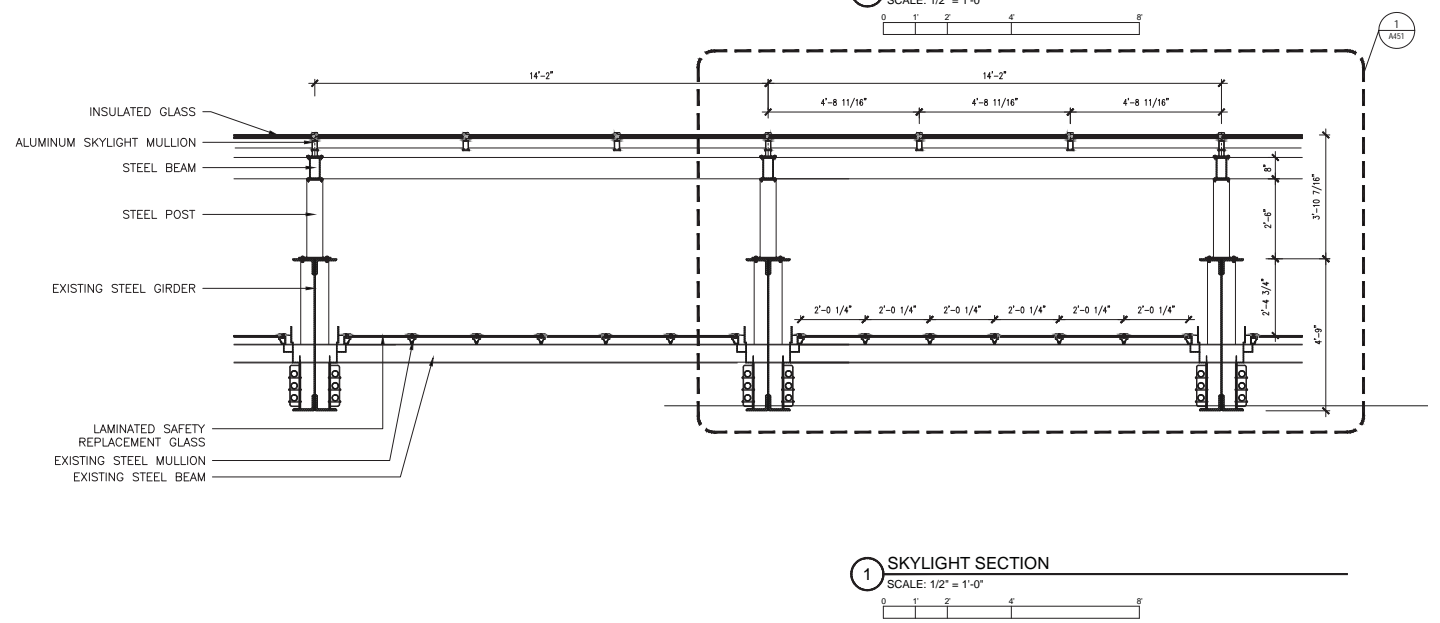
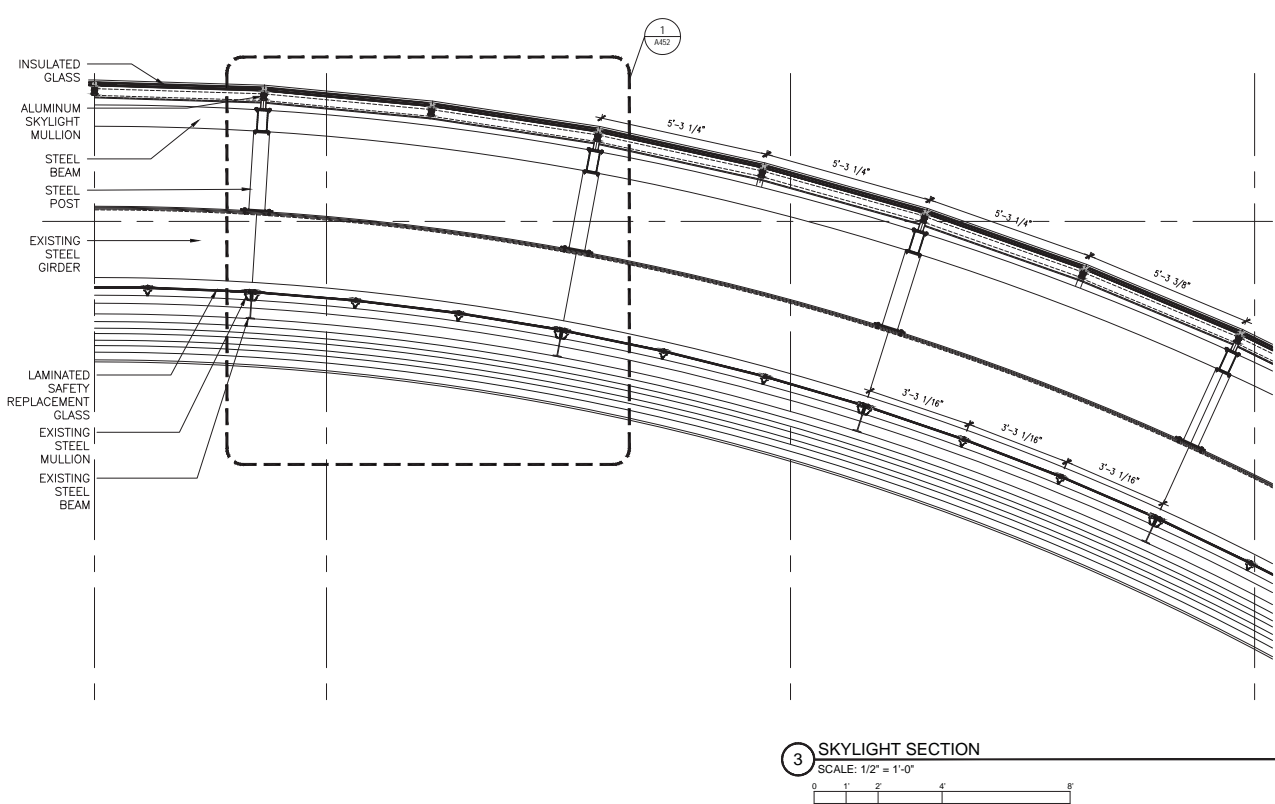
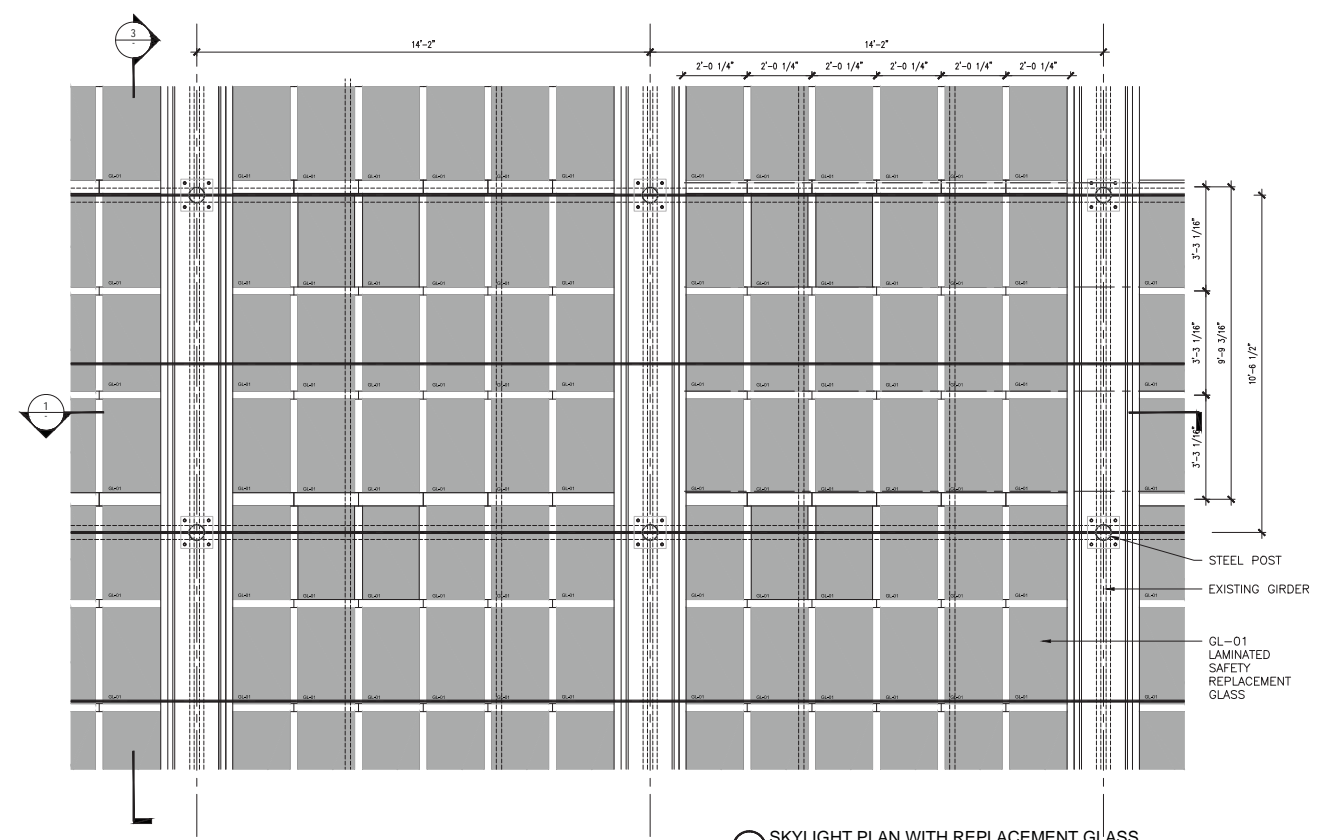
