Ottawa Street Station Transformation

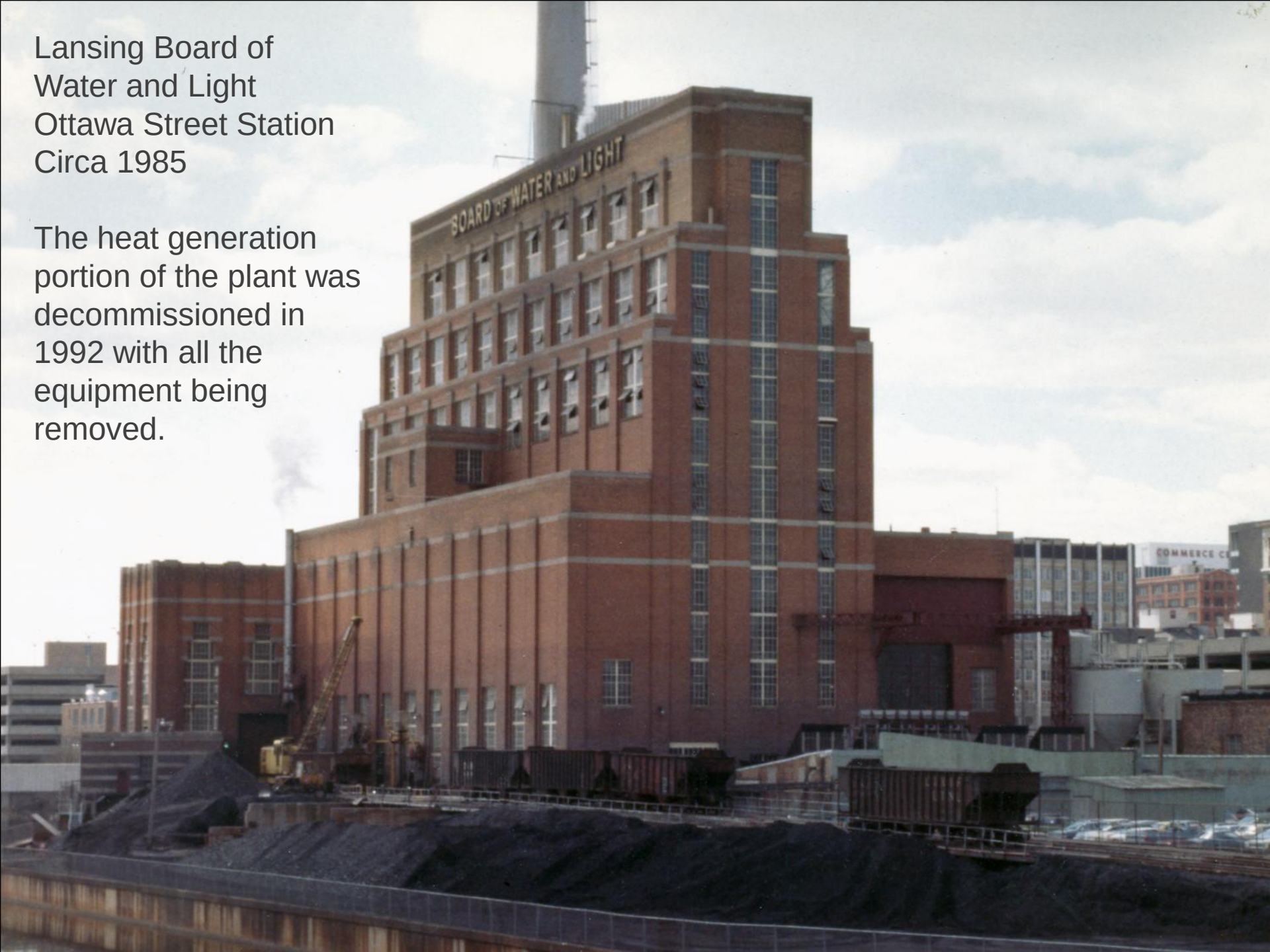
Accident Fund Insurance Headquarters

Richard JP Renaud, AIA
Bradley Cambridge, AIA

QUINN EVANS ARCHITECTS

Building Enclosure Council Presentation

Lansing Board of Water and Light
Ottawa Street Station
Circa 1960



Lansing Board of Water and Light
Ottawa Street Station
Circa 1985

The heat generation portion of the plant was decommissioned in 1992 with all the equipment being removed.

The last operating part of the plant, the chiller plant was removed at the start of construction in 2009.

At the same time, the eastern bay of the adjacent parking garage was removed re-exposing the buildings façade to downtown Lansing.

