

# Minnesota State Capitol Preservation



Presentation to the Capitol Preservation Commission

December 8, 2011

**MOCA**

# Capitol Preservation Commission

## Guiding Principles

### Commission Directions

- Work within Building Footprint

### Guiding Principals

- Architectural Integrity
- Effective Building Function of State Business
- Life Safety and Accessibility

Agenda Item 2

# **UPDATE ON MECHANICAL & ELECTRICAL ASSESSMENT**

# Mechanical Electrical Plumbing

## Guiding Principles

- Architectural Integrity
  - Respectful of historic significance
  - Repair / replace aged infrastructure
- Effective Function for State Business
  - Provide modern standard of function
- Life Safety and Accessibility
  - Improve health and safety
  - Meet Code and legal requirements
  - Minnesota B3 / 2030 guidelines

# MEP Systems - Existing

- Maintained and Managed Well, however:
  - Cass Gilbert ventilation systems were open windows and natural ventilation – impractical today.
  - Retrofitted systems do not ventilate all areas of the building – not code compliant.
  - Recirculation of interior air only, creating an unhealthy environment.
  - Leaking Pipes are a risk to damage the building.
  - Aged systems - higher costs for maintenance and energy use.

# Conditions of Existing Systems

- **Ventilation Systems** – The building has been retrofitted over the years to where today it has 32 air handling units. These units are primarily located in the basement. Two units have been installed on the roof to serve the House and Supreme Court assembly areas. The systems serving the rotunda and the grand stairs areas do not have a direct source of outside air ventilation and originally relied on natural air flow through the building.

**Recommendation: The systems should be removed and replaced to provide a modern standard of function and to make ready for the next 100 years.**

# Conditions of Existing Systems

- **Plumbing Systems** – The current systems are original in many areas and have reached their expected life.
- **Water distribution** - was upgraded in 1984, however, the system pipe materials include copper and galvanized steel. Over the years dissimilar materials have created corroding and leaking of joints.
- **Hot Water** - heated from district energy to temperatures of 110 Deg. F for general use and 140 Deg. F for the kitchen. A booster is used for the dishwasher to reach 180 Deg. F.
- **Storm, waste and vent piping** - uses a combination of materials. Leaks in accessible locations are repaired as needed.

**Recommendation: The systems should be removed and replaced to make ready for the next 100 years.**

# Conditions of Existing Systems

- **Building Controls** – Have been updated over time for direct digital control of most of the central systems. Pneumatic systems remain at terminal devices.
- **Fire Protection** – Approximately 1/3 of the building total floor area has been retrofitted with a fire protection system.

**Recommendation: Building controls and a complete Fire Protection plan should be part of the restoration.**

# Conditions of Existing Systems

- **Communication/Data** – The communication and data systems are run “as needed” currently. This need to be reworked to provide more efficient distribution of service. Wireless need to also be configured.
- **Electrical Service** - Current service in to the building is 208 volt. The building is set for 13.8 KV, with the utility vaults outside of the Capitol. Transition to 480 volt should be relatively straight forward.

**Recommendation: Building communication/data systems need to be upgraded. The electrical service can be reused, however, the distribution wiring and panels should be replaced to provide a modern standard of function.**

# Conditions of Existing Systems

- **District Energy Service** – the building heating and cooling is provided by St. Paul District Energy. Service piping enters the building in the northwest corner of the building. Currently there is a project underway to improve the hot water service entrance and distribution piping.

**Recommendation: The district energy services are in good condition and can be re-used to the greatest extent possible.**

# MEP Challenge

- Effective preservation planning requires a strategy of renovation to integrate engineered systems to provide a modern standard of function with no modification to the historic fabric.

