

# Minnesota State Capitol Restoration ACEC Building Engineering and Construction Conference



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HGA Architects and Engineers  
October 18, 2016

*Minnesota State Capitol Restoration*

Preserving our past. Preparing our future.

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**LOCATIONS**

- Minneapolis, MN
- Rochester, MN
- Milwaukee, WI
- Sacramento, CA
- San Francisco, CA
- Los Angeles, CA
- Washington, DC



**SERVICES**

- Architecture
- Interior Design
- Landscape Architecture
- Lighting Design
- Sustainable Design

- Civil Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering
- Structural Engineering



**PROJECT TYPES**

- Corporate
- Cultural
- Education
- Engineering
- Government
- Healthcare
- Interior
- Landscape
- Lighting
- Planning
- Religious
- Science & Technology
- Sustainability



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# OUTLINE

- ▶ Introduction
  - ▶ Building & Project History
  - ▶ Existing Conditions
  - ▶ Initial Coordination
- ▶ Infrastructure
  - ▶ Basement
  - ▶ Vertical Distribution – vaults, shafts, stairs
  - ▶ Attics
- ▶ Functionality & Life Safety
  - ▶ Lighting
  - ▶ Restrooms
  - ▶ Smoke Evacuation System
- ▶ Finishes Restoration & Preservation



## INTRODUCTION:

### A PROJECT 110 YEARS IN THE MAKING...

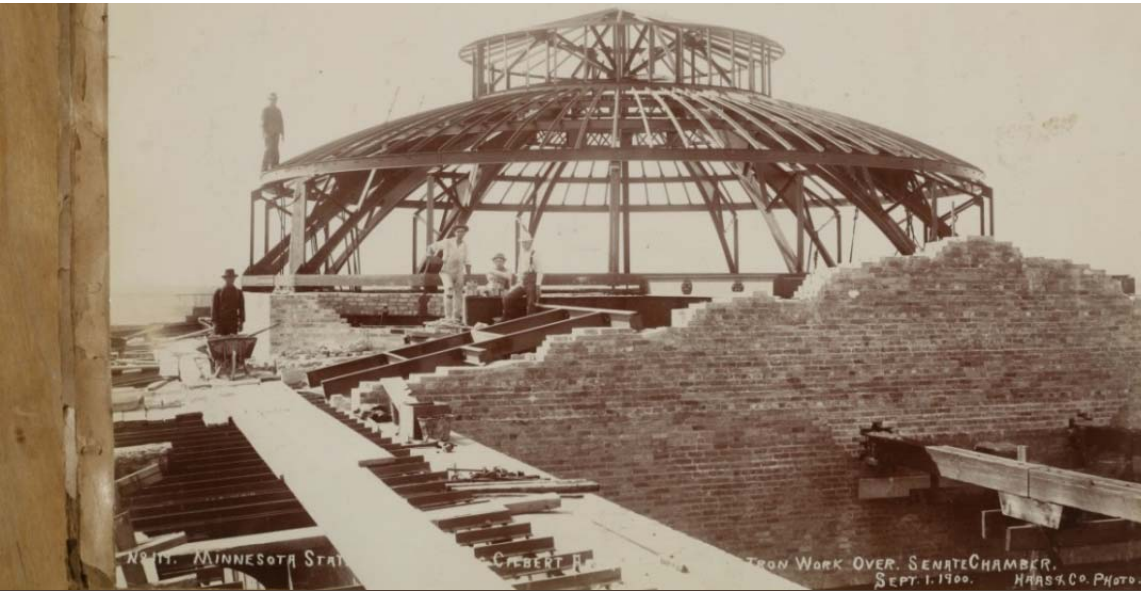
- ▶ Original construction completed in 1905

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## CASS GILBERT ARCHITECT 1859 - 1934

### ▶ Significant Buildings

- ▶ Minnesota State Capitol
- ▶ New York Custom House
- ▶ Arkansas State Capitol
- ▶ West Virginia State Capitol
- ▶ Woolworth Tower
- ▶ United States Supreme Court

# Capitol Reaching a Tipping Point



- ▶ Previous work was done in a piecemeal approach
- ▶ Stone Restoration – Ongoing Scaffolding
- ▶ Failing Mechanical
- ▶ Failing Electrical
- ▶ Failing Plumbing
- ▶ Failing Windows
- ▶ Limited Sprinkler System Coverage
- ▶ Accessibility Issues
- ▶ Security Concerns

# Project Summary

- ▶ Building Exterior Marble Restoration
- ▶ New Roof
- ▶ Replace All Infrastructure:
  - ▶ HVAC Systems
  - ▶ Plumbing
  - ▶ Electrical
  - ▶ Lighting
  - ▶ Data, Telecom & Audiovisual
  - ▶ Security Systems
- ▶ Comprehensive Interior Restoration
- ▶ Site Improvements & Landscaping



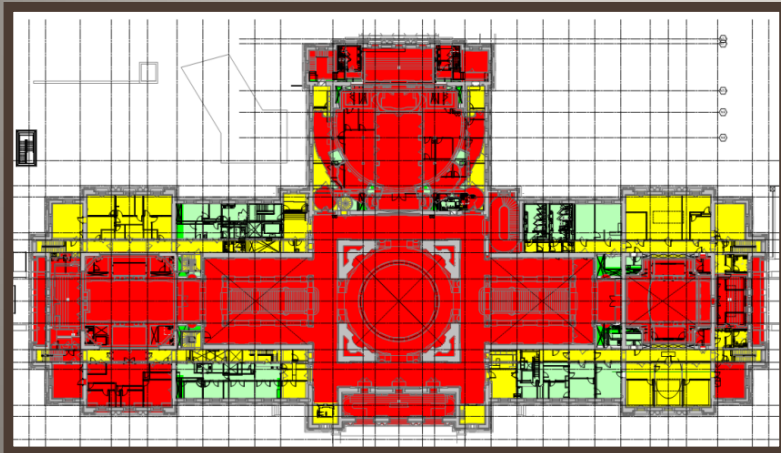
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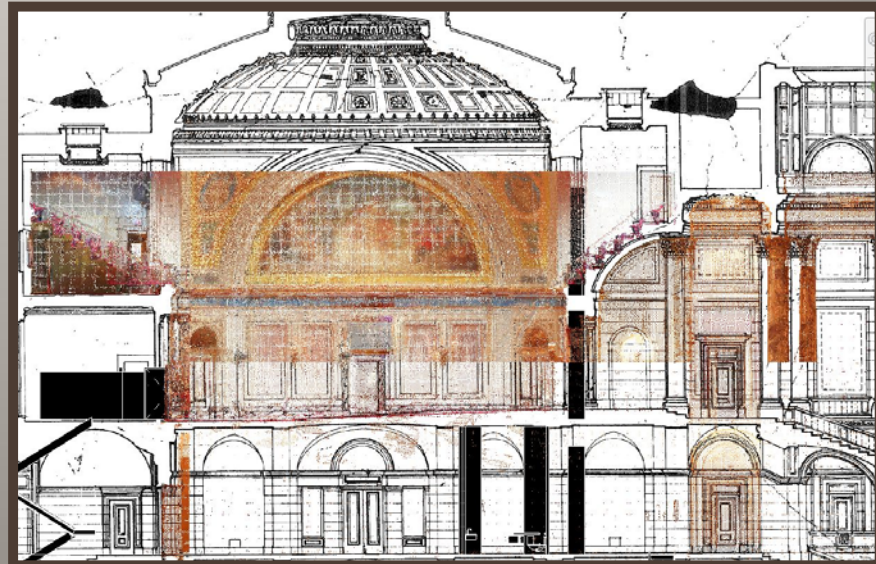
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# Documenting Existing Conditions



- ▶ Laser Scan
- ▶ Defining Historic Zones
- ▶ MultiVista





# Existing Structural Systems

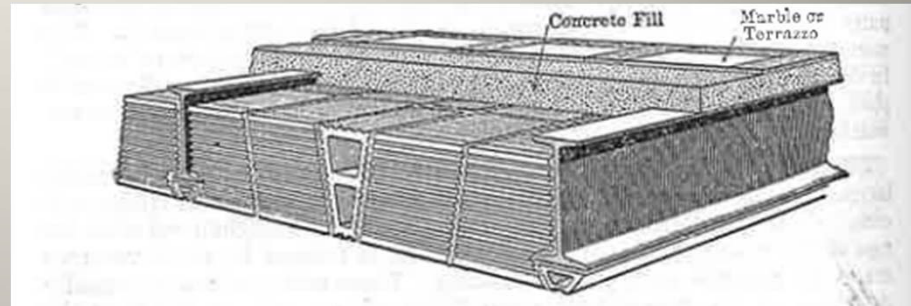
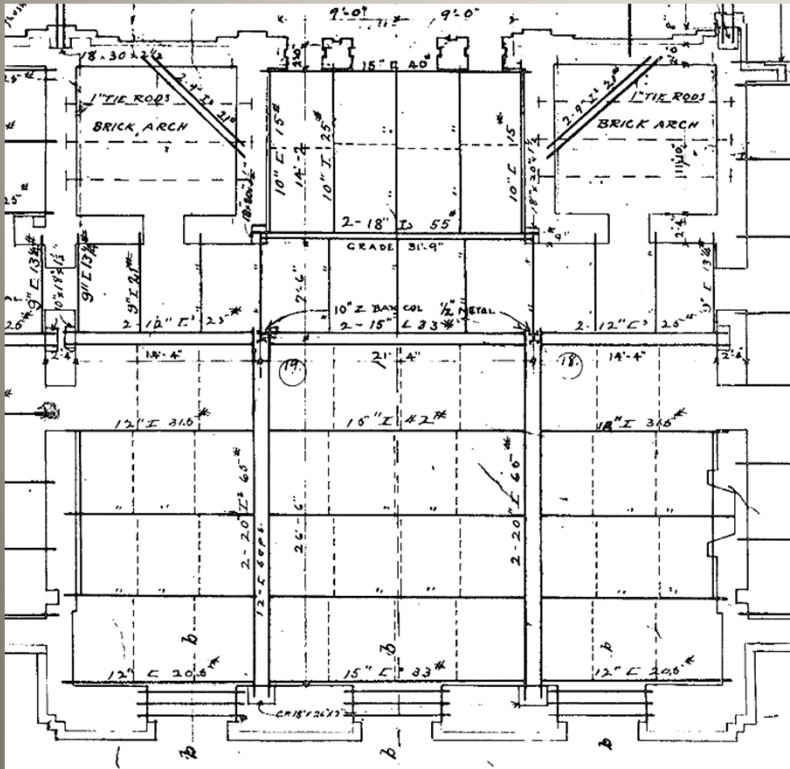


Fig. 46. Section of End-construction Flat Arch with End-construction Skews and with Marble or Terrazzo Finish, Illustrating Placing of Units and Methods of Making Concrete Fill

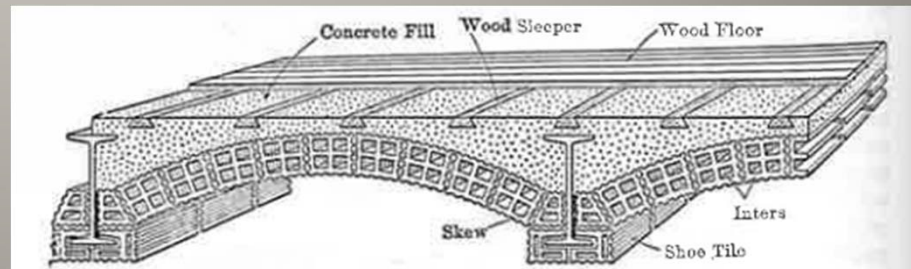
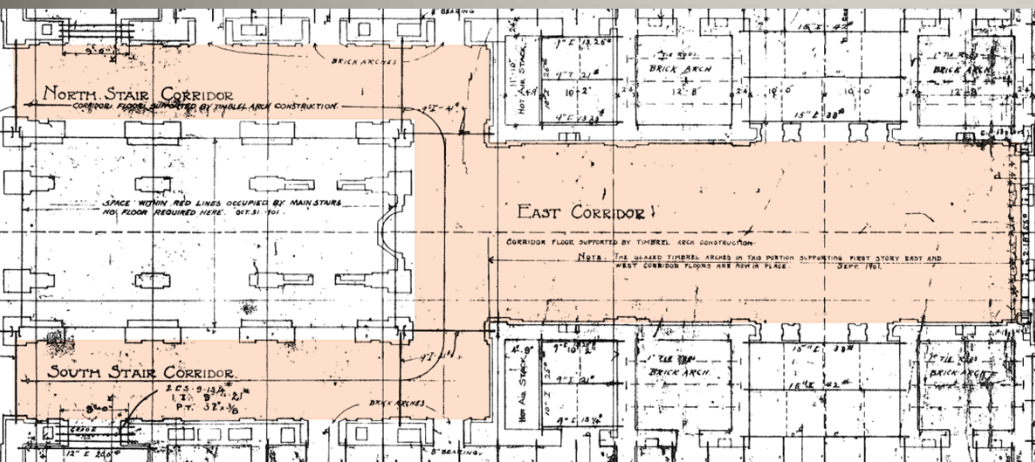