1946 Addition

1938 Building

WEST ELEVATION

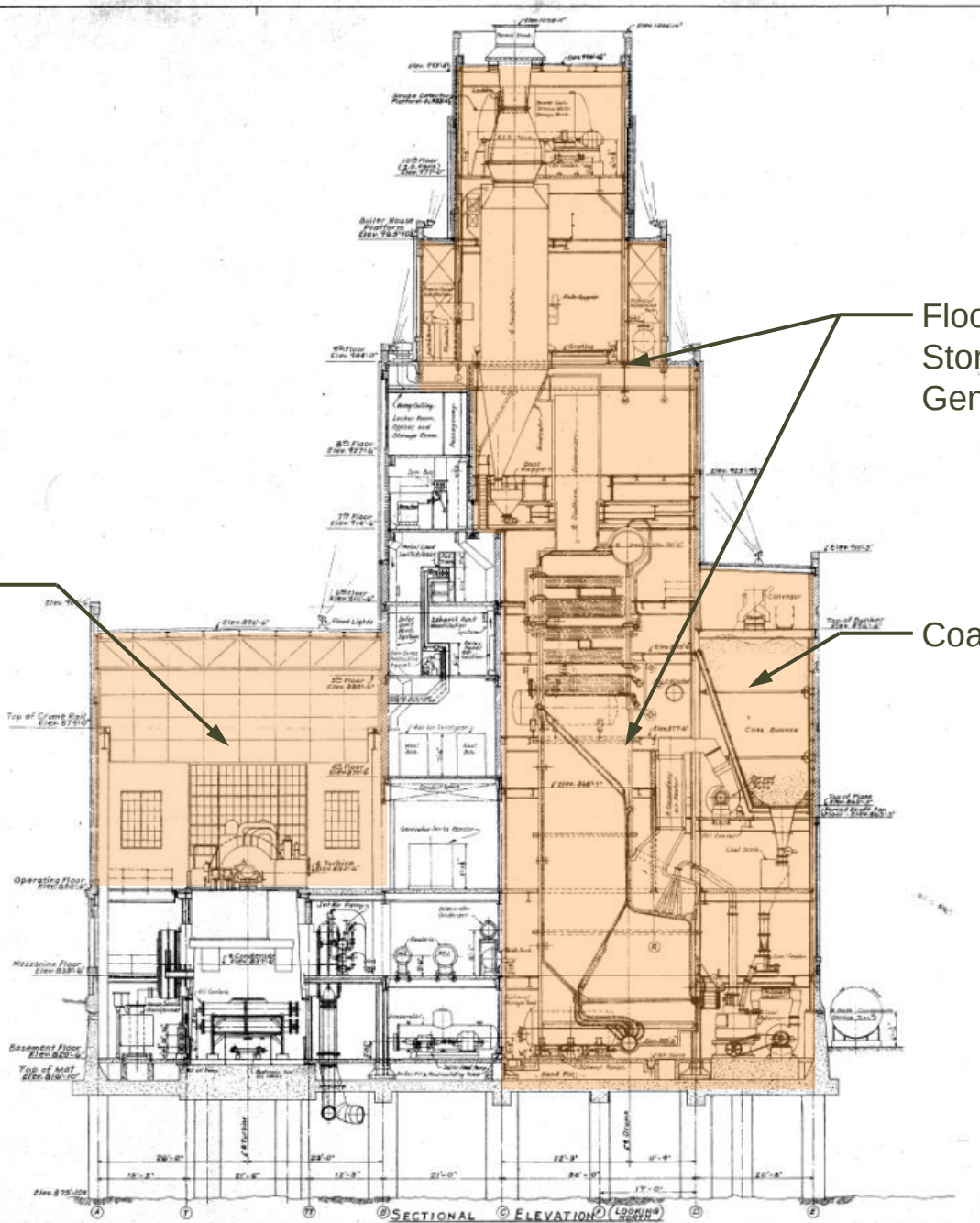
LO- 1143-5

BURNS AND ROE INC.
NEW YORK

BOARD OF WATER & ELEC. LIGHT
LANSING, MICHIGAN

OTTAWA STREET STATION EXTENSION

WEST ELEVATION



BURNS AND ROE, INC.
NEW YORK

OTTAWA STREET STATION EXTENSION, UNIT No. 2
BOARD OF WATER & ELEC. LIGHT COMM'RS.
LANSING, MICHIGAN

W.O. 1194

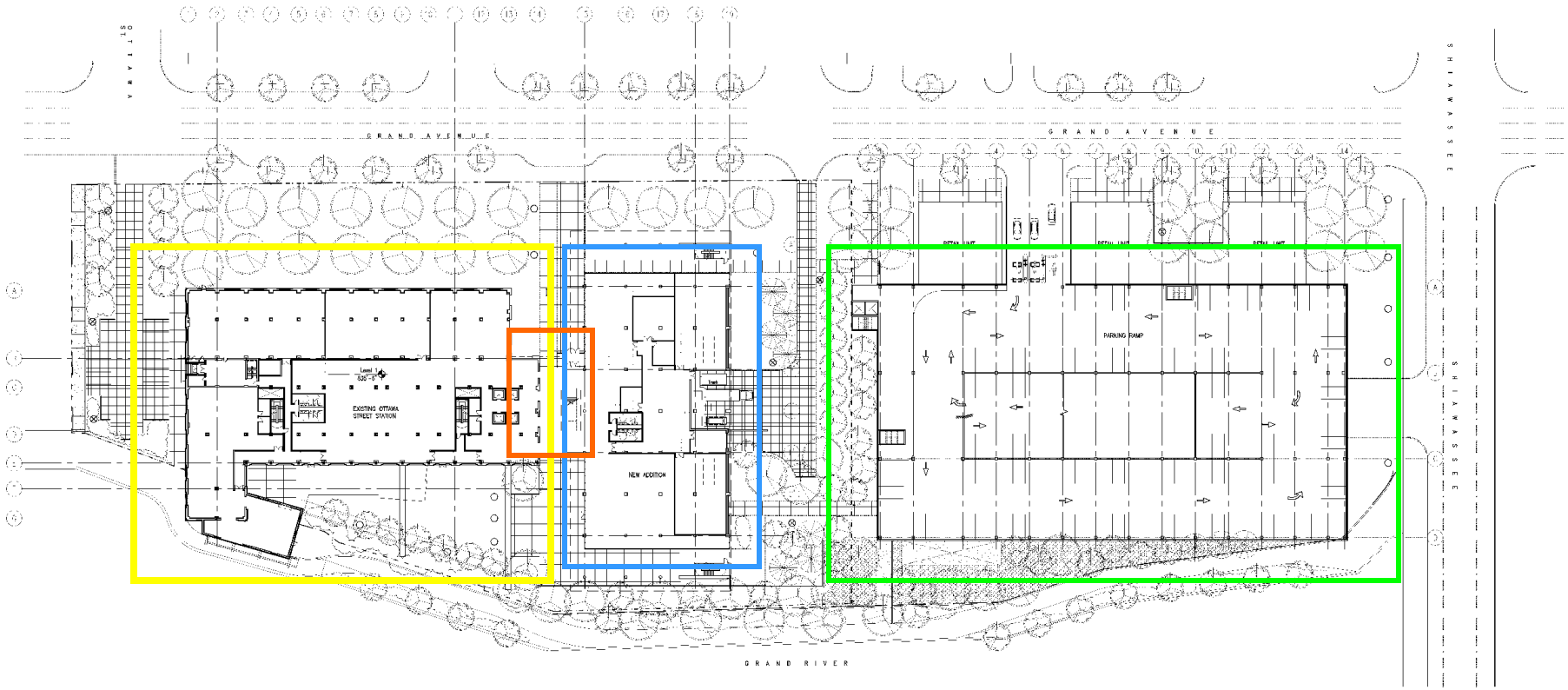
DWG. LD-2255

Open Floor Plates Void of Equipment

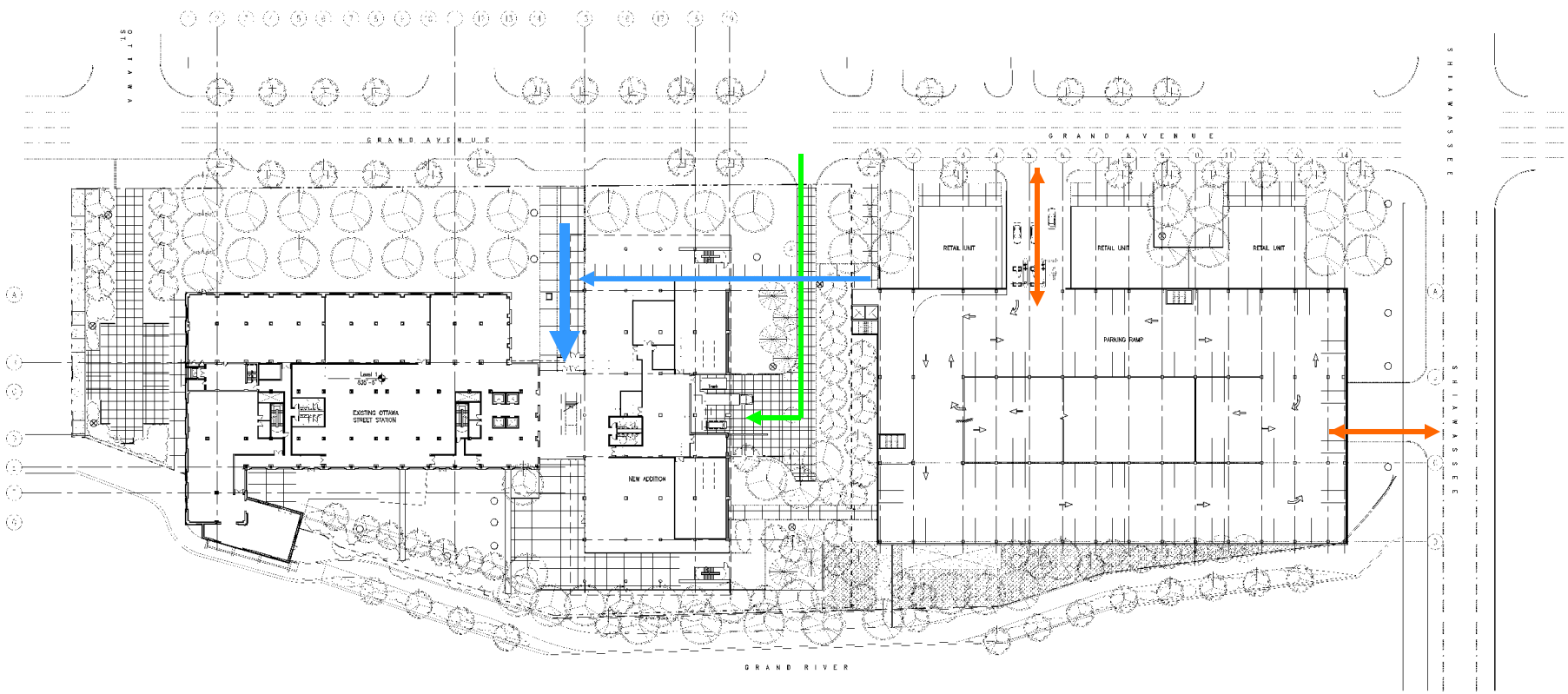
Main Turbine Hall Void of Equipment

Main Entry Lobby Detailing

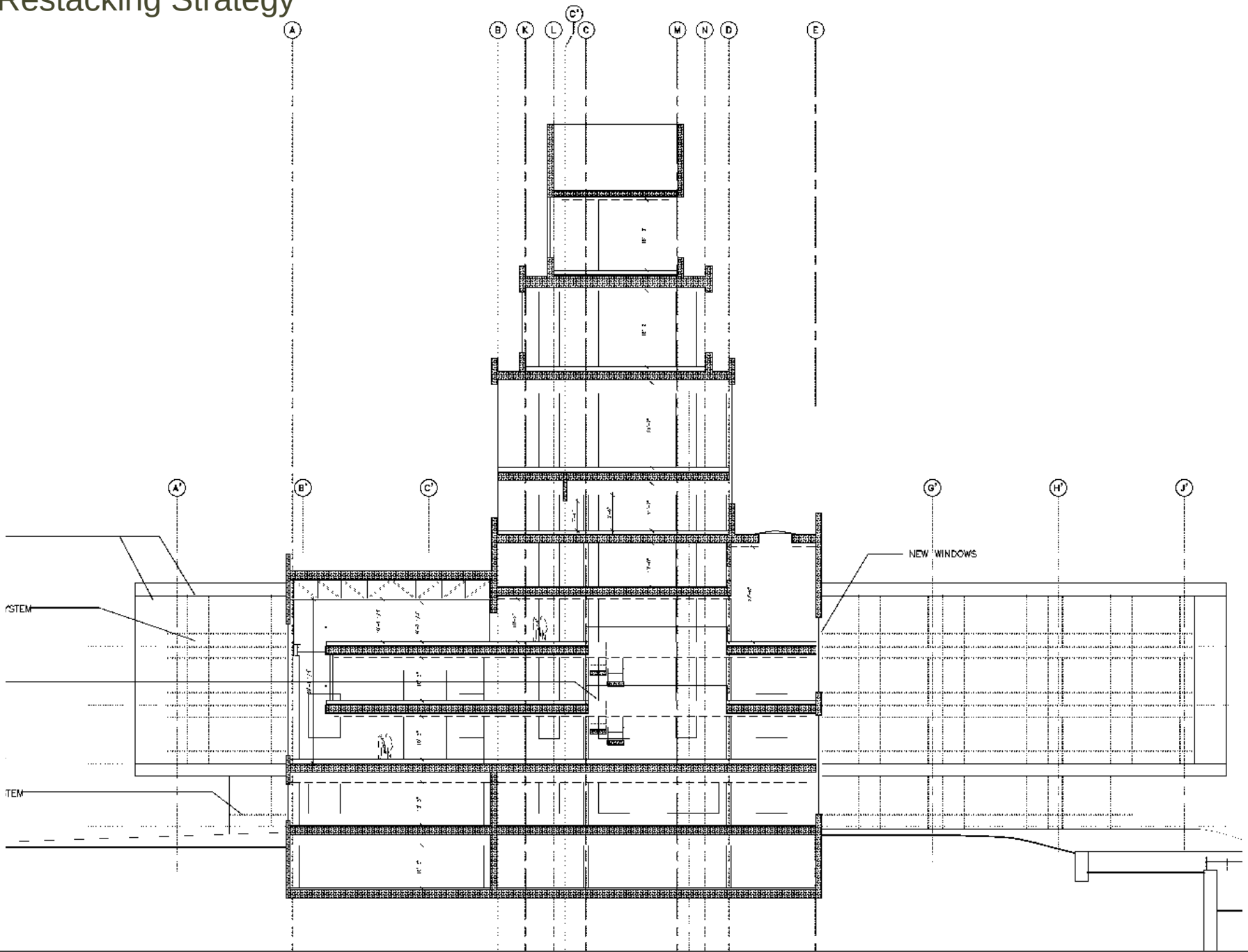
Site Development Strategy

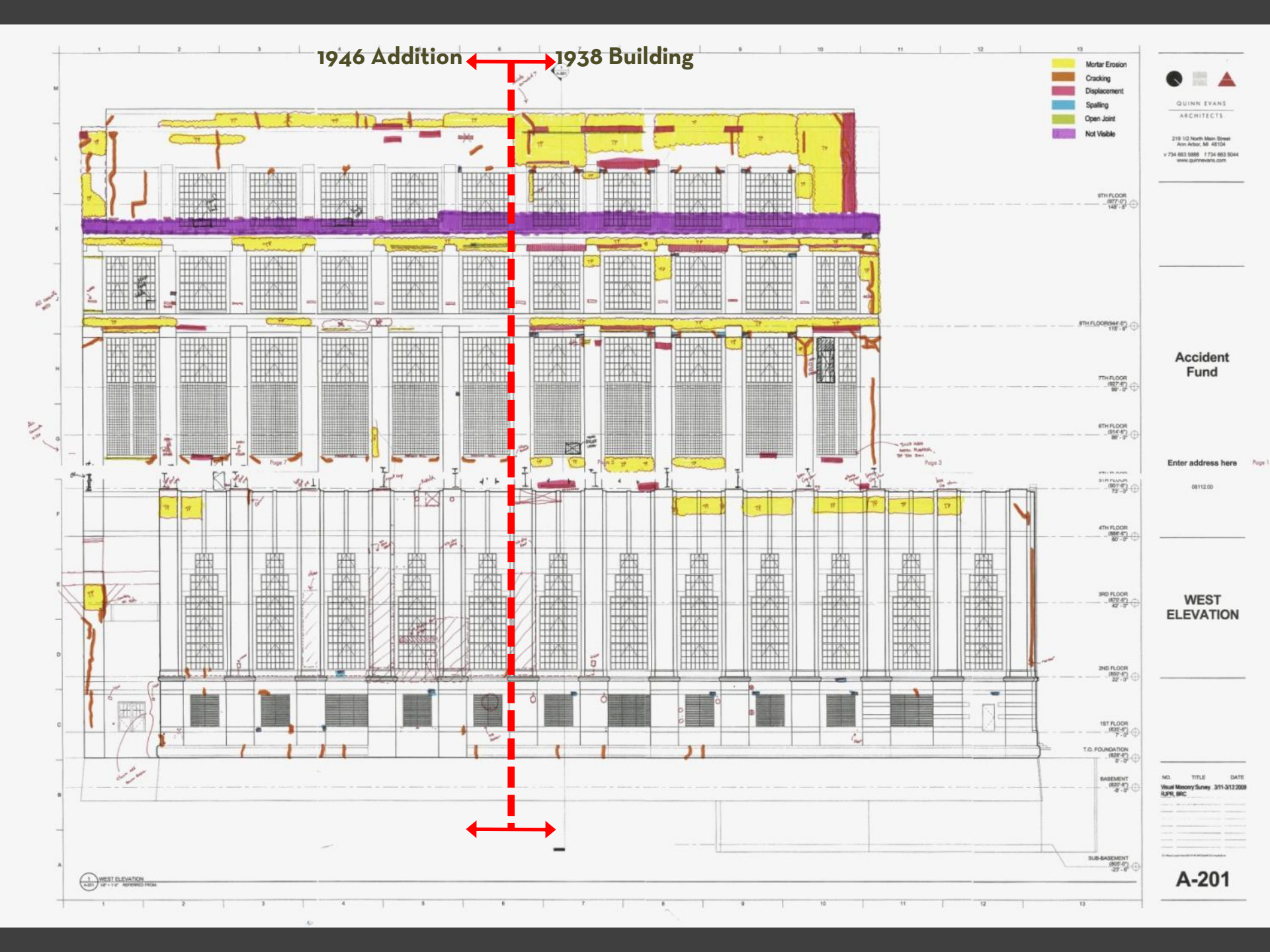


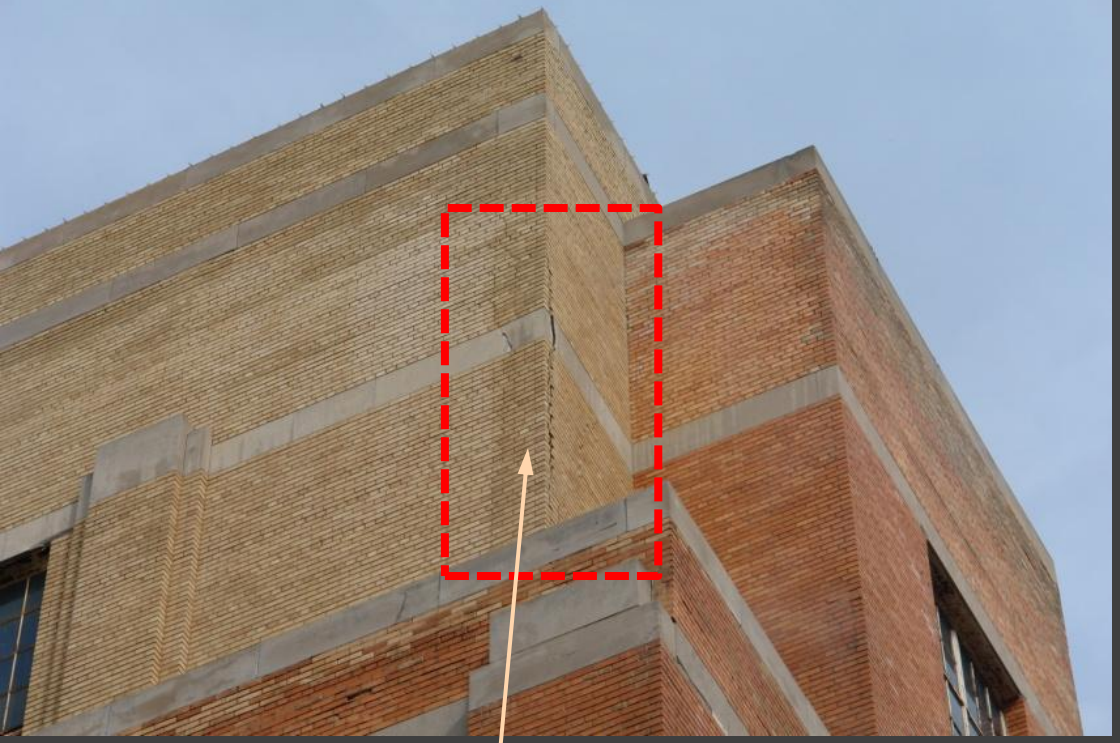
Site Circulation Strategy



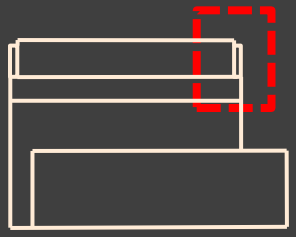
Restacking Strategy




1946 Addition
1938 Building
Mortar Erosion
Cracking
Displacement
Spalling
Open Joint
Not Visible
9TH FLOOR
8TH FLOOR
7TH FLOOR
6TH FLOOR
4TH FLOOR
3RD FLOOR
2ND FLOOR
1ST FLOOR
T.O. FOUNDATION
BASEMENT
SUB-BASEMENT
WEST ELEVATION
QUINN EVANS
ARCHITECTS
Accident Fund
Enter address here
WEST ELEVATION
A-201



Crack in Masonry & Mortar
Joint with Pivoting
Displacement 2”+ Out of Plane

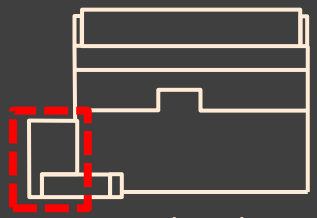


West Elevation

Line of Roof Surface
Behind Parapet

Crack in Masonry & Mortar
Joint with Displacement
Out of Plane

Crack in Masonry &
Mortar Joint



East Elevation

Crack and Displacement Out of Plane in the Masonry

Where "Lime-Cement Mortar" is called for it shall consist of:

Forty pounds of approved hydrated lime, one bag of approved Portland cement, and six cu. ft. of approved sand. Where used in exterior walls, and elsewhere waterproofed lime cement mortar is called for, four pounds of powdered aluminum stearate, calcium stearate or ammonium stearate shall be added.

It is recommended that hydrated lime and calcium stearate be well mixed dry and that the water be added to the mixture at least ten hours before use, but the cement is not to be added until the final mixture of the mortar just before it is used, or liquid ammonium stearate may be added with the water.

Soil and Materials Engineers, Inc.
The Kramer Building
43980 Plymouth Oaks Blvd.
Plymouth, MI 48170-2584
tel (734) 454-9900
fax (734) 454-0629
www.sme-usa.com

July 15, 2008