# MEP Approach

- Modern systems require connectivity throughout the building. The challenge is make connections where none were intended.
  - Outside Connections
  - Equipment Locations
  - Horizontal Distribution
  - Vertical Distribution

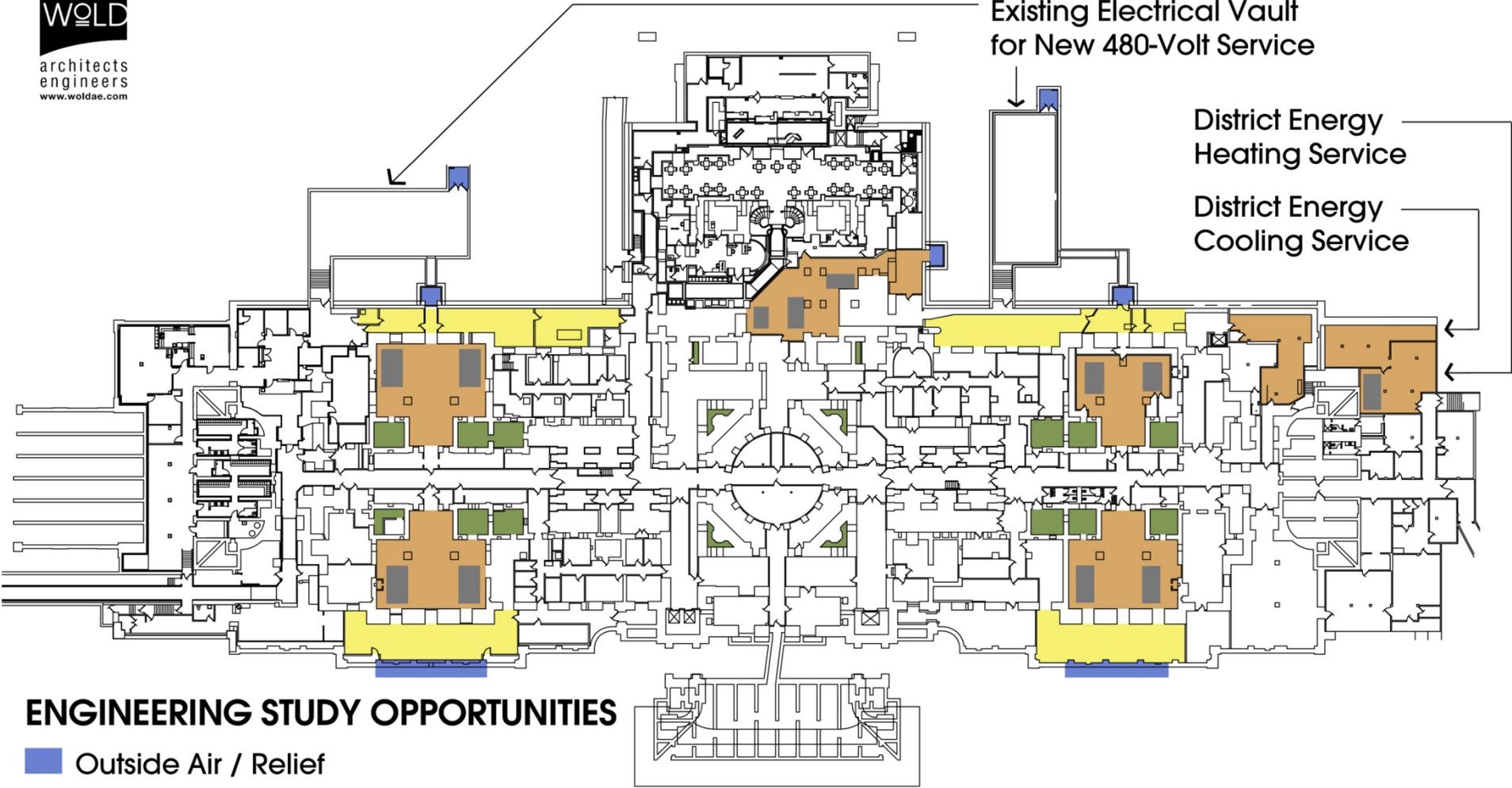


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Existing Electrical Vault  
for New 480-Volt Service