Fig. 43. Segmental Floor-arch, Illustrating Method of Protecting Exposed Portions of Girder

► Flat and segmental tile floor systems

# Existing Structural Systems

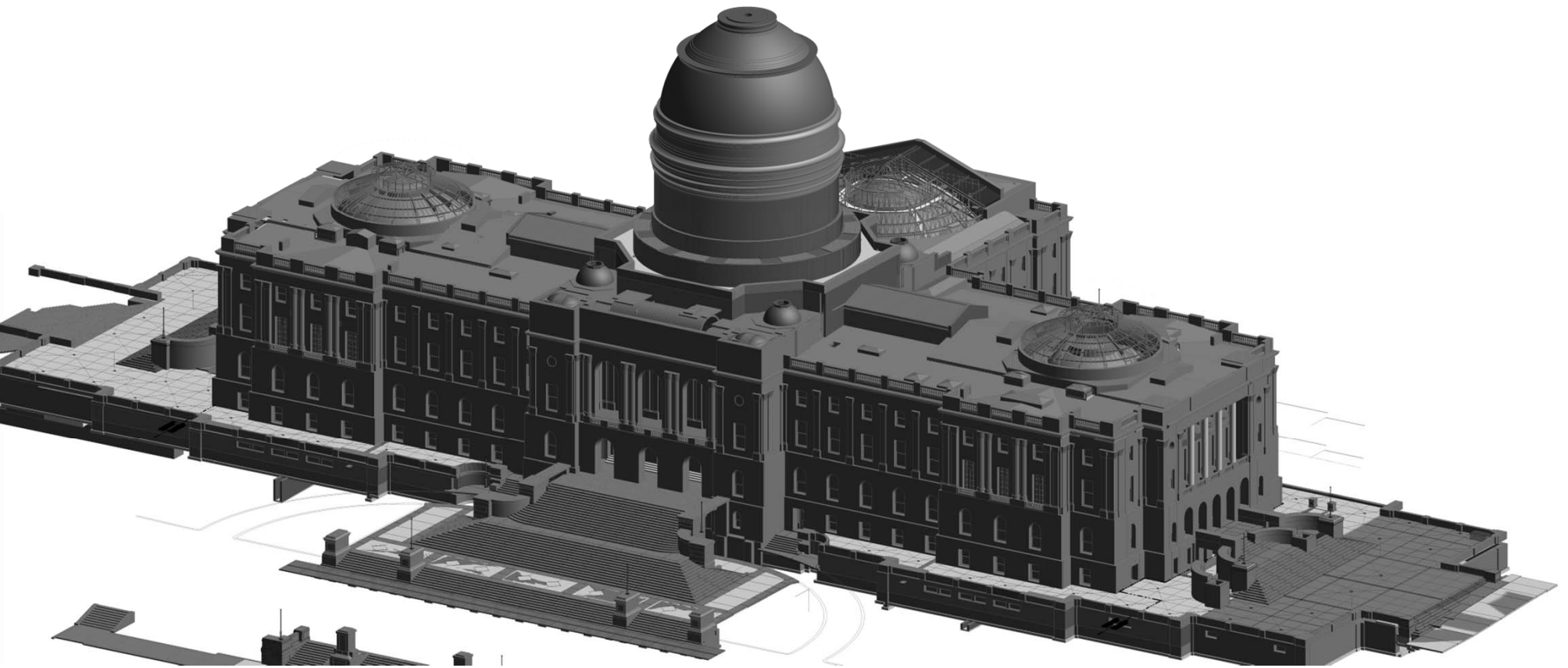
- ▶ Guastavino timbrel arch construction



# Challenges and Limitations



# Infrastructure



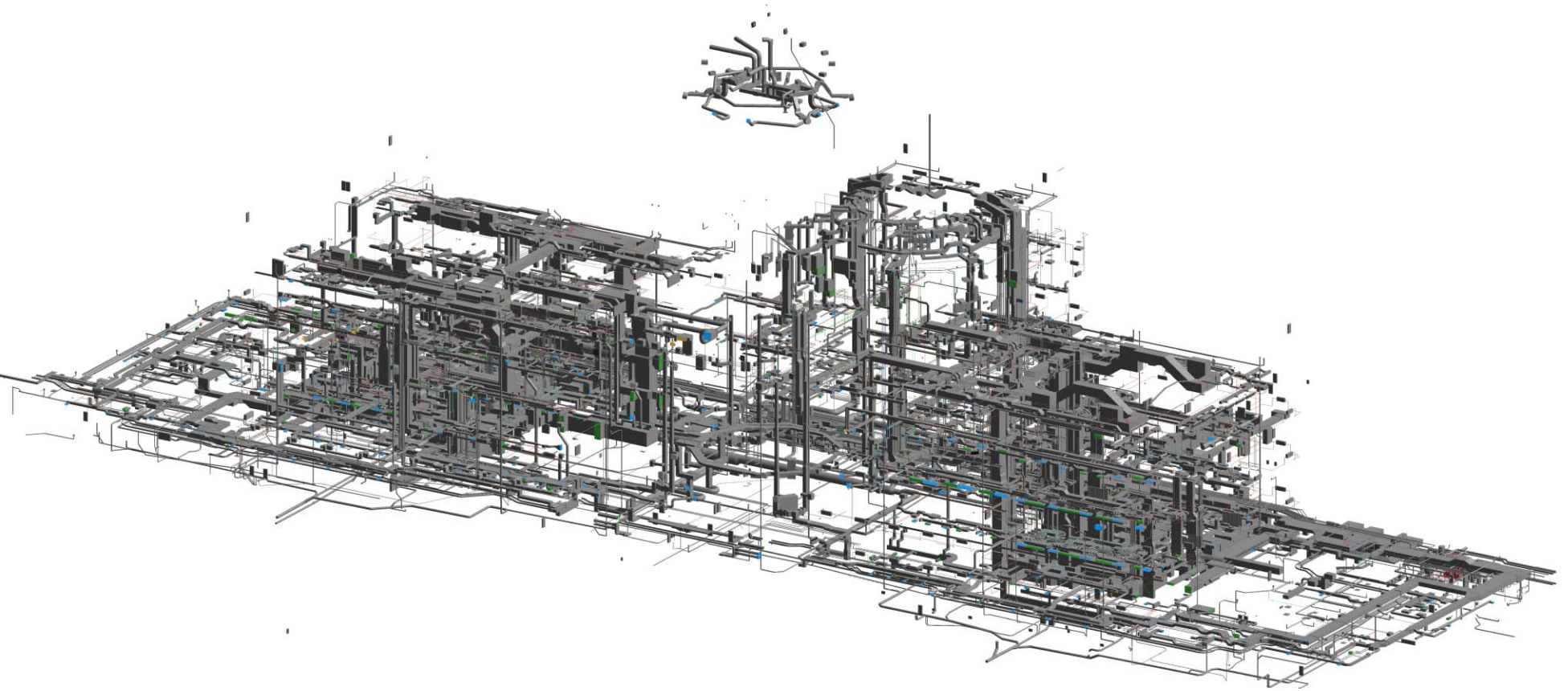
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# Infrastructure