Mr. Richard Renaud
Quinn Evans Architects, Inc.
219-1/2 North Main Street
Ann Arbor, Michigan 48104

Transmitted by Email:rrenaud@QUINNEVANS.com

RE: Masonry Mortar Evaluation - Addition
Accident Fund –Ottawa Street Power Station
Lansing, Michigan
SME Project PM57570

Dear Mr. Renaud:

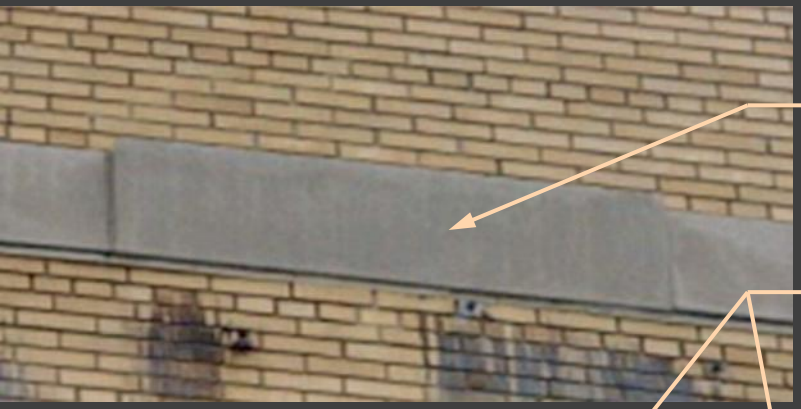
At your request, Soil and Materials Engineers, Inc. performed an assessment of the masonry mortar used in the 1950's construction of the Addition to the Ottawa Street Power Station located in Lansing, Michigan. The analysis was performed to assist in restoration mortar mix selection for the current restoration work converting the building into the Accident Fund Headquarters.

The ten story structure was constructed in 1942-43 with the addition added in the mid-1950's. SME has performed a laboratory analysis of the mortar used in construction of the brick work for the Addition, which has been removed under the direction of your firm from bedding joints of the masonry.

CEMENTITIOUS ANALYSIS

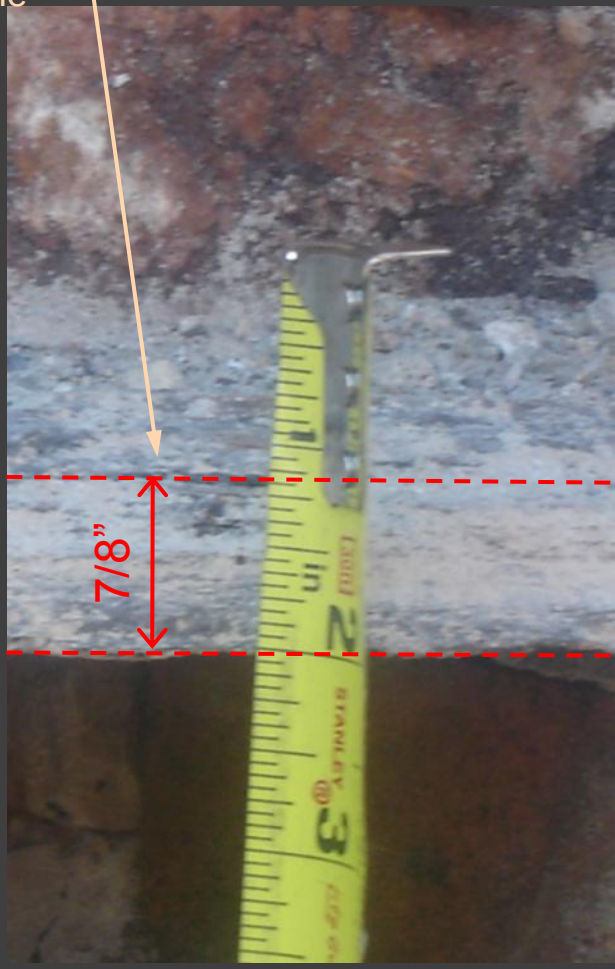
mposition was performed using ASTM C 1324-
od for Examination and Analysis of Hardened
roscopic evaluation as referenced per ASTM C
sis, indicates the mortar has a distinct formulation
ous aggregates by volume. The cementitious
hibited 30% carbonation with the composition
ent as the binder. The component analysis of the
to aggregate is presented in Table 1. Soluble
10 ppm count of the mortar. The FTIR analysis
component in the binder. The elevated level of
position of the stearate. As the stearate degrades

"The component analysis of the cementitious proportions to aggregate is presented in Table 1. Soluble chloride tests indicate a 310 ppm count of the mortar. The FTIR analysis confirmed an ammonium component in the binder. The elevated level of chloride is from the decomposition of the stearate. As the stearate degrades over time a soluble chloride is released which can accelerate corrosion of metallic imbeds and deterioration of the iron-spots in the flashed brick faces. The ammonium traces indicate the additive was an ammonium stearate as noted in the original specifications. The addition of stearates was an early version of the current integral water repellants now available for use in field mixed mortars."