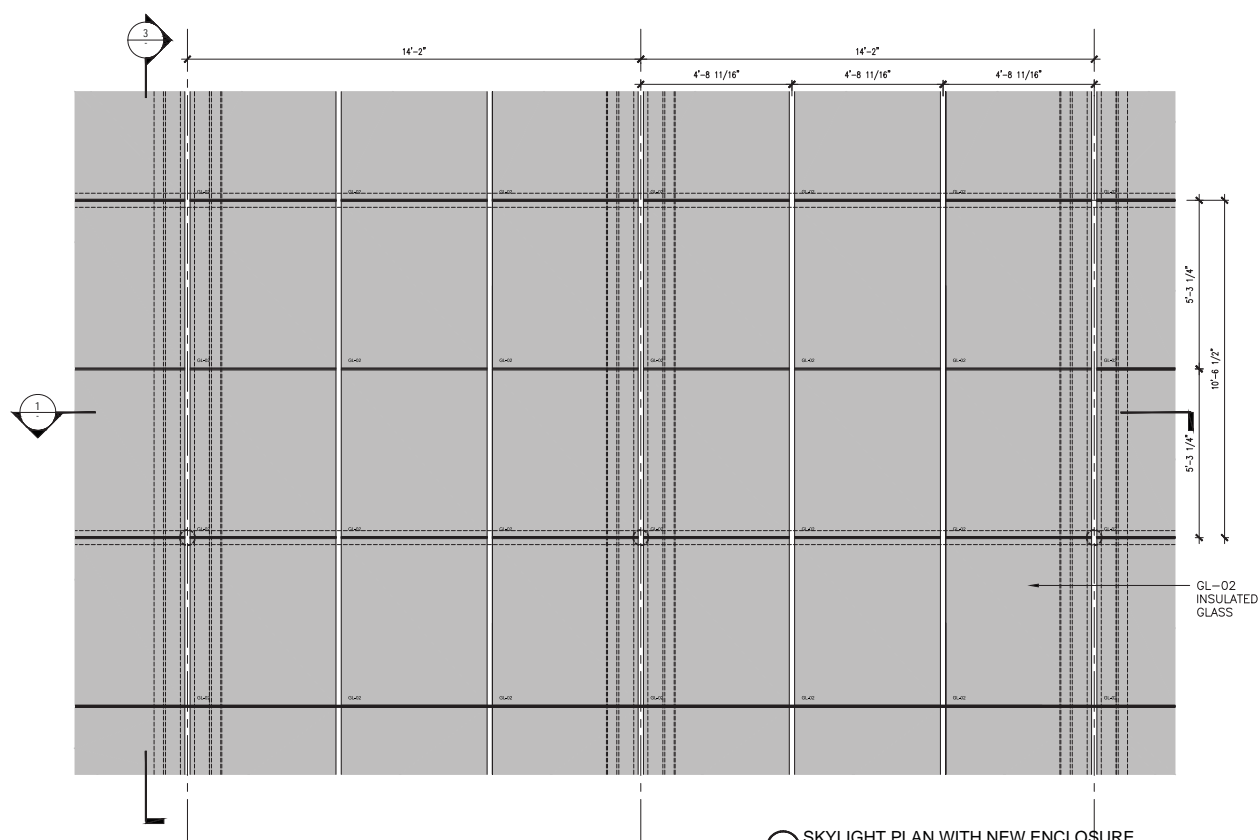


SKYLIGHT FROM ABOVE WITH SECTION OF OVERLAY FLASHINGS REMOVED



50% INCREASE IN LIGHT

SKYLIGHT FROM BELOW WITH SECTION OF OVERLAY FLASHINGS REMOVED



PROPOSED SKYLIGHT CONSTRUCTION
RESTORATION OF HISTORIC SKYLIGHT (BOTTOM)
NEW ENERGY EFFICIENT SKYLIGHT (TOP)