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# Infrastructure

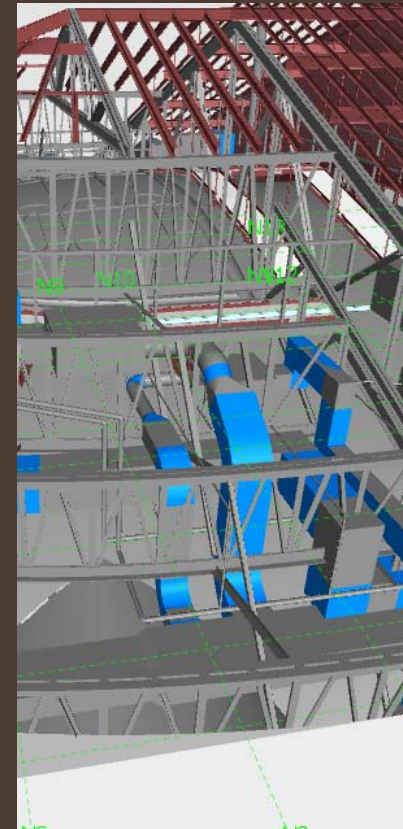
Basement



Vertical  
Distribution

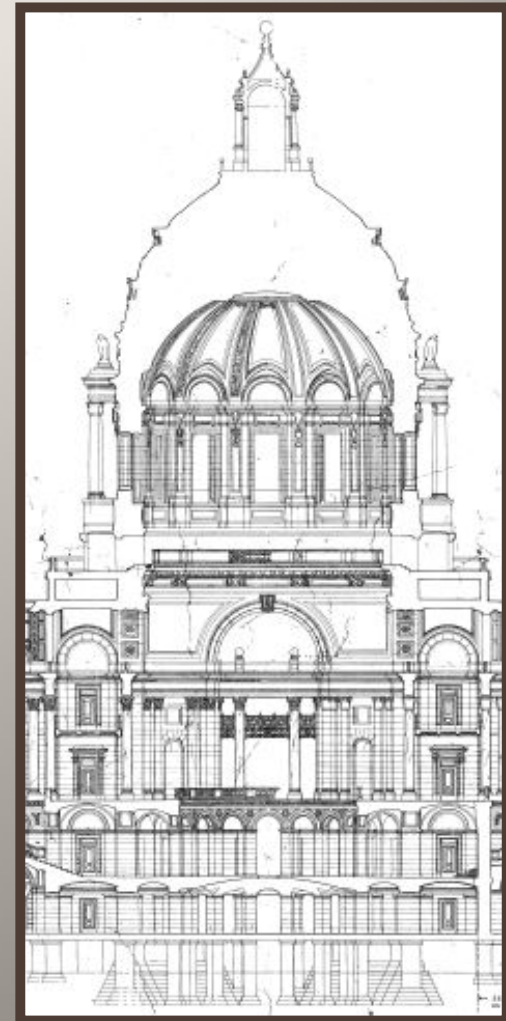


Attics



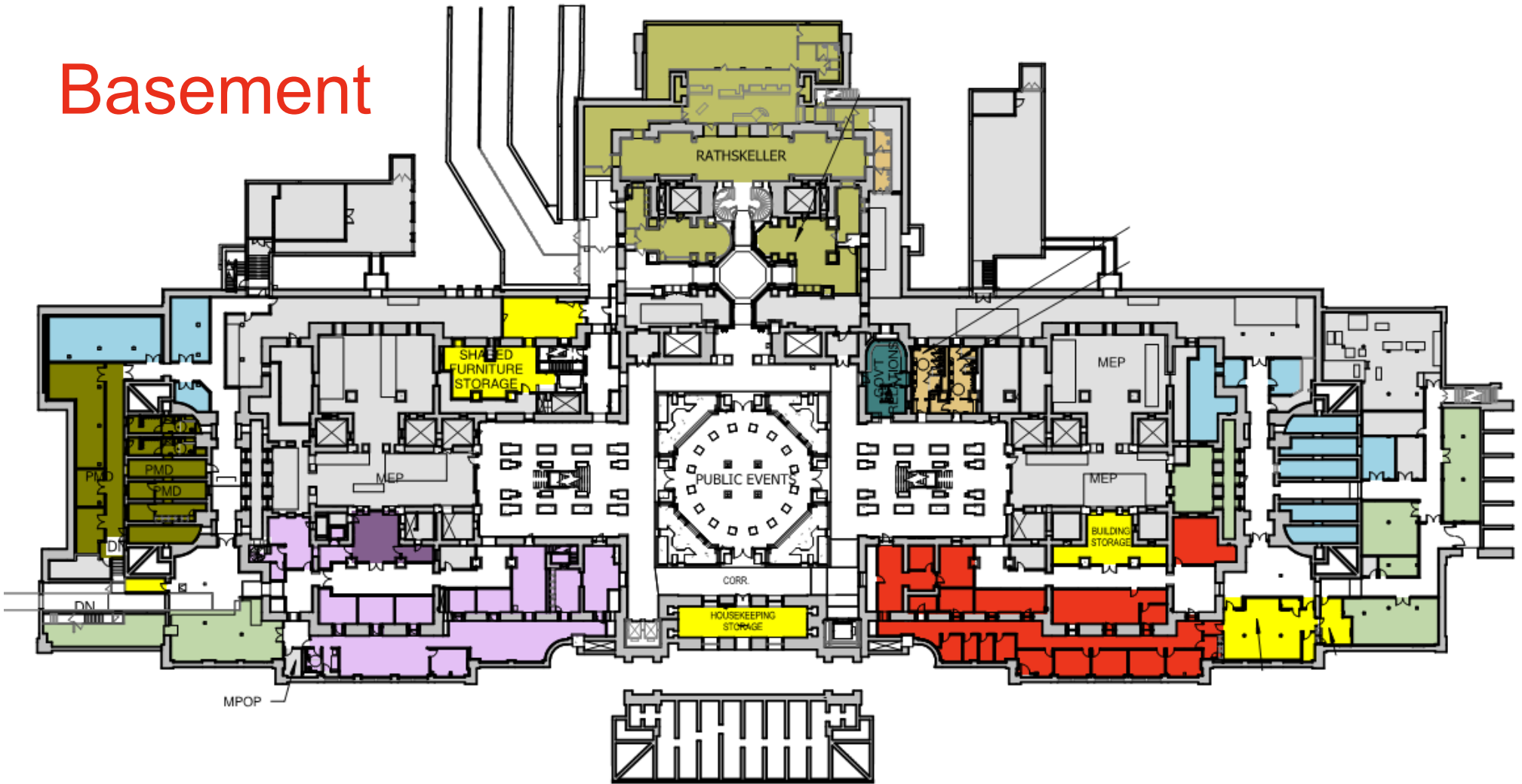
Basement

# Basement: Before/History

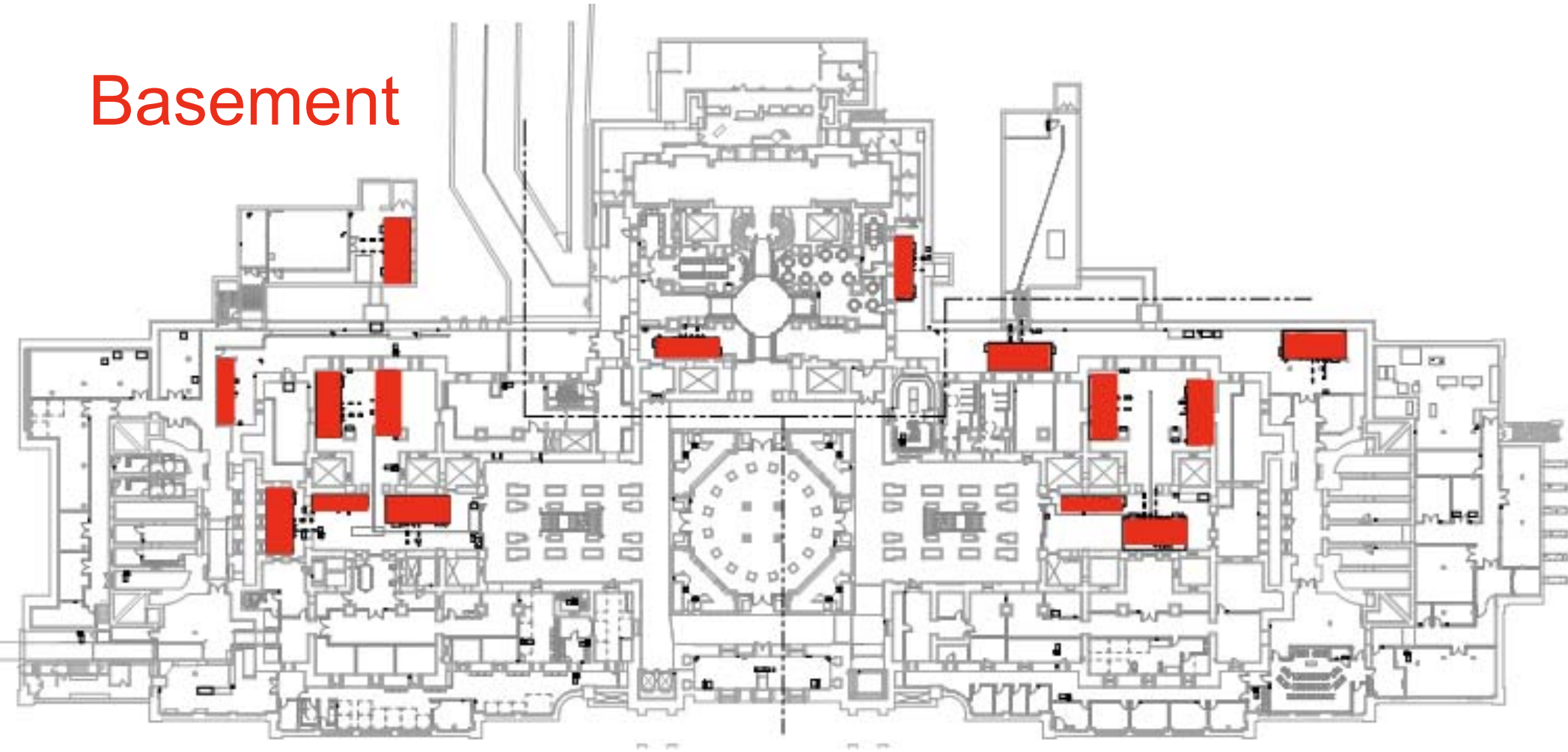




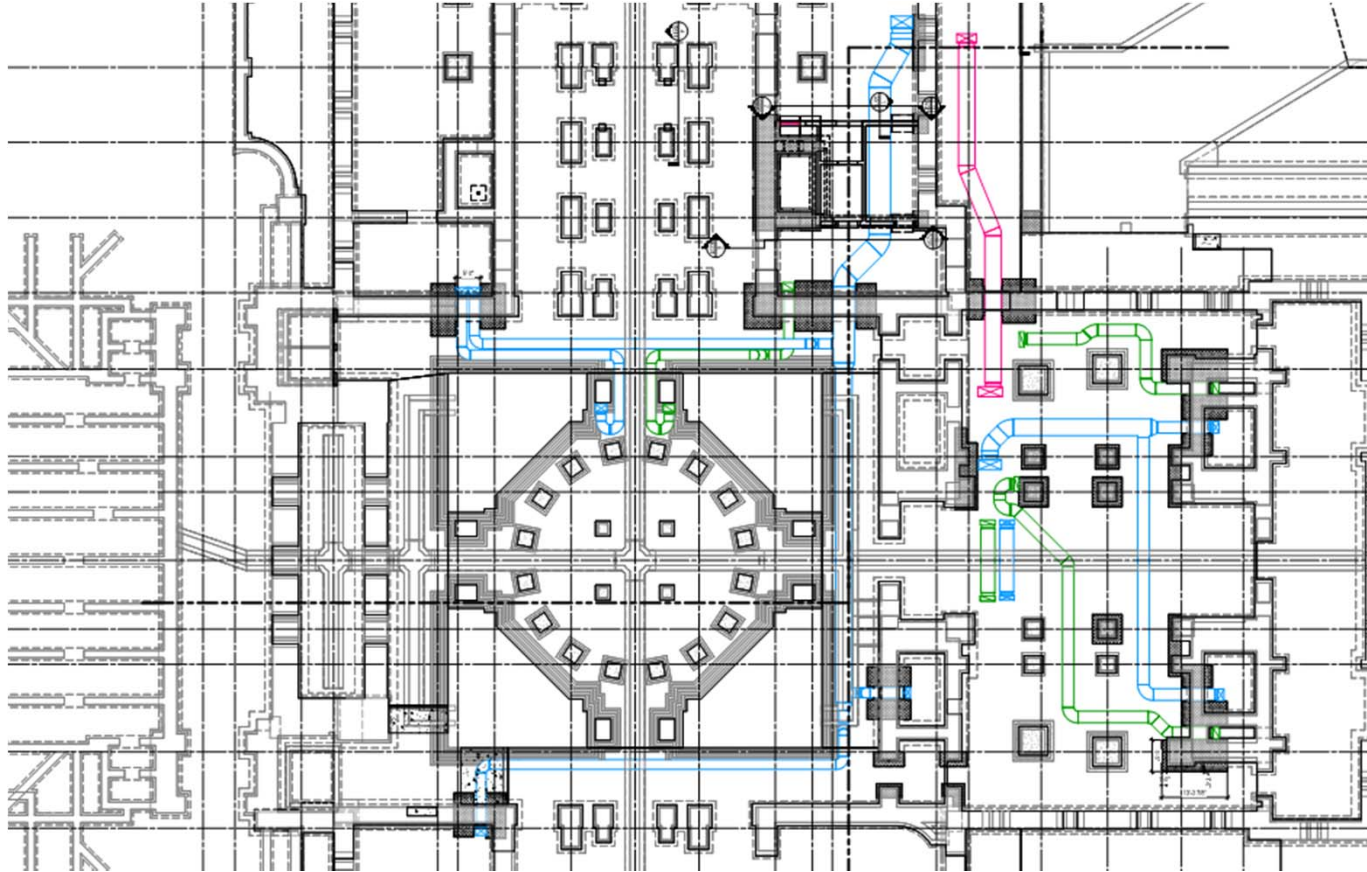
# Basement



# Basement



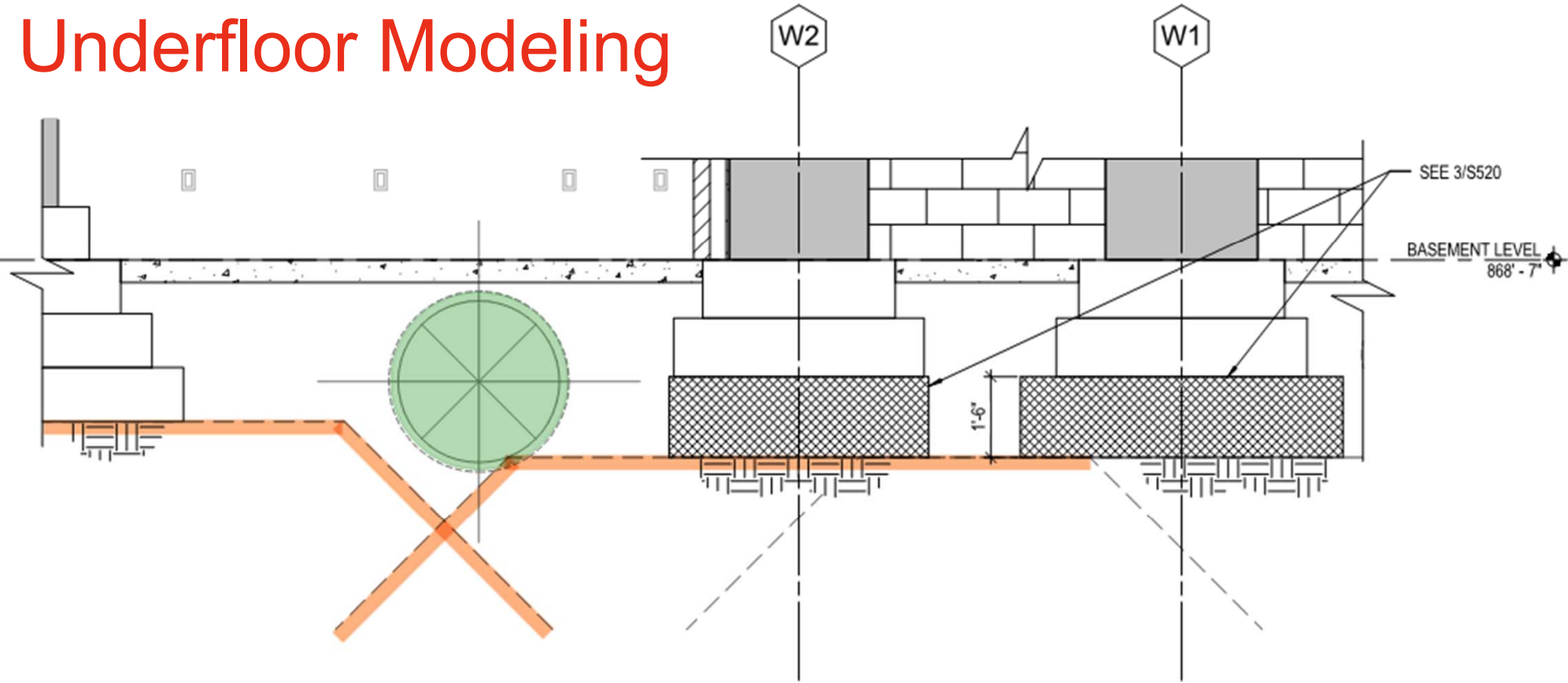
# Basement: Underfloor Systems



# Basement: Underfloor Systems



# Underfloor Modeling



3 SECTION  
1/2" = 1'-0"

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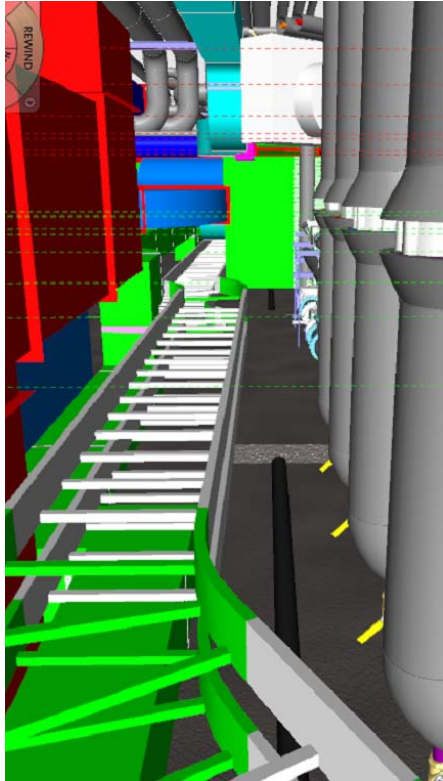
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# Underpinning