4”x16”x56” Limestone Section
Dislodged from the Masonry

Sever Delamination of Steel
Angles Supporting Limestone
& Laterally Bracing Parapet



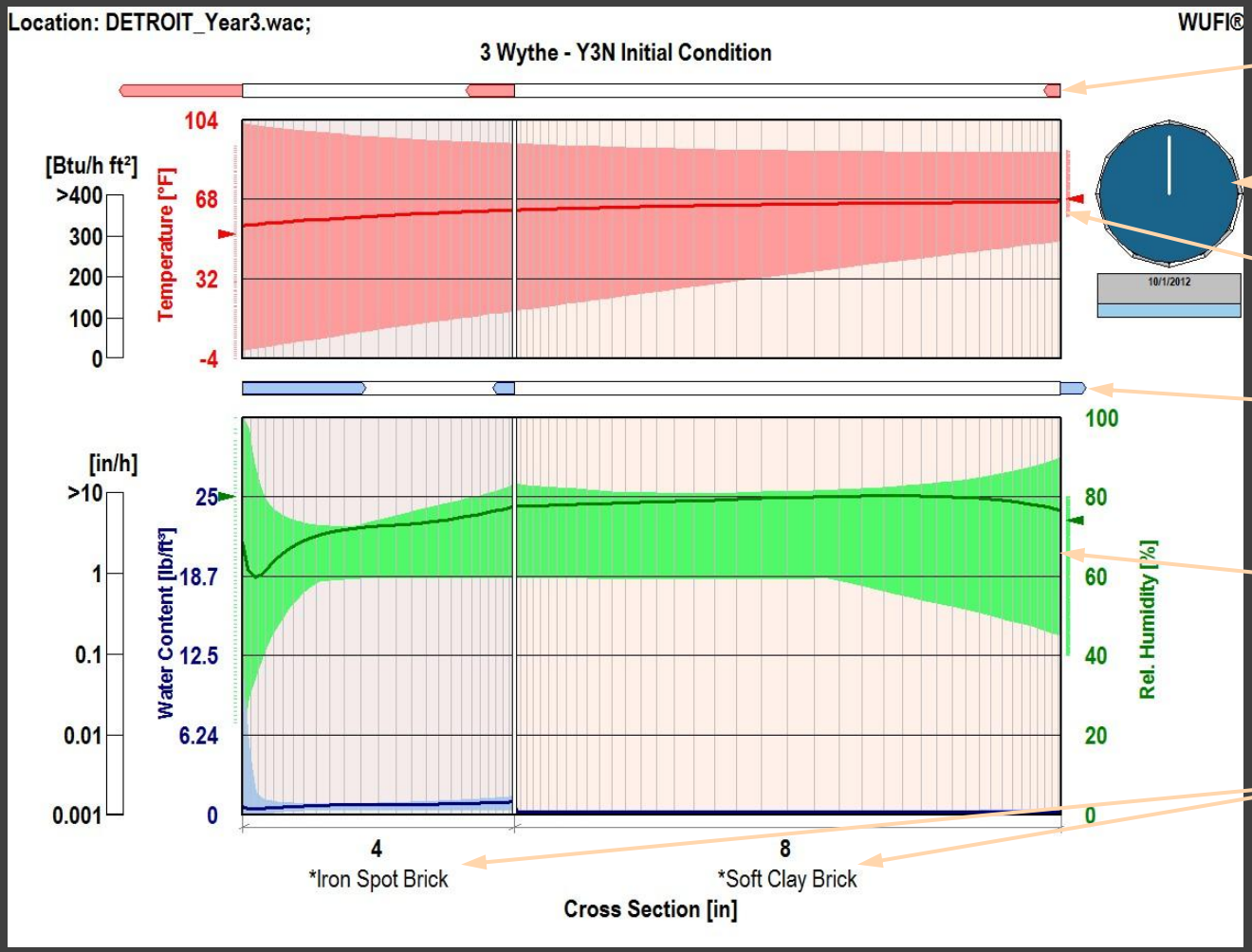
Hygrothermal Analysis: A tool to study of heat, air & moisture fluctuations in building materials. It includes the study of movement of water vapor through an material or assembly of material over time with varying conditions on each side of the material(s) / assembly.

HYDRO =

HYGRO =

WUFI® 1D (Wärme und Feuchte instationär; Transient Heat and Moisture)

Developed by Oak Ridge National Laboratory's Buildings Technology Center (Oak Ridge, Tennessee, USA) in conjunction with the Fraunhofer Institute for Building Physics (Holzkirchen, Germany)



Direction of heat movement

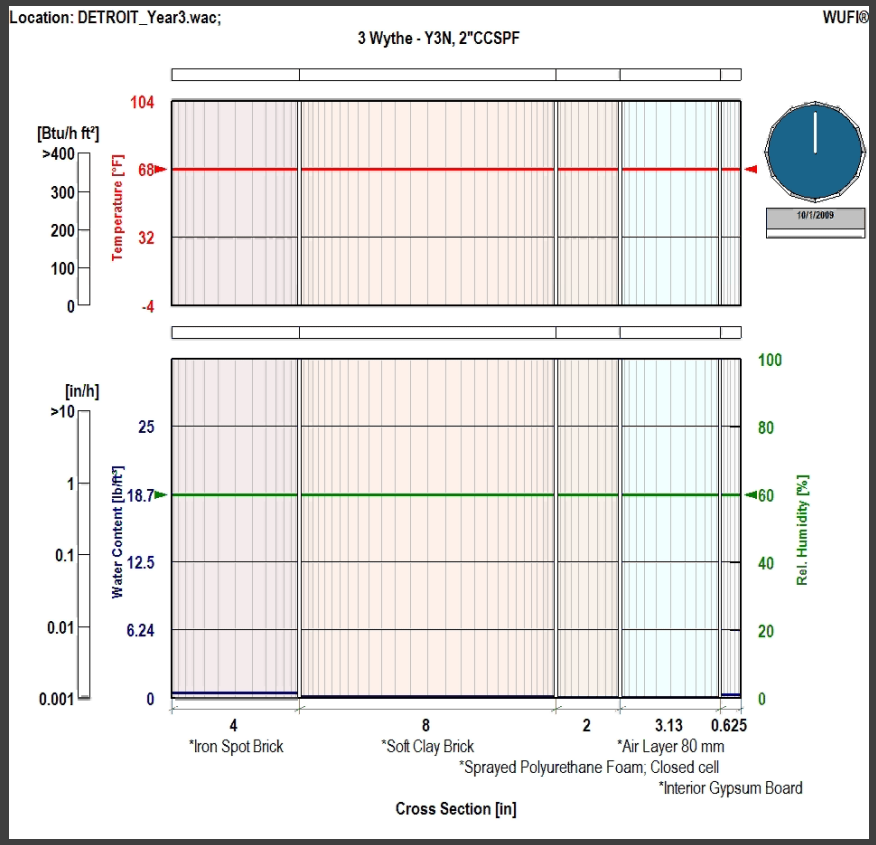
Time (1 hour increments)

Temperature

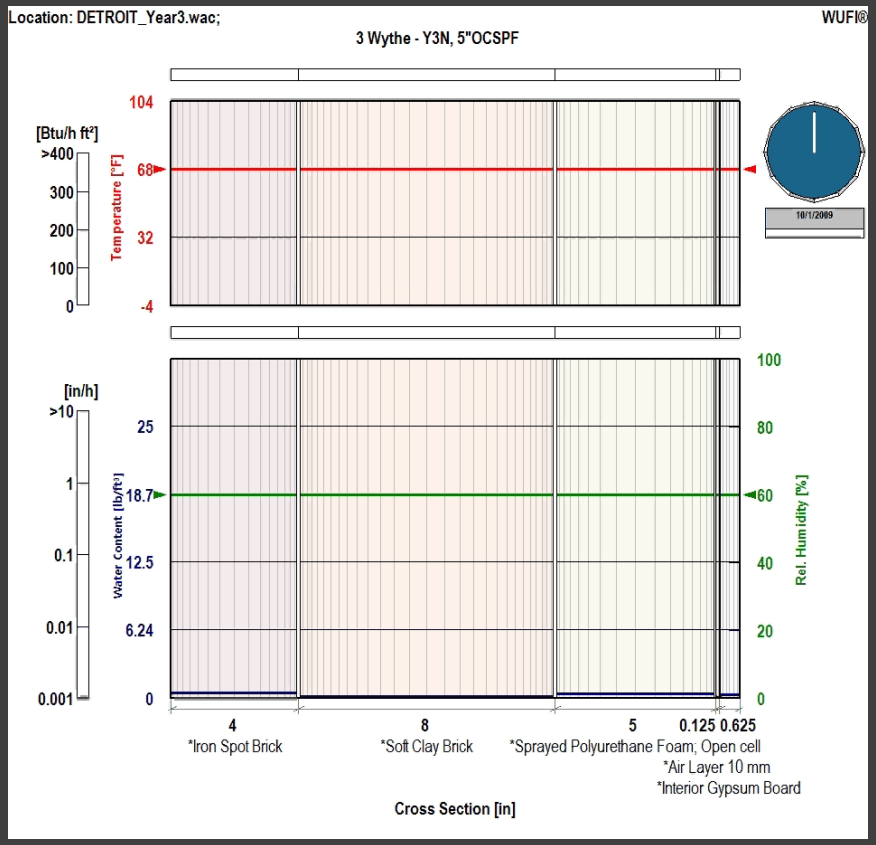
Direction of moisture movement

Moisture Content & Humidity Level

Materials

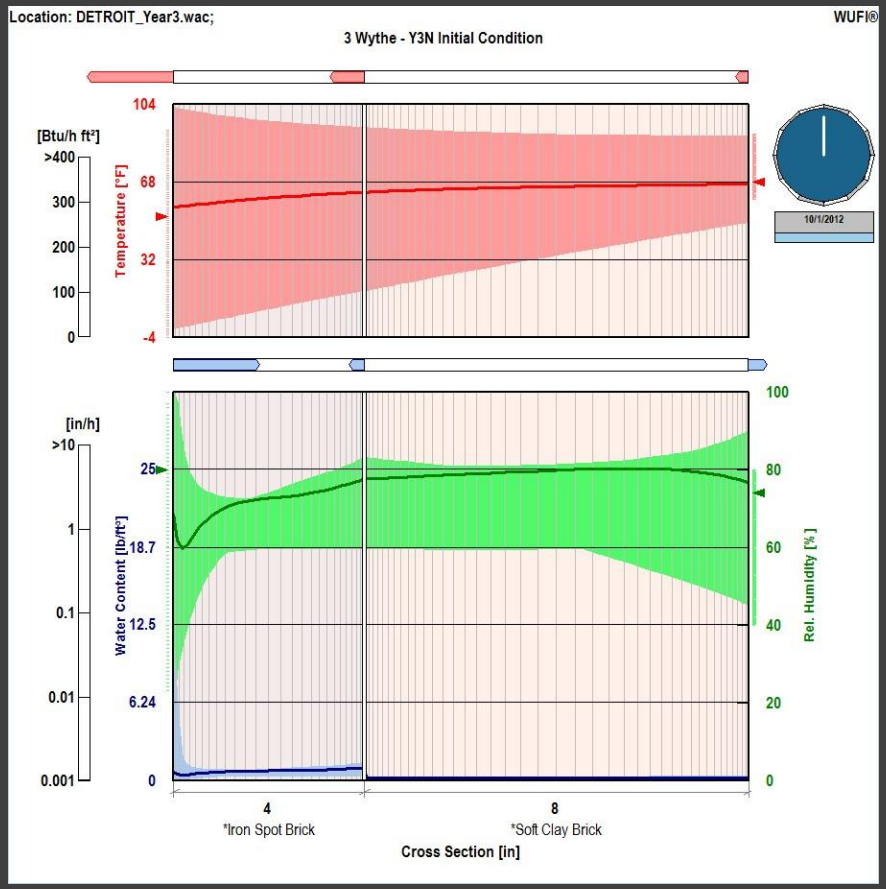


2” Closed Cell SPF

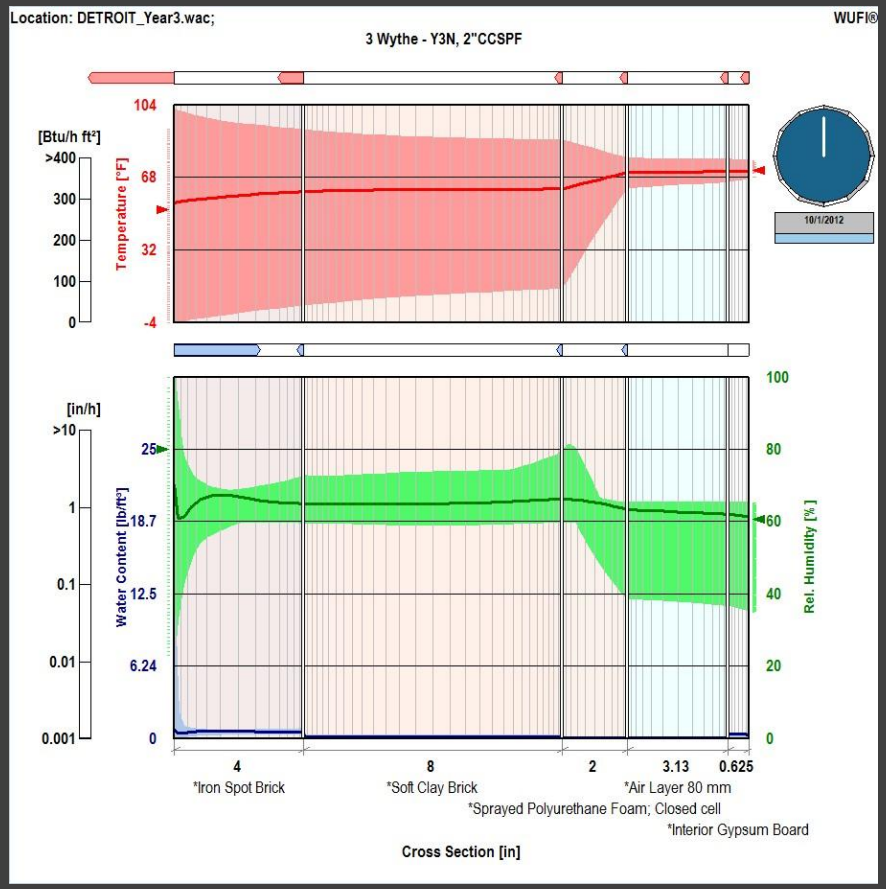


5” Open Cell SPF

Dynamic Comparison

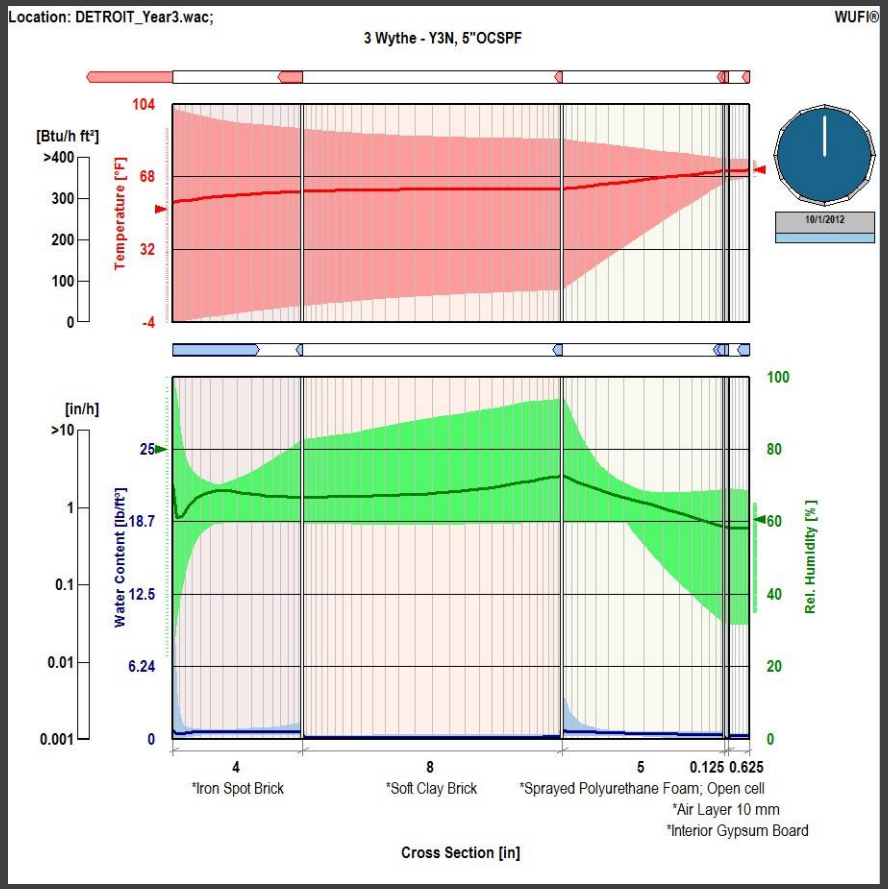


Initial Condition

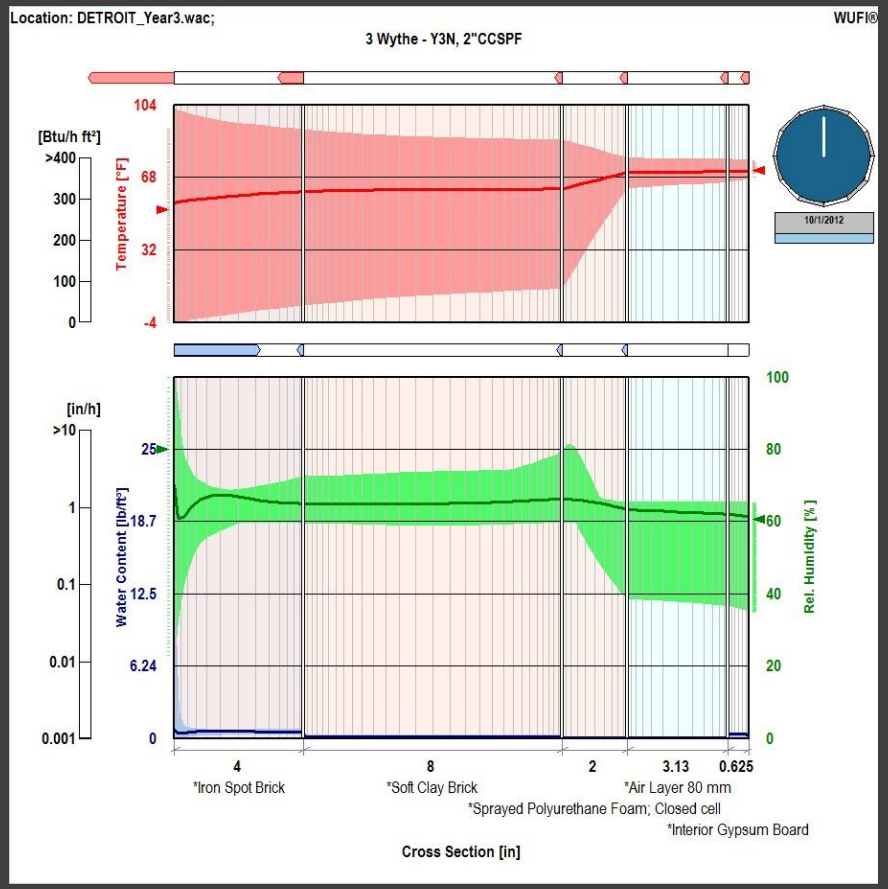


2” Closed Cell SPF

Comparison of Results



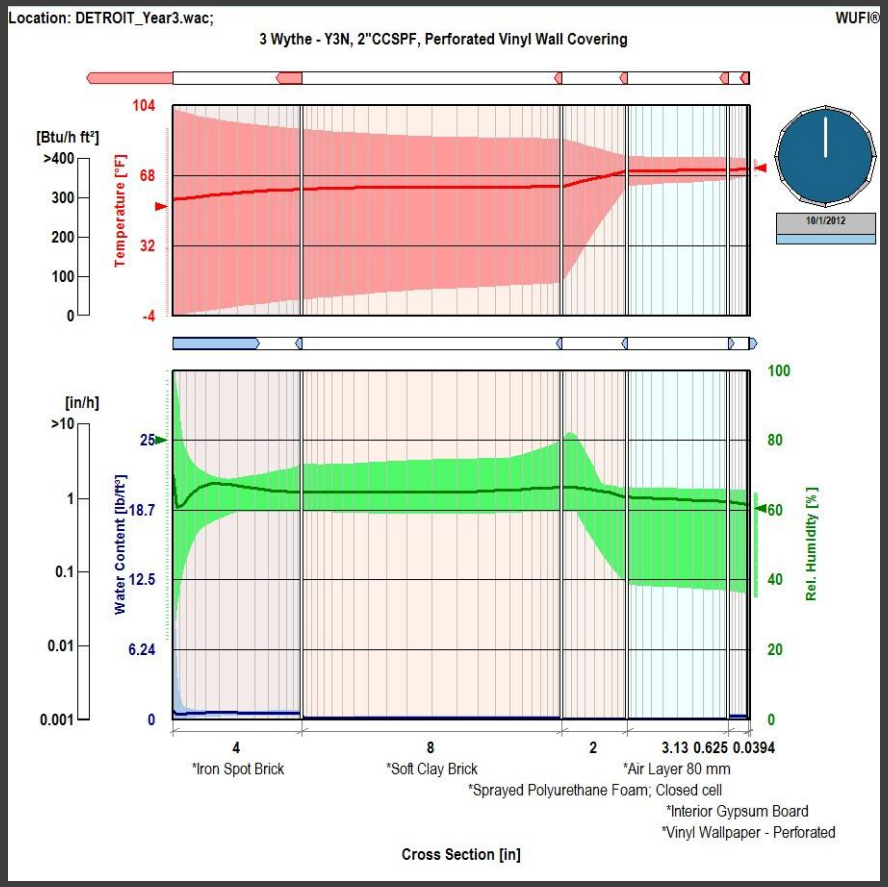
5” Open Cell SPF



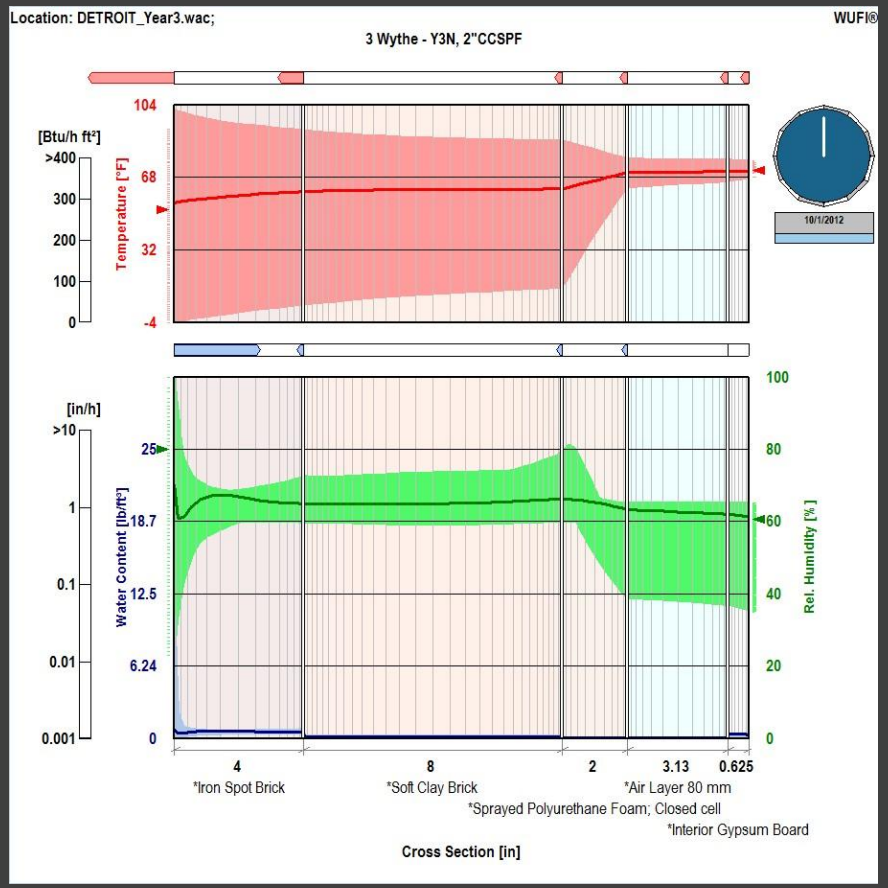
2” Closed Cell SPF

Comparison of Results

Vinyl Wall Covering and Mold



2” Closed Cell SPF with Perforated Vinyl Wall Covering

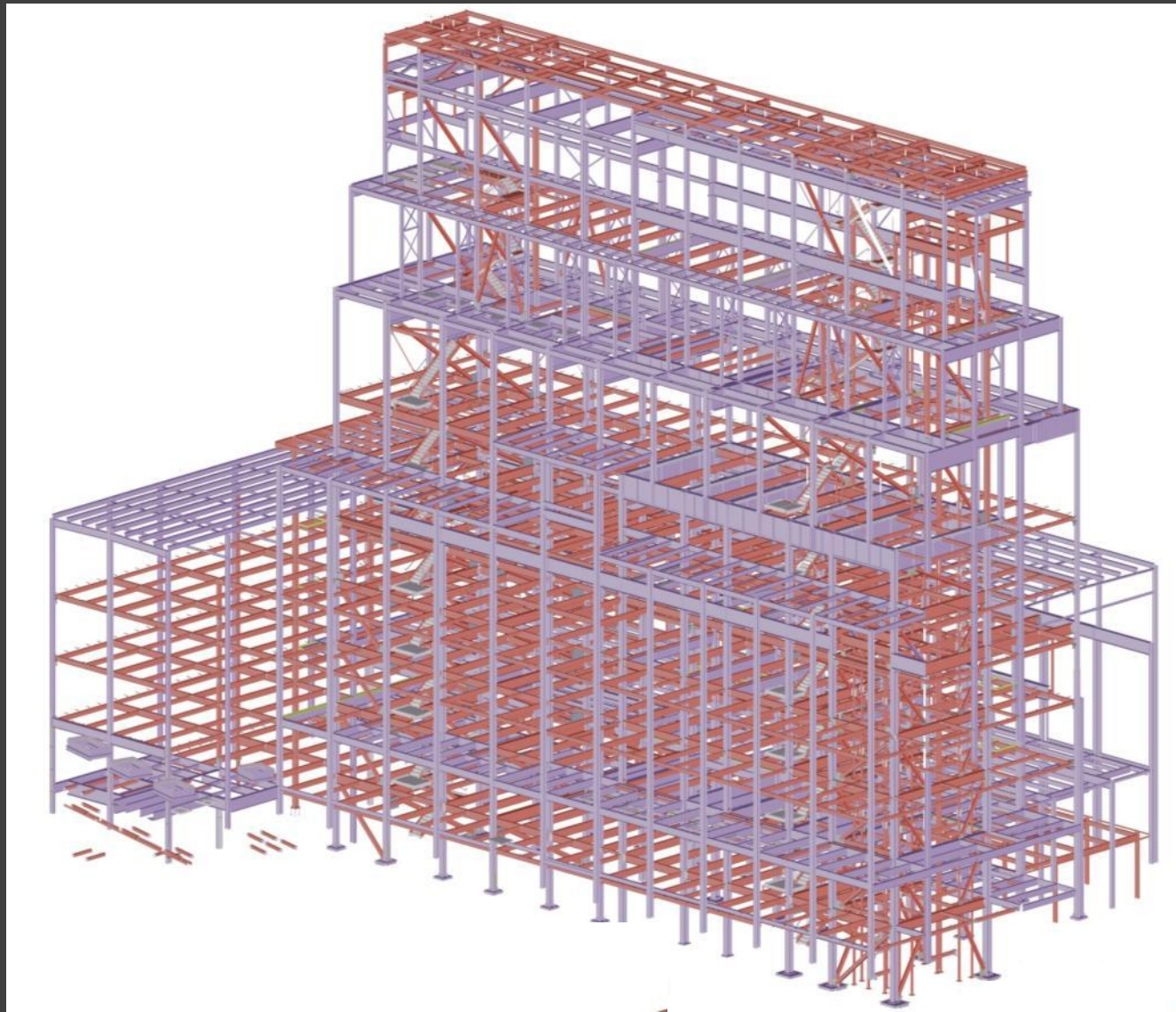


2” Closed Cell SPF

Comparison of Results