# Basement: Underfloor Systems



# Basement: Above Floor Systems



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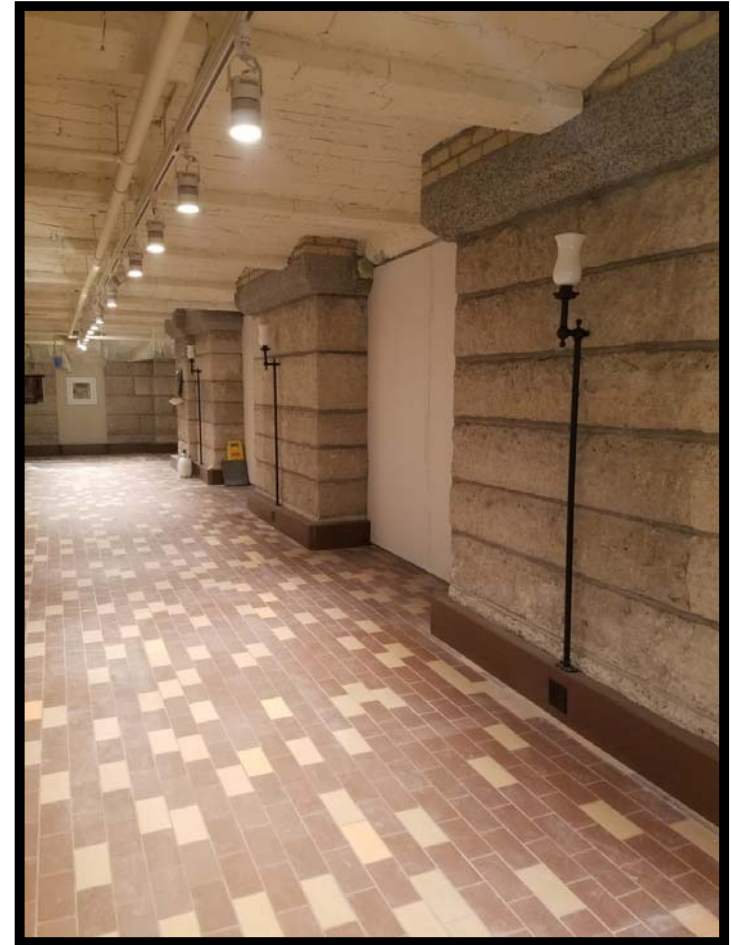