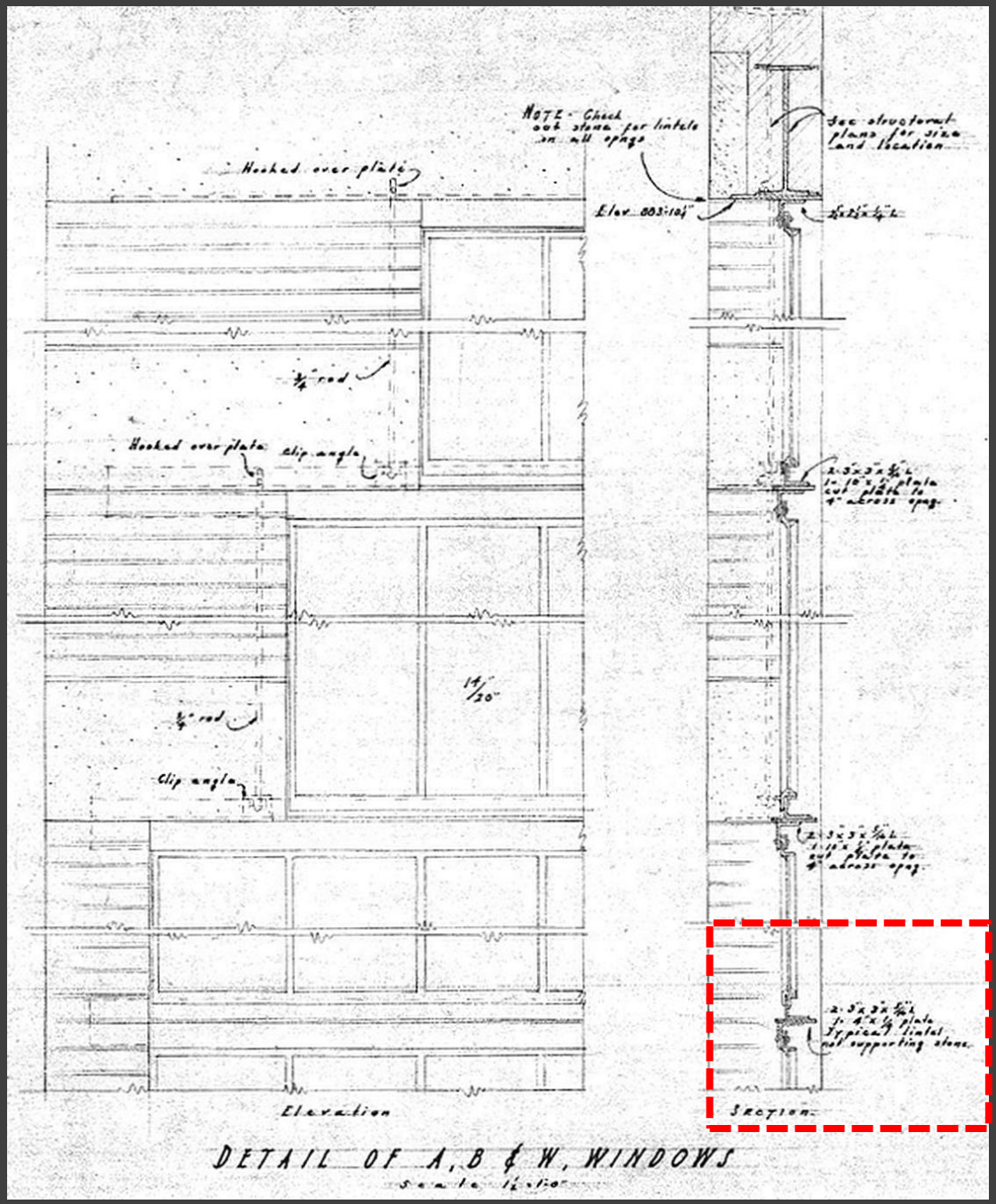
Due to the dangerous conditions in the building, the Revit model was created from a laser point cloud and the original historic drawings–an early demonstration of the potential of point clouds to facilitate the restoration of historic buildings where access is difficult or dangerous.

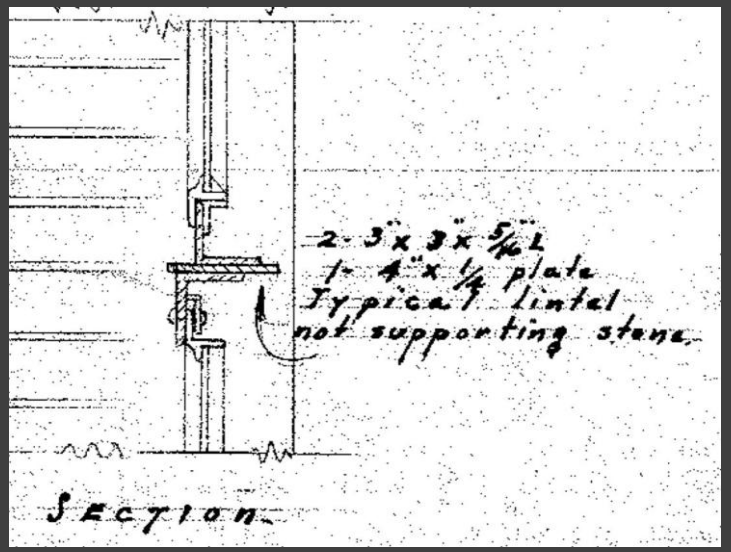
The project team was recognized by the American Institute of Steel Construction's prestigious Presidential Award, in part for using structural models originating from point clouds to engineer the installation of new steel and remove unnecessary existing steel without disturbing the historic masonry walls. The process permitted much of the design work to be completed without dangerous field work.