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# Basement Systems

# Basement: now



# Infrastructure

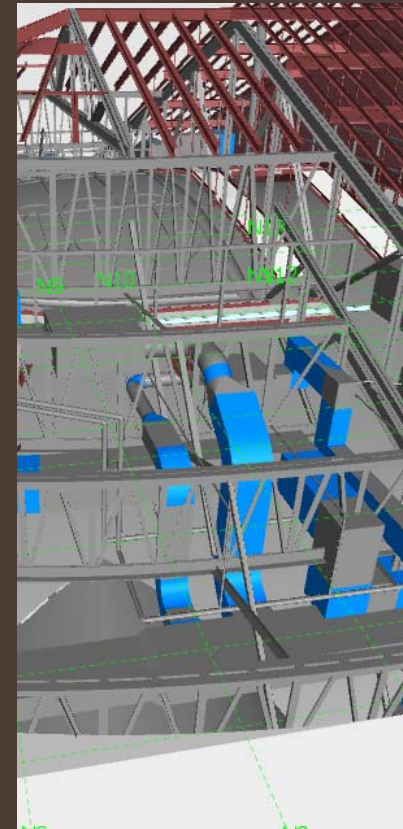
Basement



Vertical  
Distribution

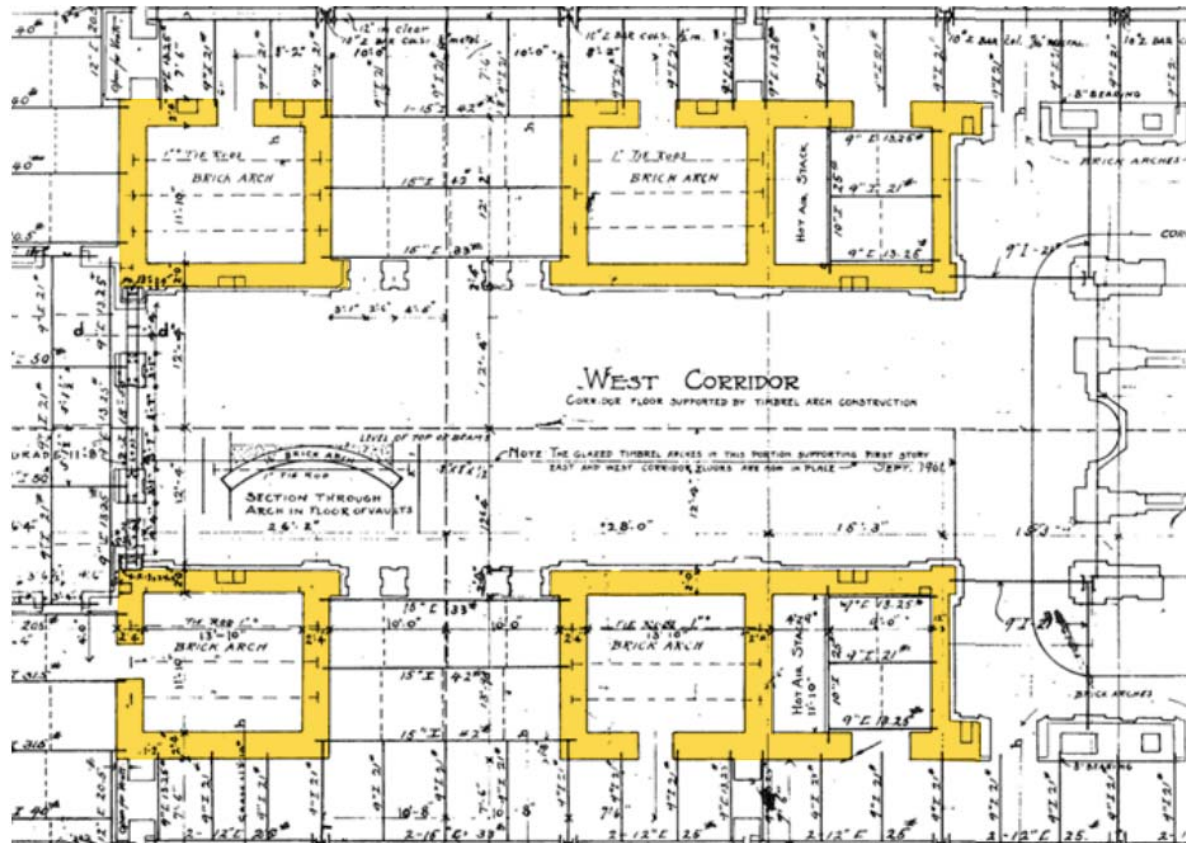


Attics

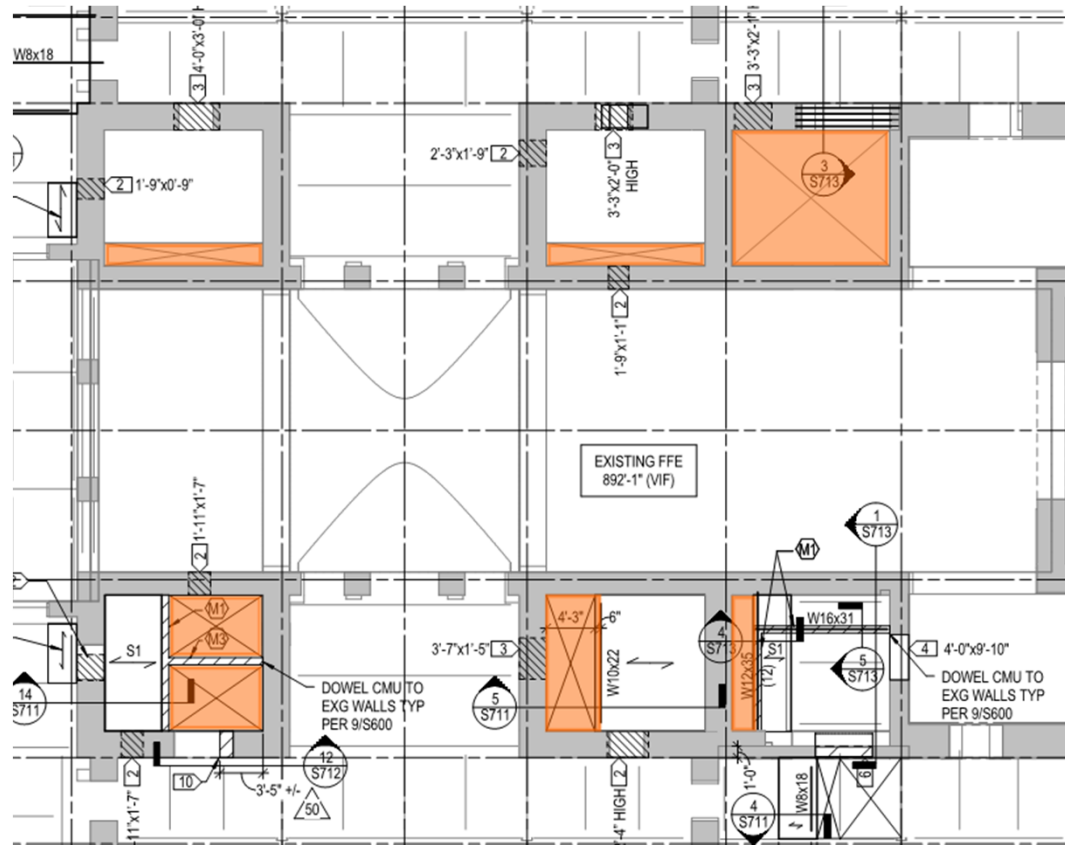


# Vertical Distribution

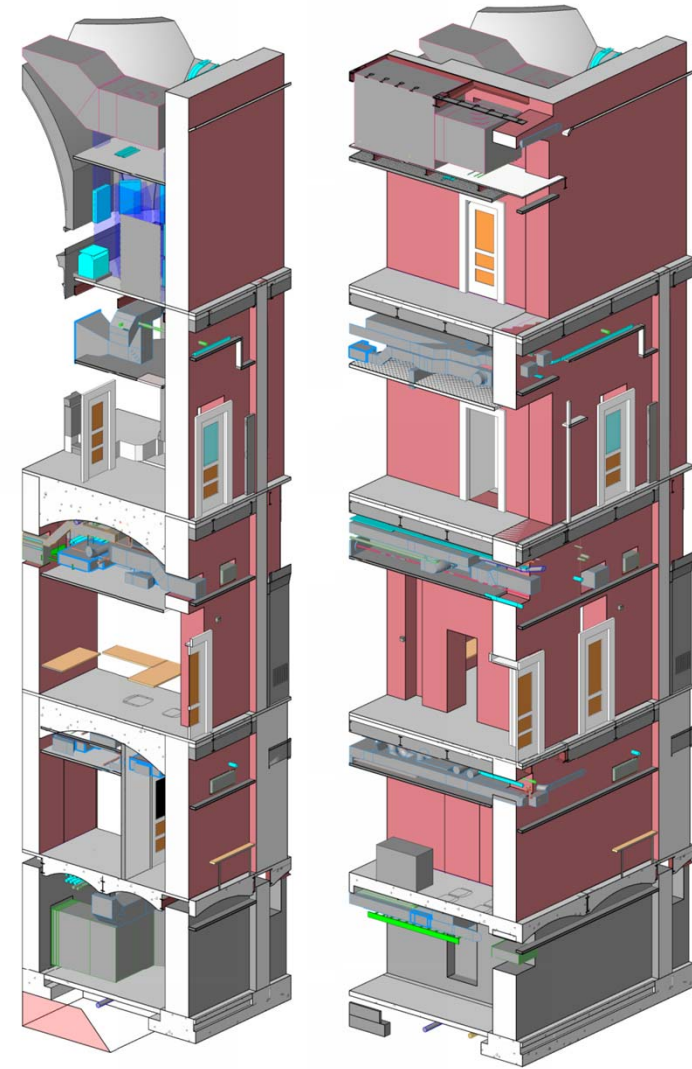
# Vertical Distribution: Vaults



# Vertical Distribution: Vaults



# Vertical Distribution: Vaults



# Horizontal Distribution: Sleeves & Lintels

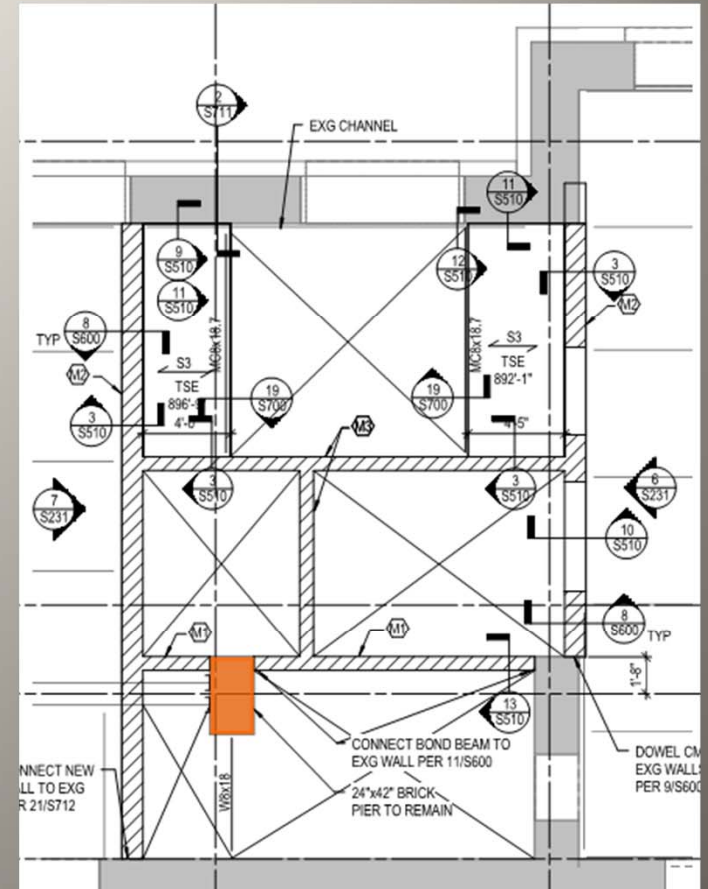
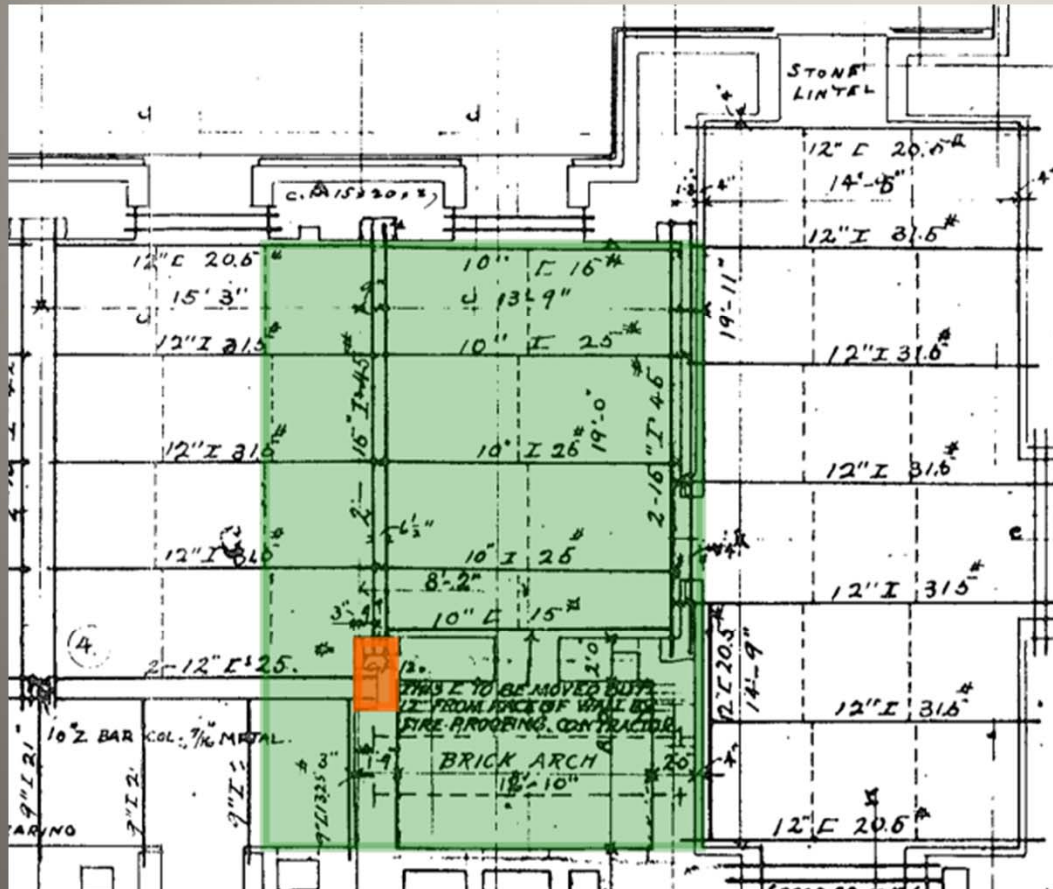




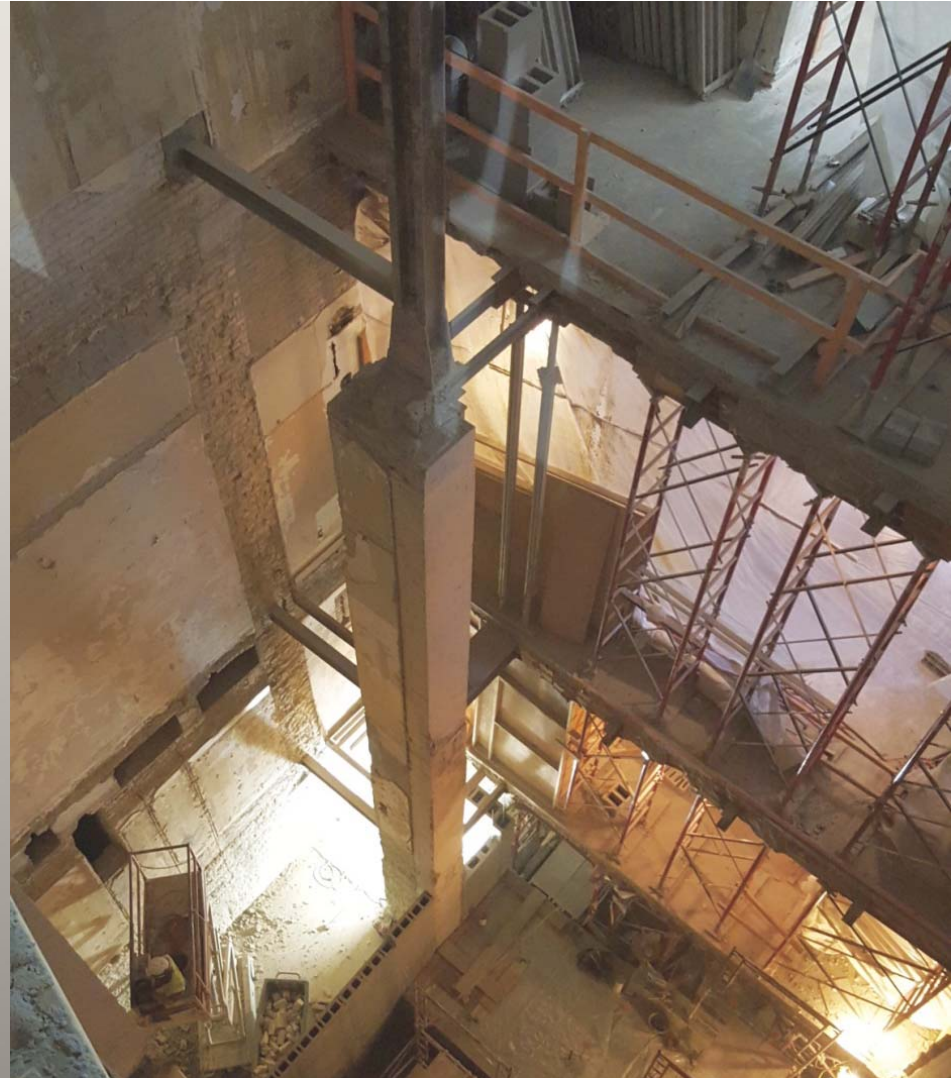
# Horizontal Distribution: Cutting and Coring



# Service Elevator and Enclosed Exit Stair



# Elevator and Stair



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# New and Extended Stairs



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# Infrastructure

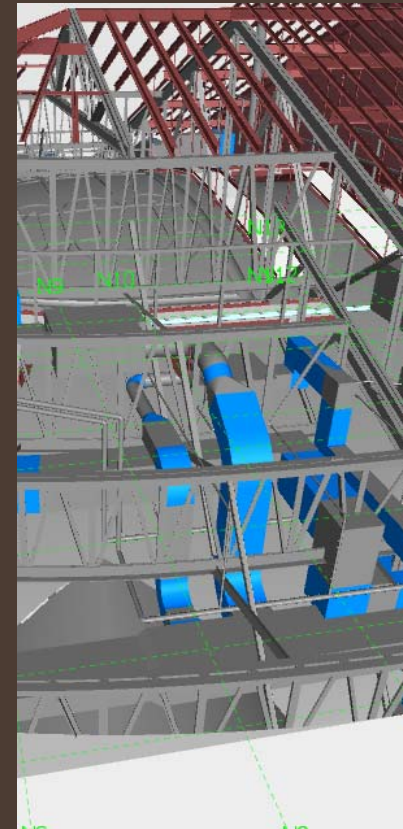
Basement



Vertical  
Distribution

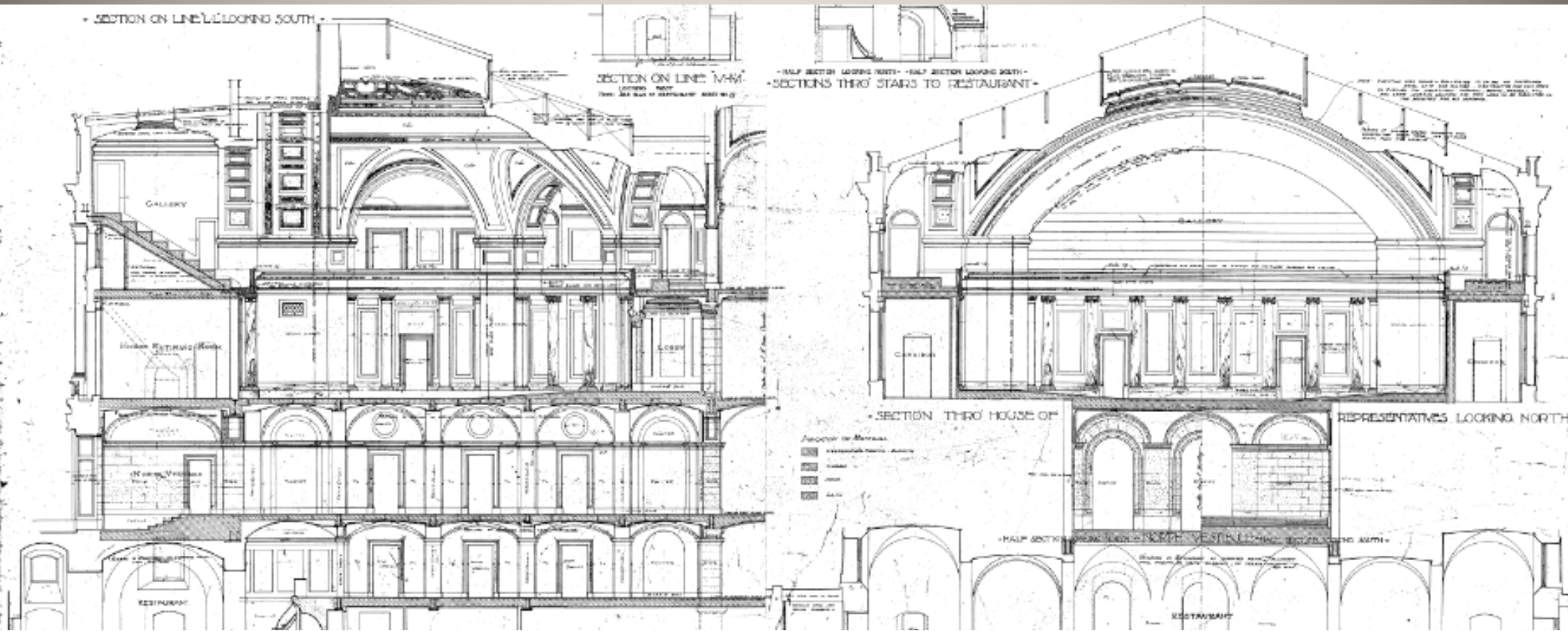


Attics



# Attics

# Attics



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# Existing Catwalk Access



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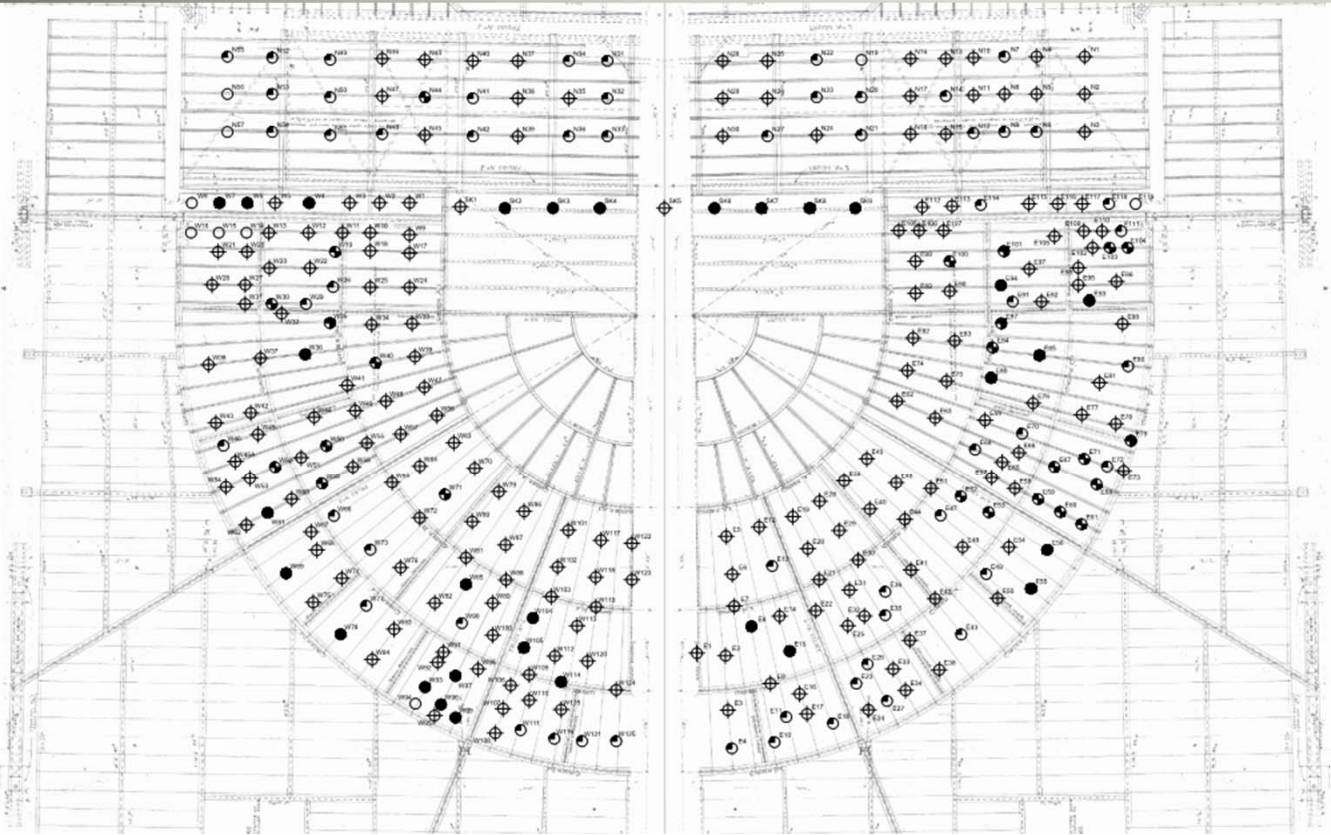
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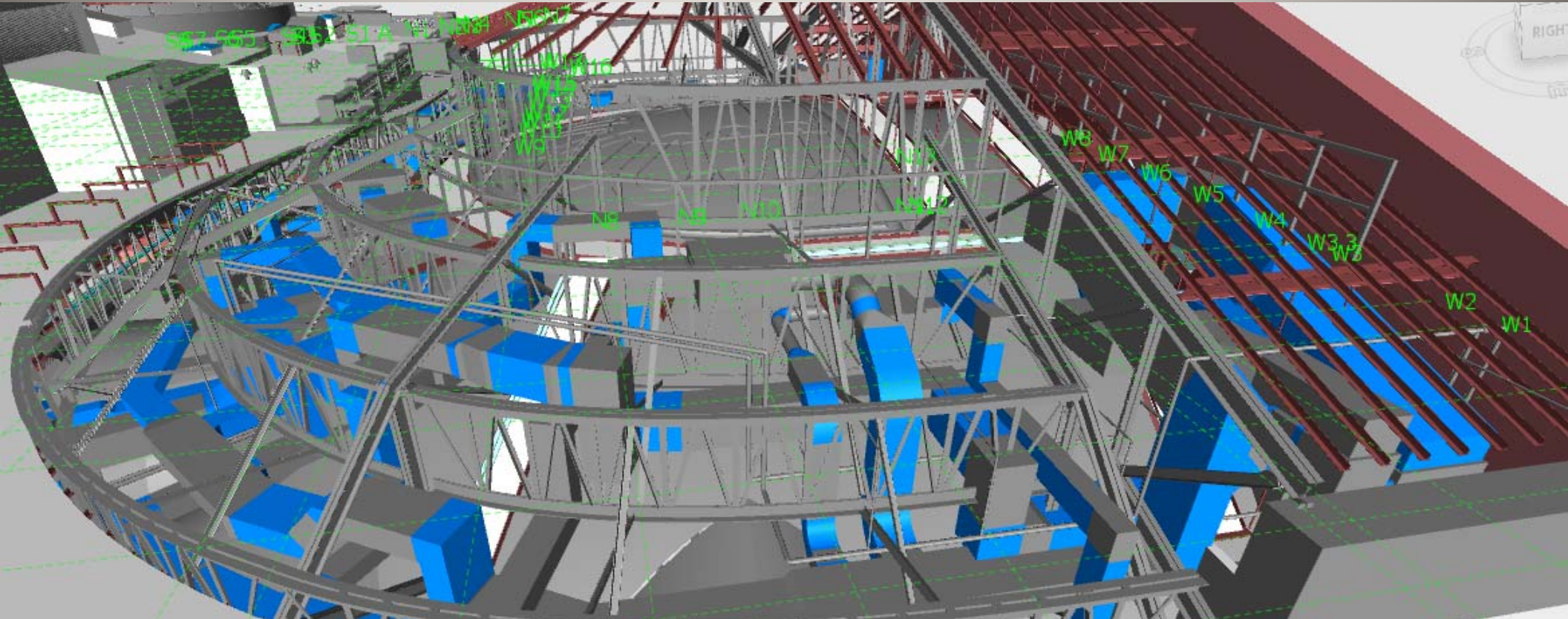
# Plaster Hangers – House Attic



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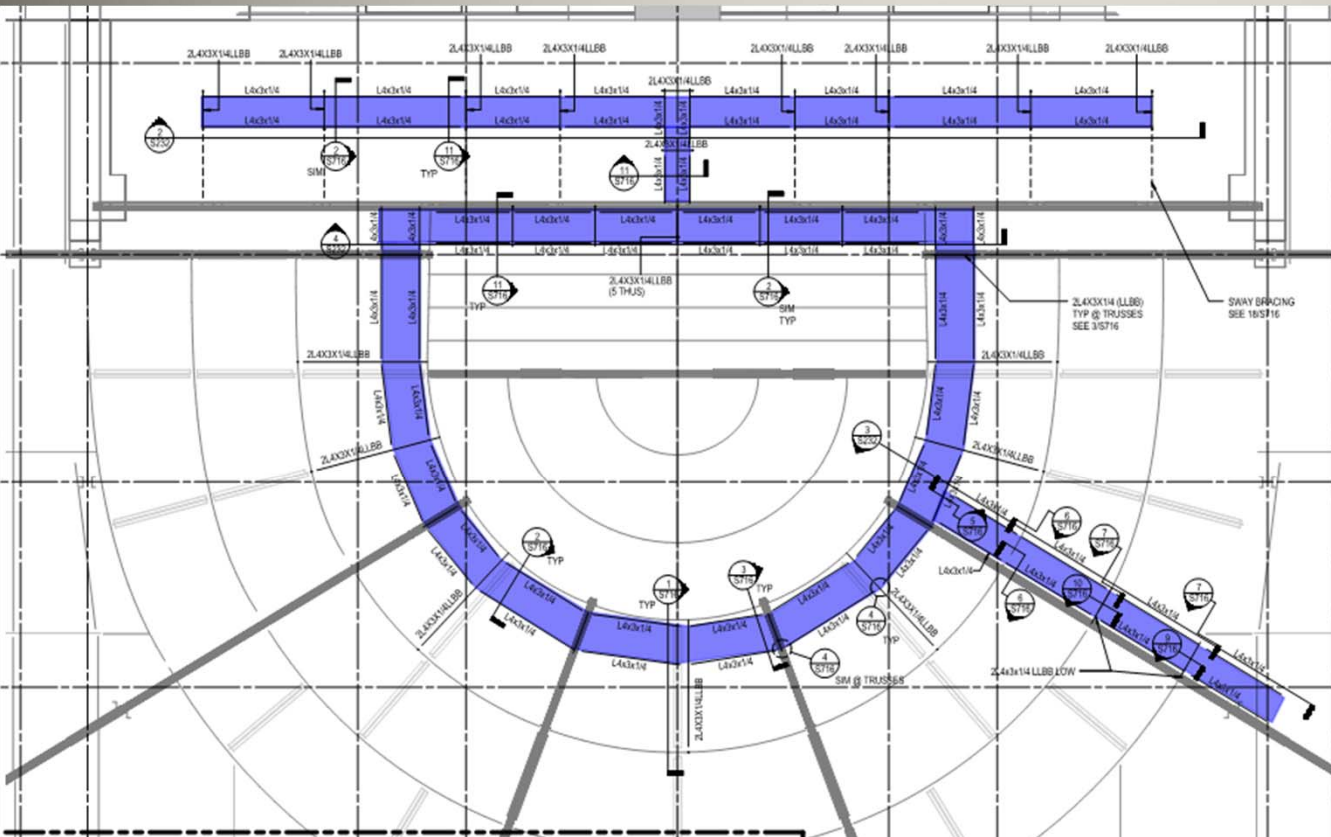
# Catwalk Access