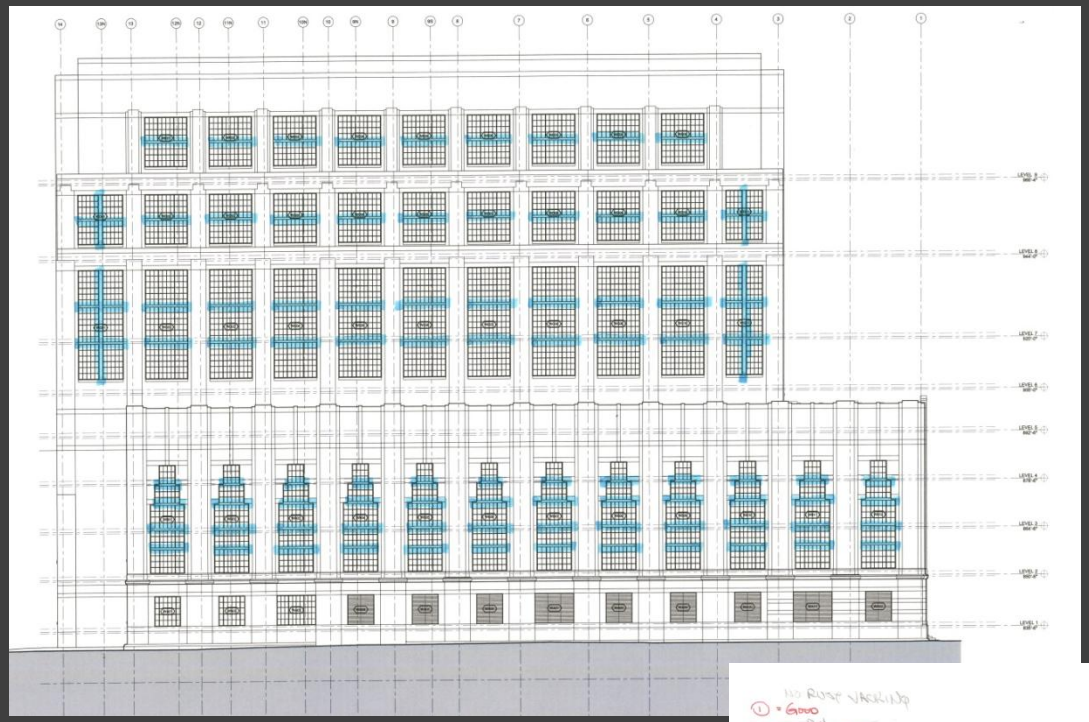


South and East Elevations

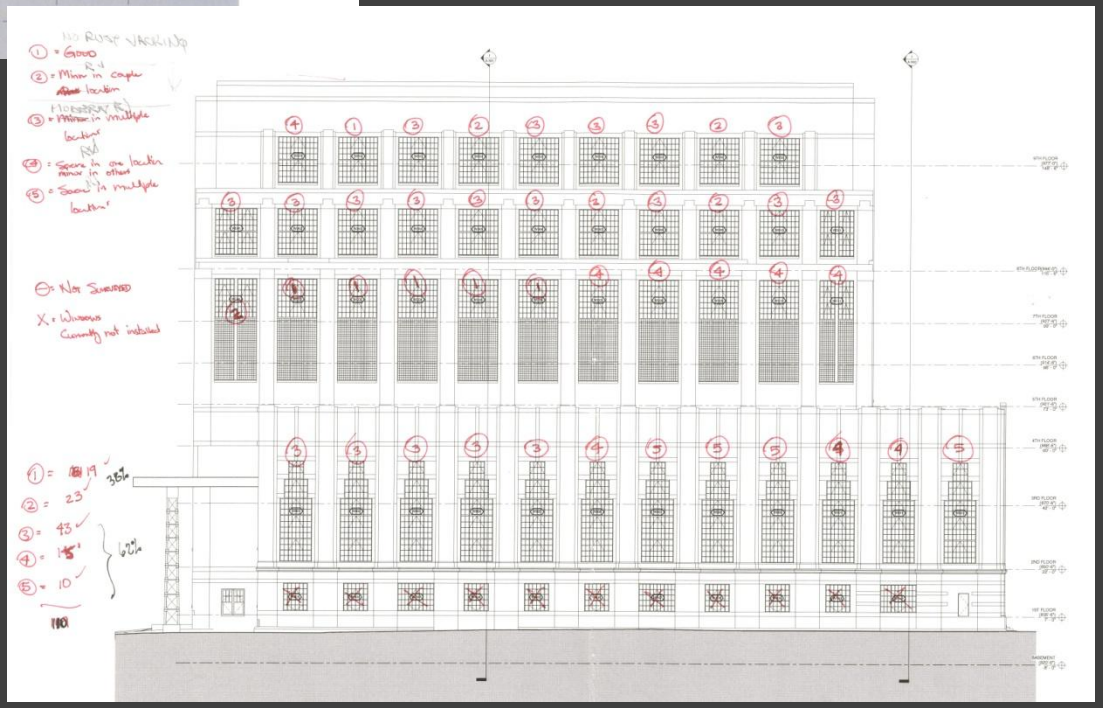
Historic Steel Windows


NOTE - Check out stone for lintels on all openings
See structural plans for size and location
Elev. 883:10½"
Hooked over plate
¾" rod
Hooked over plate
clip angle
14/20"
¾" rod
clip angle
Elevation
Section
DETAIL OF A, B & W, WINDOWS

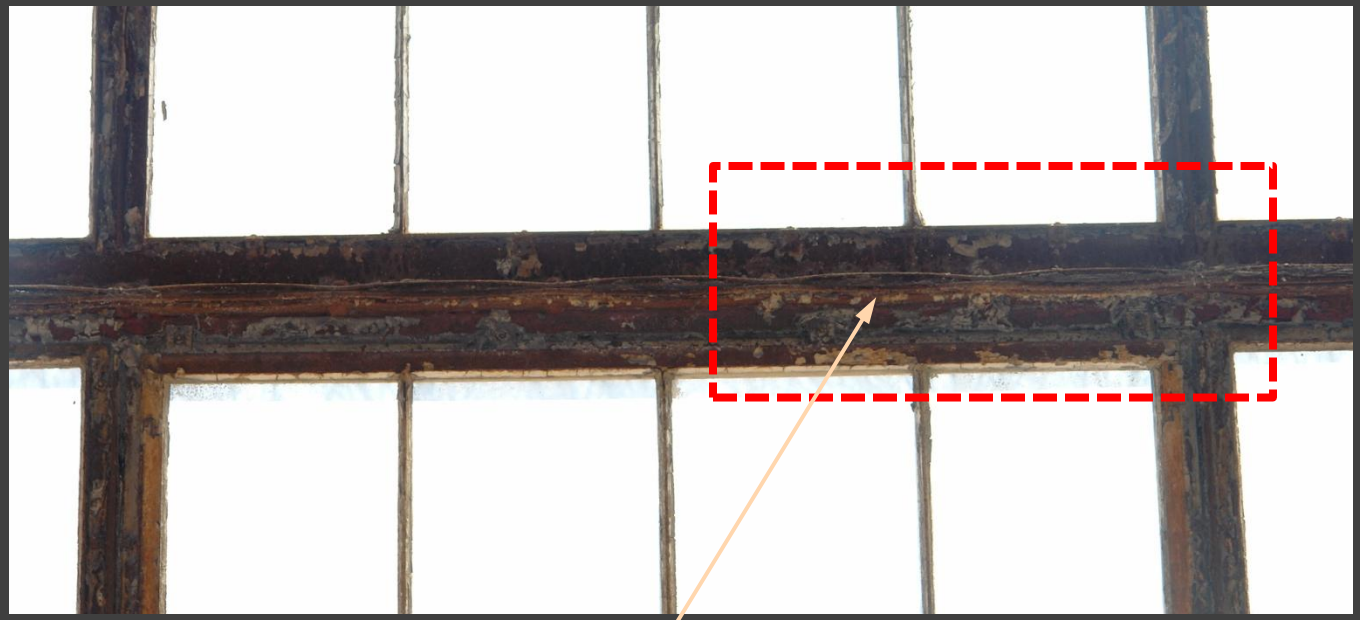

2-3"x3"x5/16"L
1-4"x¼" plate
Typical lintel
not supporting stone
Section



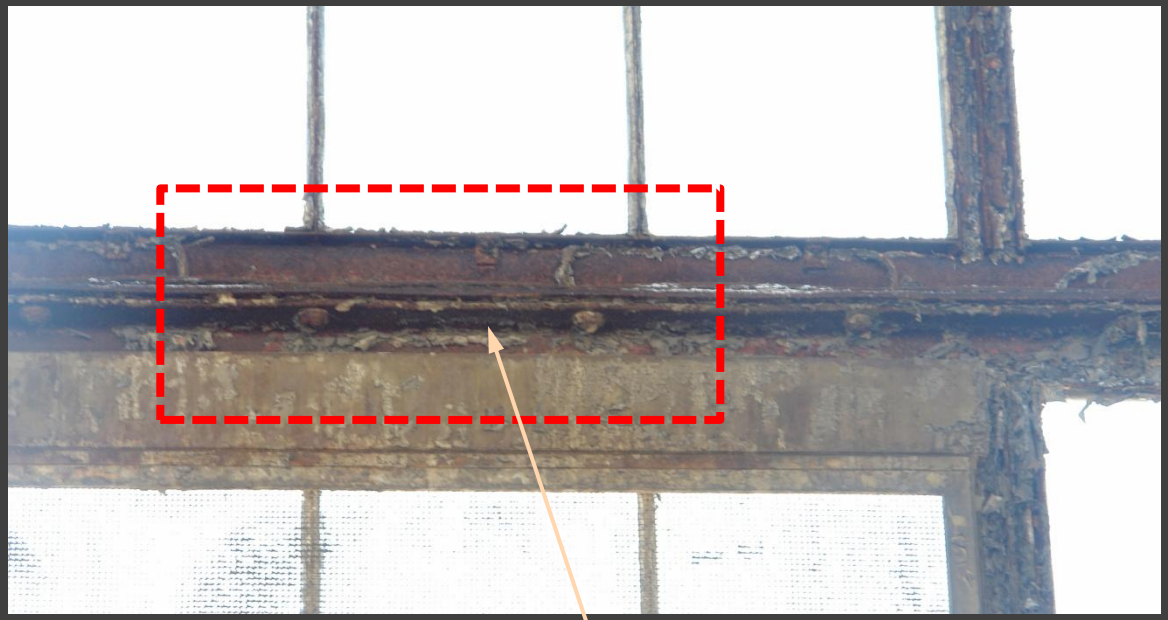
Locations of structural steel framing for the windows



Survey of severity of steel deterioration

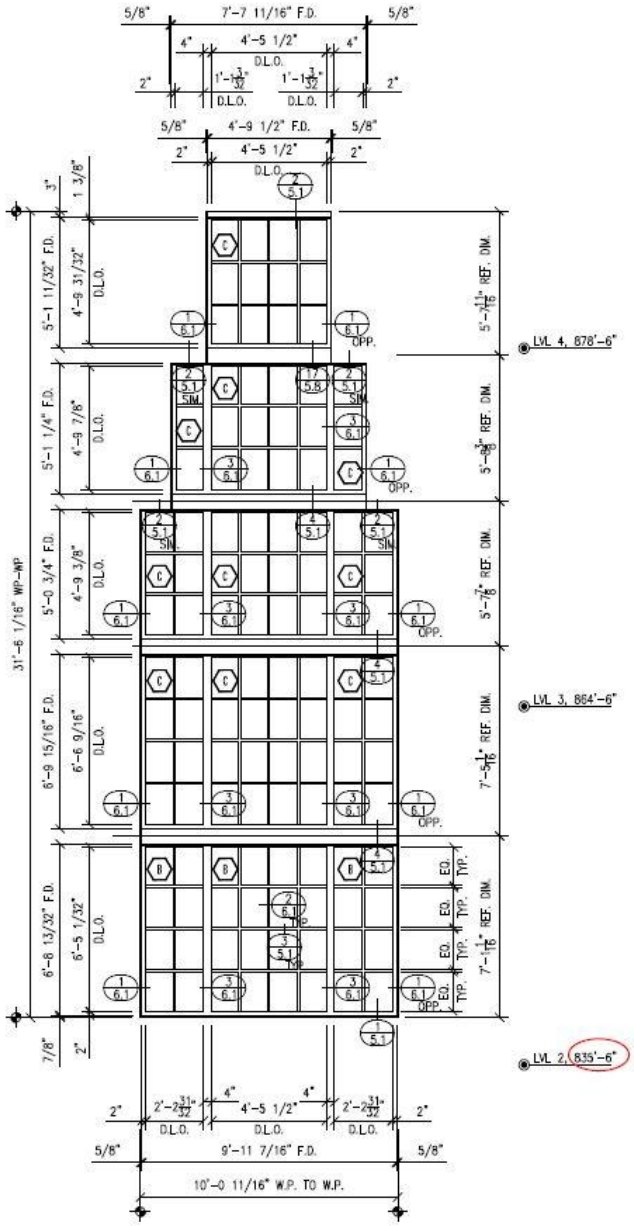


Rust jacking of steel window angles



Rust jacking of steel window angles

Damage at masonry jambs and sills due to steel angles rusting



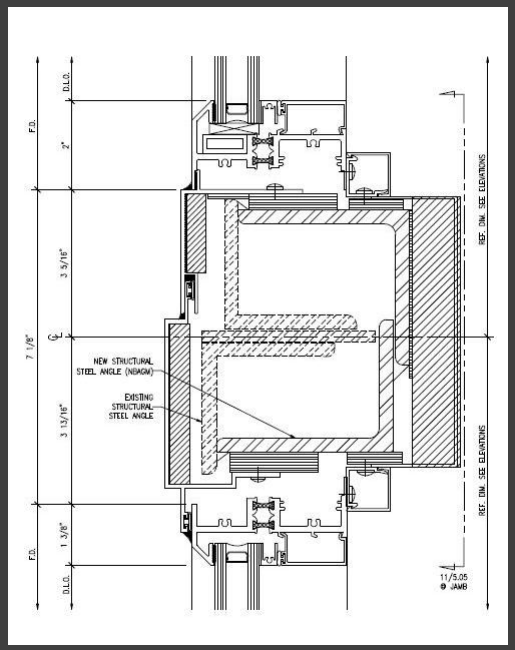
ELEVATION WE-1.2 GRAHAM WINDOWS

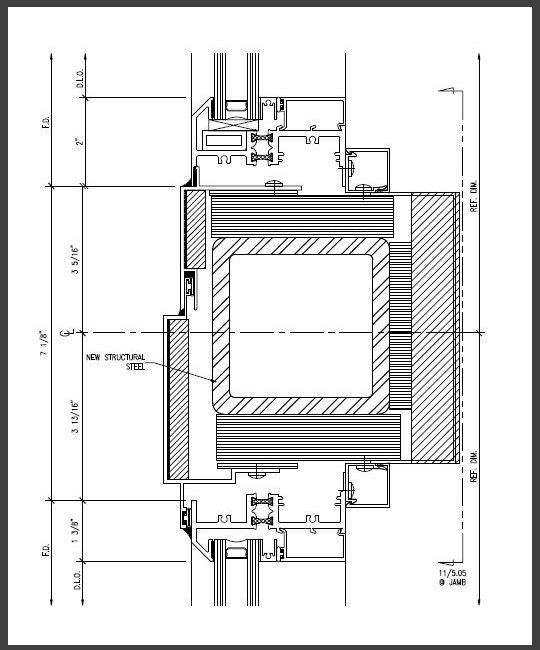
(1) REQ'D AT 2ND FLR

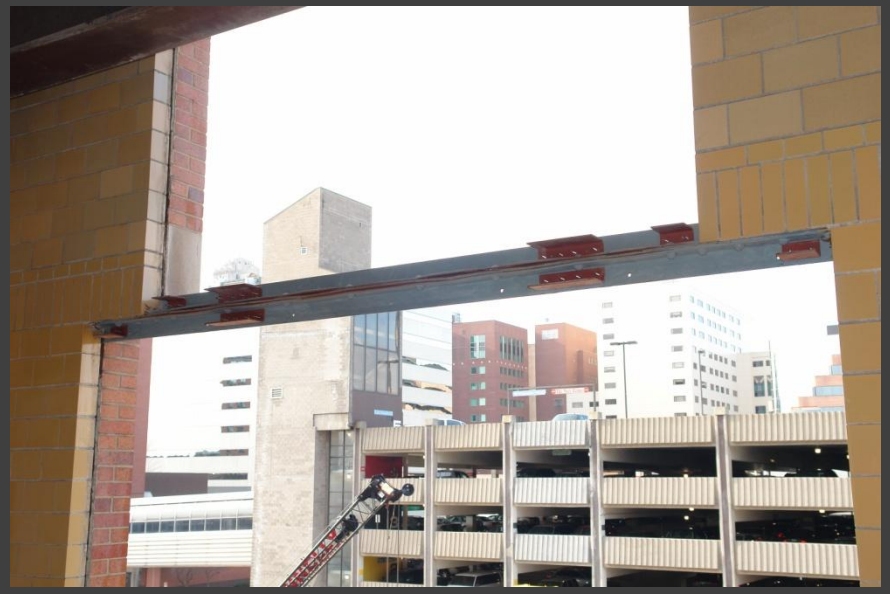
(1) THUS REQ'D.

ARCH. REF.: 1/HP-602

SCALE: 3/8"=1'-0"







Strengthening of existing structural steel

Addition of the windows


CONN

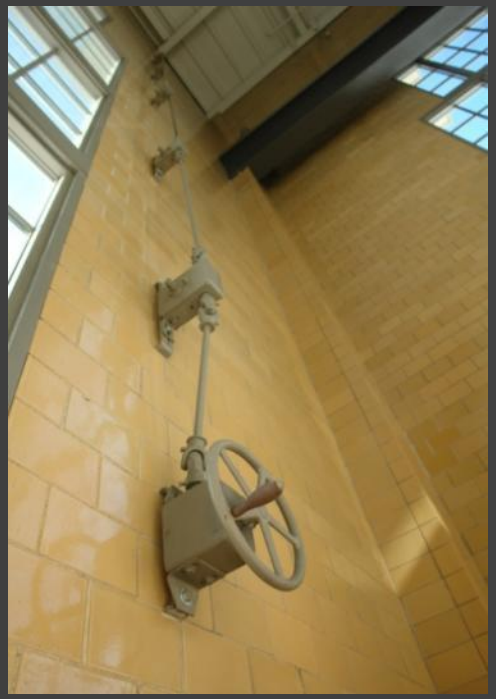

CONNELLY


Before


After


Before


Accident Fund
NATIONAL HEADQUARTERS
After



The original building retains its distinctive historic features. The Art Deco lobby with its unique steel doors was carefully restored to its historic appearance.


Before

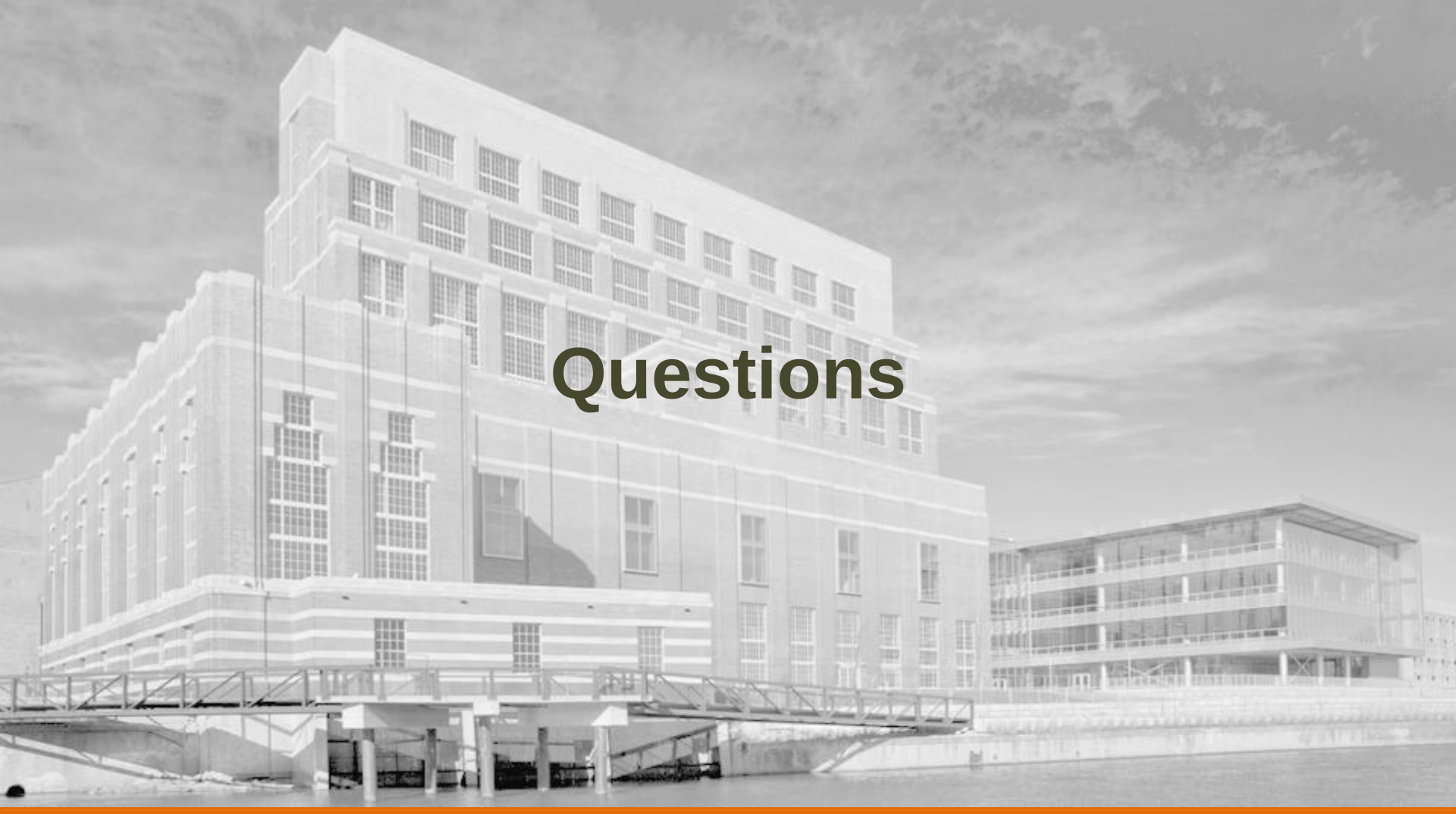
Careful detailing of the new and old beam intersections avoided damage to decorative elements of the historic glazed terra cotta walls.

New floors provide necessary additional office space, but maintain the original turbine hall's sense of scale by hanging from new beams spanning the original bearing beams for the hall's historic crane.

A large industrial crane and steel doors are reminders of the building's original use, imparting visual interest in an employee break out area at one end of the former turbine hall overlooking the entry court.

Brick walls and exposed original steel framing throughout the building are reminders of its original industrial use.

North and East Elevations



Questions

QUINN EVANS
ARCHITECTS

Ottawa Street Station Transformation
Accident Fund Insurance Headquarters