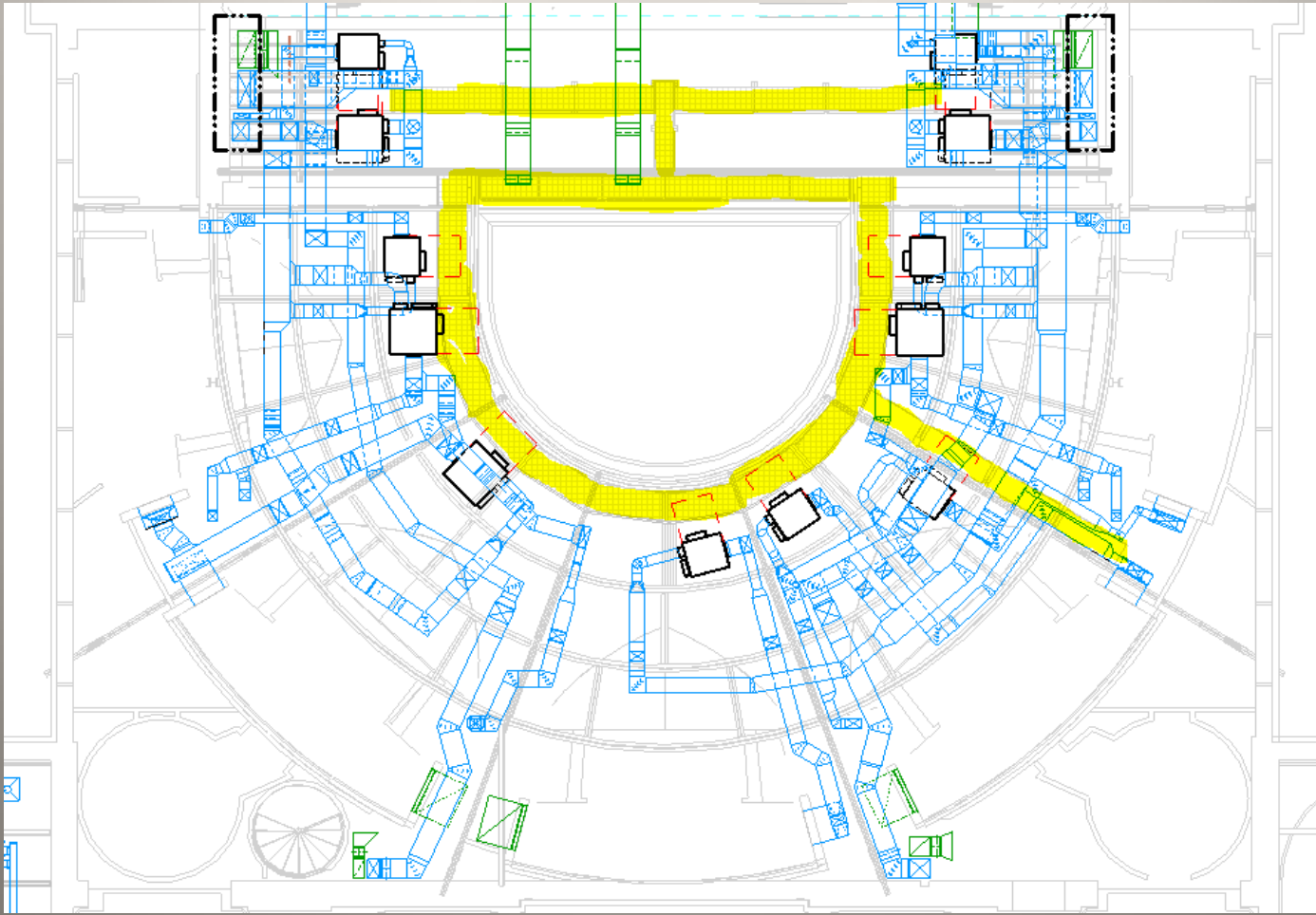
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# Catwalk Access



# Attics



# Attics

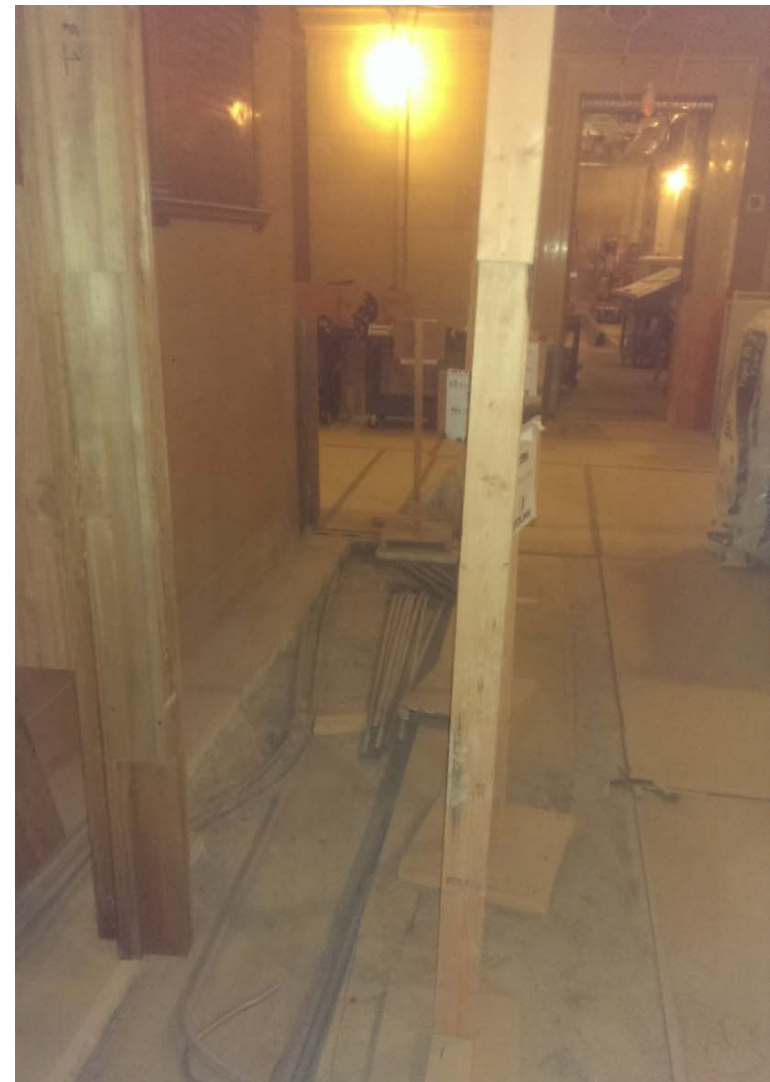
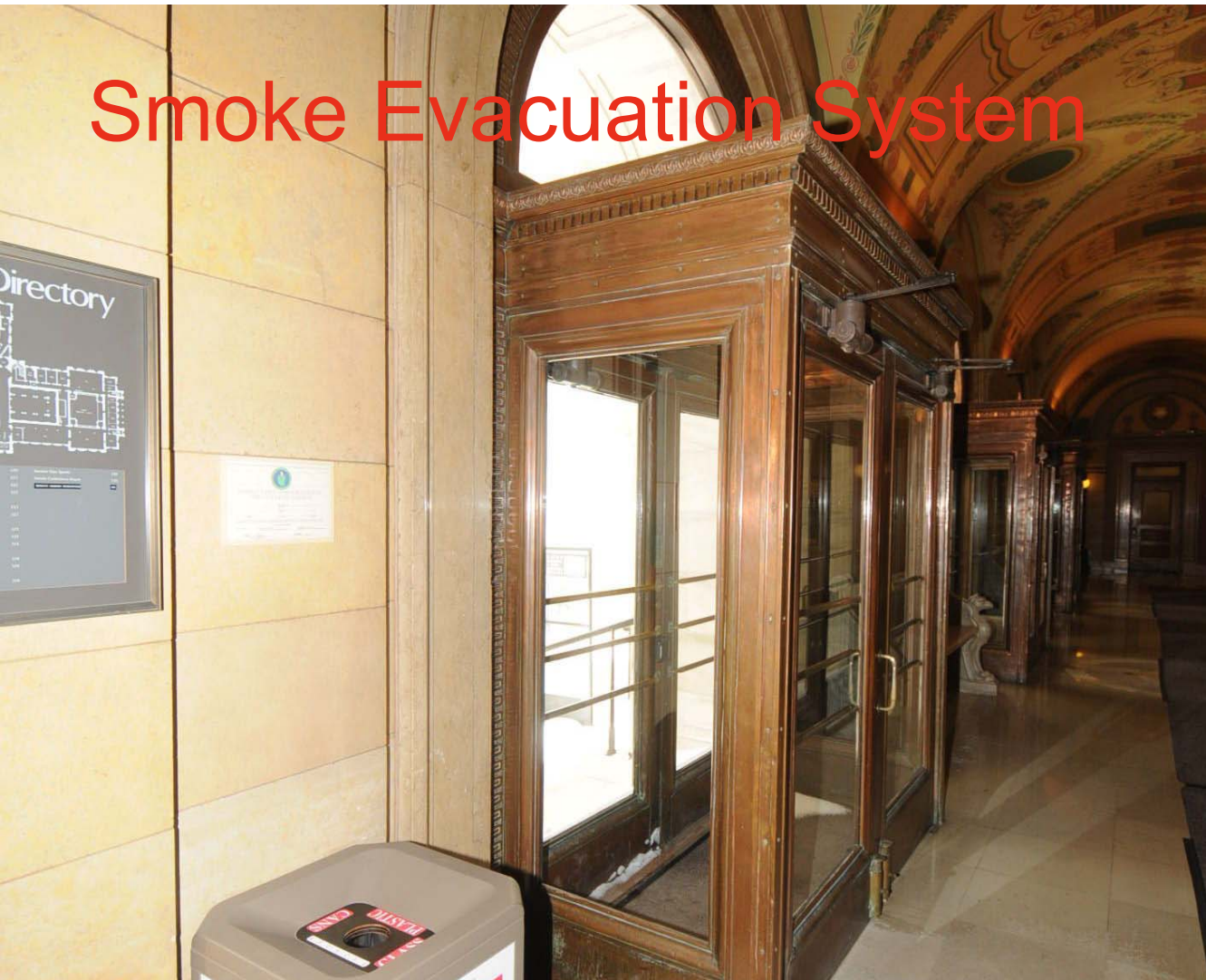


# All the Coordination in the World....

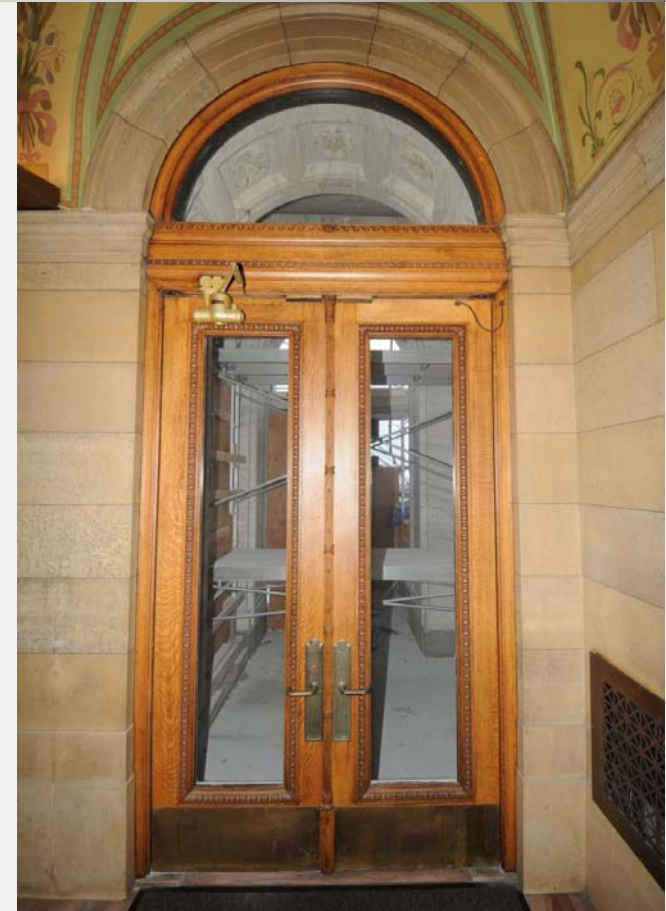


# Functionality & Life Safety

# Smoke Evacuation System



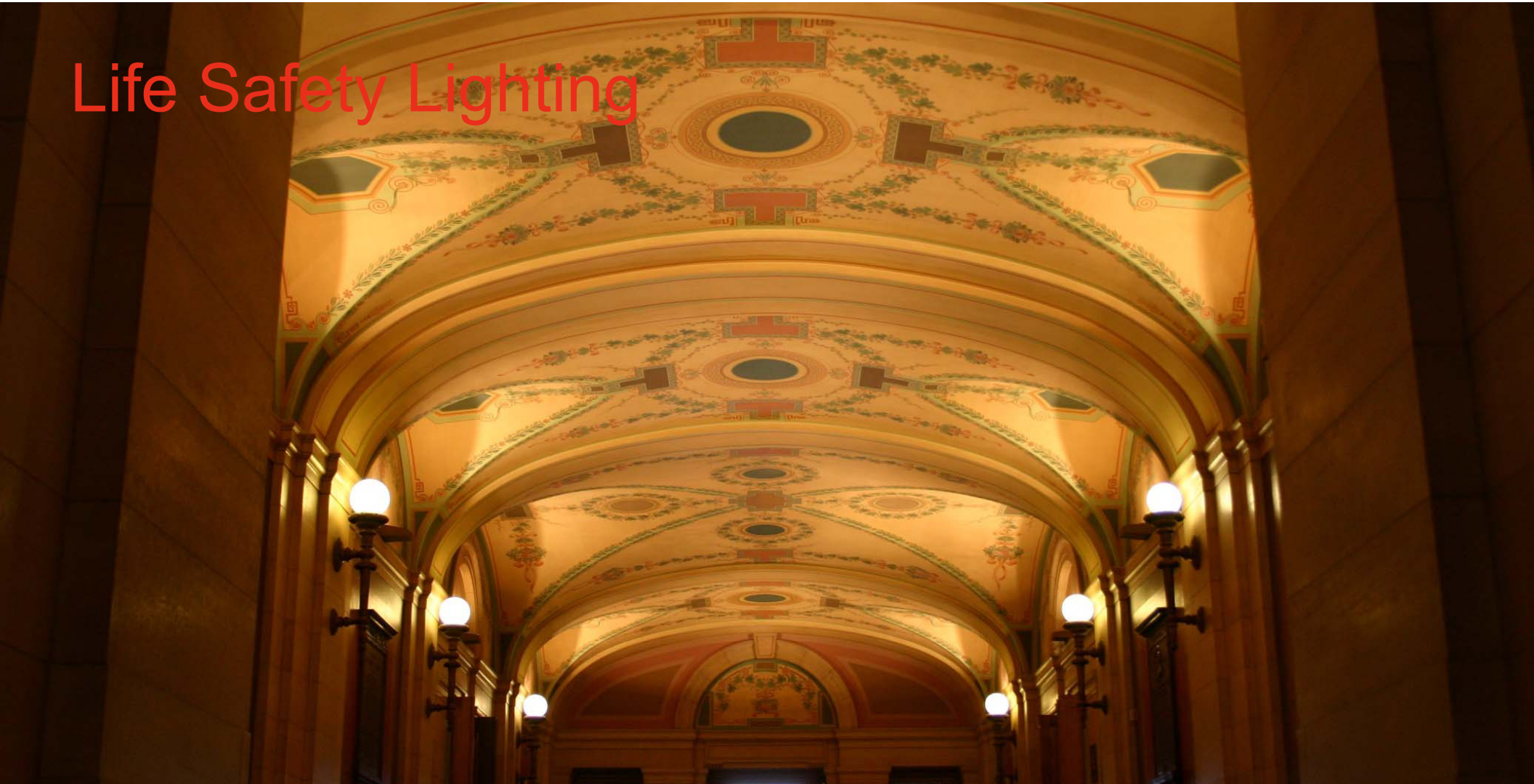
# Smoke Evacuation System



# Life Safety Lighting



# Life Safety Lighting



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# Life Safety Lighting



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# Life Safety Lighting



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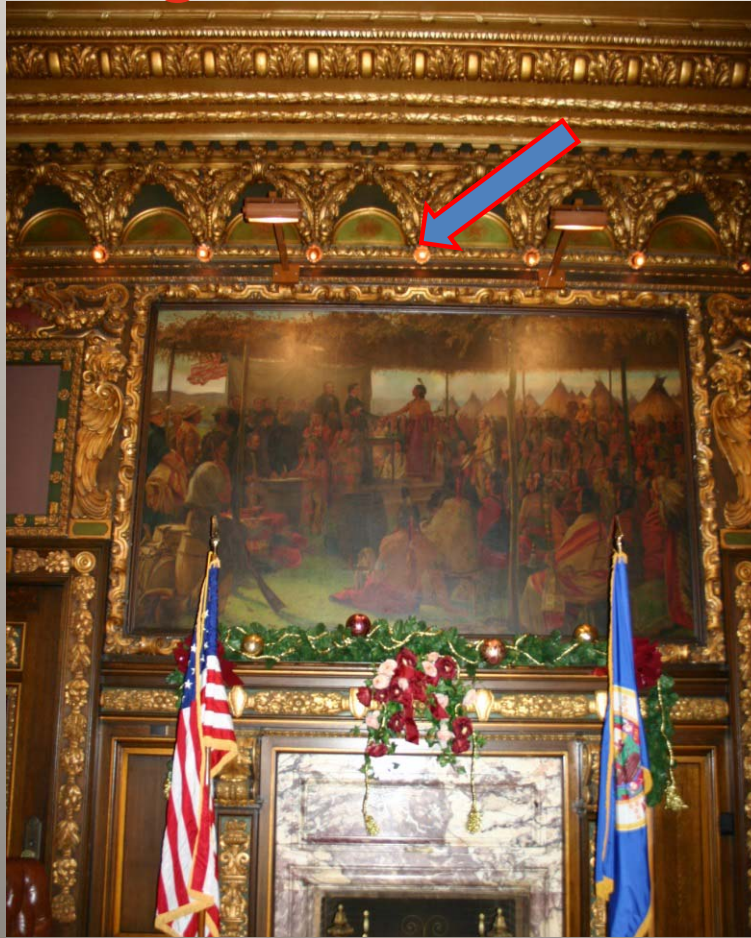


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# Data, Telecom, Electrical Devices (Wall Channeling)



# Wall Channeling & Sensitive Spaces



# Data, Telecom, Electrical Devices (Hearing Rooms)



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# Energy Efficiency Goals

- ▶ Minnesota B3 , Buildings, Benchmarks, and Beyond
- ▶ 2030 Energy Standard
- ▶ Energy models currently predict this building will operate 60-70% better than the SB2030 goals.

## How

- ▶ District Energy
- ▶ Fan wall AHU technology
- ▶ Full economizer



## Restrooms

The original restrooms in the building were very unique with Tennessee Pink Marble walls and floors, wood doors, and nickel hardware. The stalls even had lights that lit when the stall door closed. Unfortunately many of those elements were gone or damaged, and the bathrooms needed to be made accessible. Plus, there was originally only one public restroom per floor, considering most of the building occupants in 1905 were male. The restoration project is adding restrooms so there will be adequate accommodations on every floor, in a consistent location so they are easier to find.



# Finishes Preservation



# Plaster Repair



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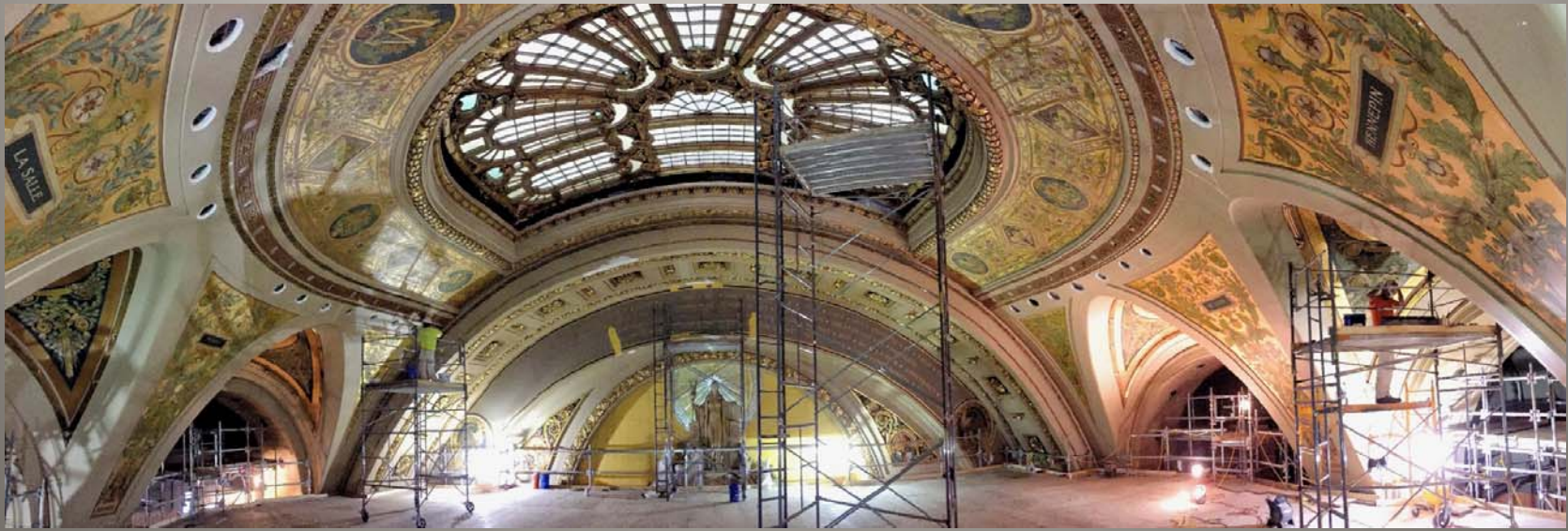
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# Access - Scaffolding



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# Decorative Paint



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# Fine Art



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# Glass Elevator Fronts

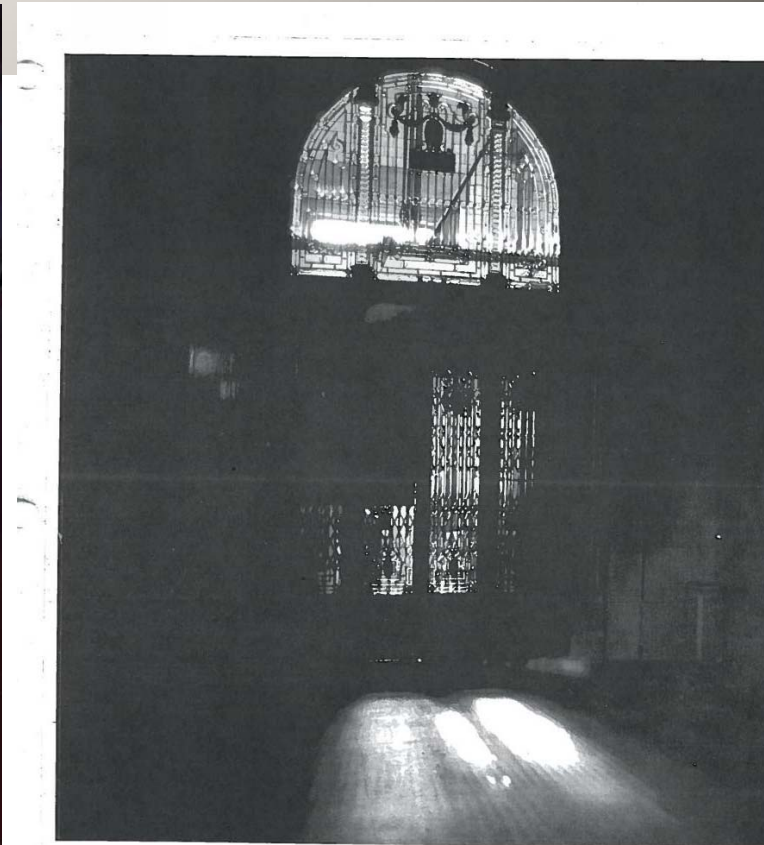


Figure 1 Southeast elevator in the second floor, ca. 1970. Minnesota Historical Society audio-visual collection. no. FMP6.15Cp35.



## Skylights

**OUT OF THE BUILDING'S 30 ORIGINAL SKYLIGHTS, 10 HAD BEEN COVERED WITH DROPPED CEILINGS. THE PROJECT HAS UNCOVERED AND IS RESTORING THEM**

The skylights over the oval stair and grand stairs are composed of curved leaded and stained glass panels. 100 years of baking sunlight had caused the leading to lose its structural integrity and many of the glass pieces had cracked. Each curved panel was taken to a local artisan, Gaytee Glass, and a custom mold was built to match the curve. Then the leading was removed from the glass pieces and replaced. The Grand Stair skylights are 25 feet by 50 feet each!

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# Tile Floor Restoration



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**QUESTIONS?**

**THANK YOU!**

**SEE YOU AT THE  
GRAND OPENING  
FALL 2017!**



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