District Energy  
Heating Service

District Energy  
Cooling Service



## ENGINEERING STUDY OPPORTUNITIES

Blue square: Outside Air / Relief

Orange square: Equipment Space

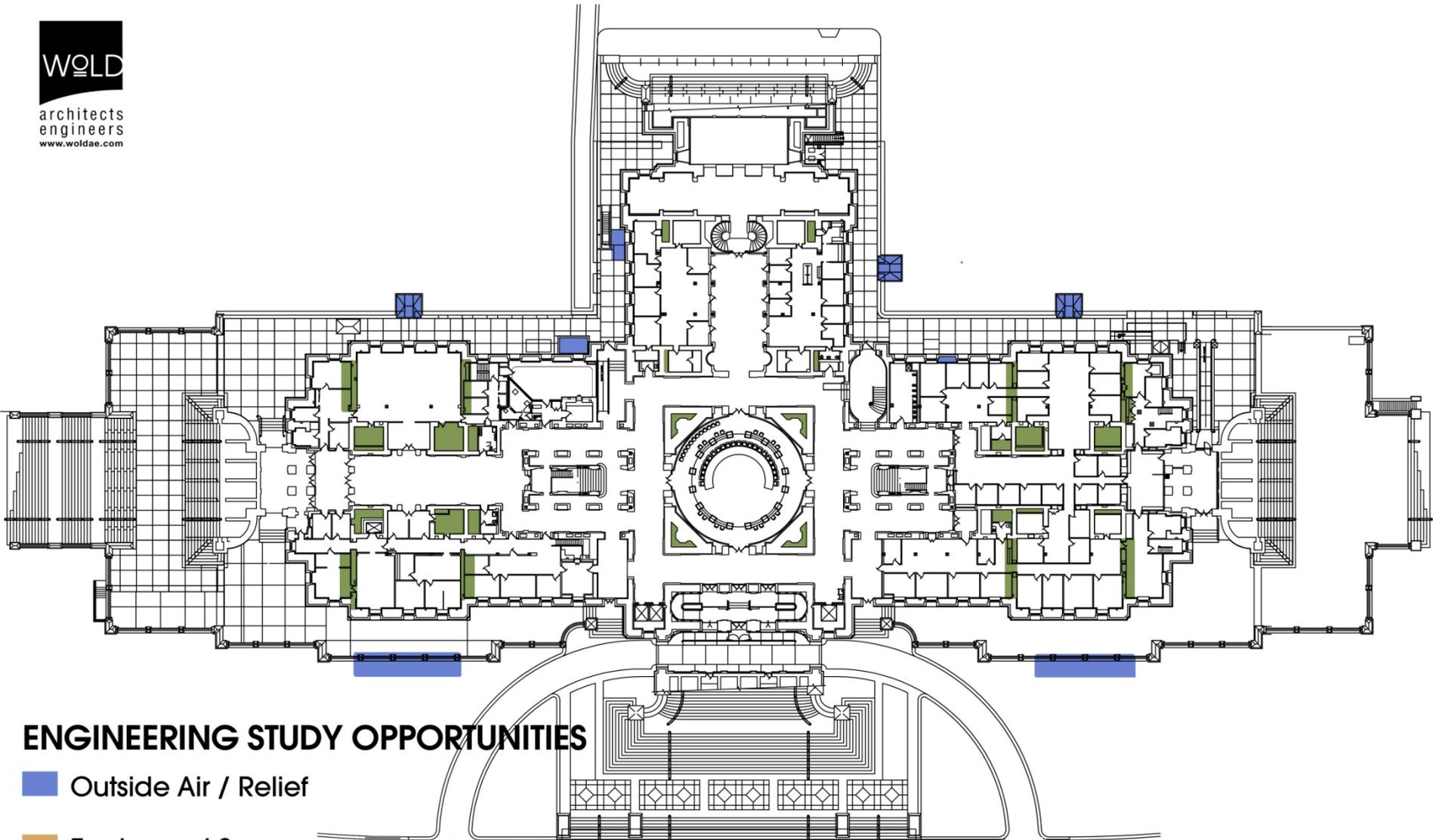
Grey square: Air Handling Units

Yellow square: Horizontal Distribution

Green square: Vertical Distribution

# BASEMENT

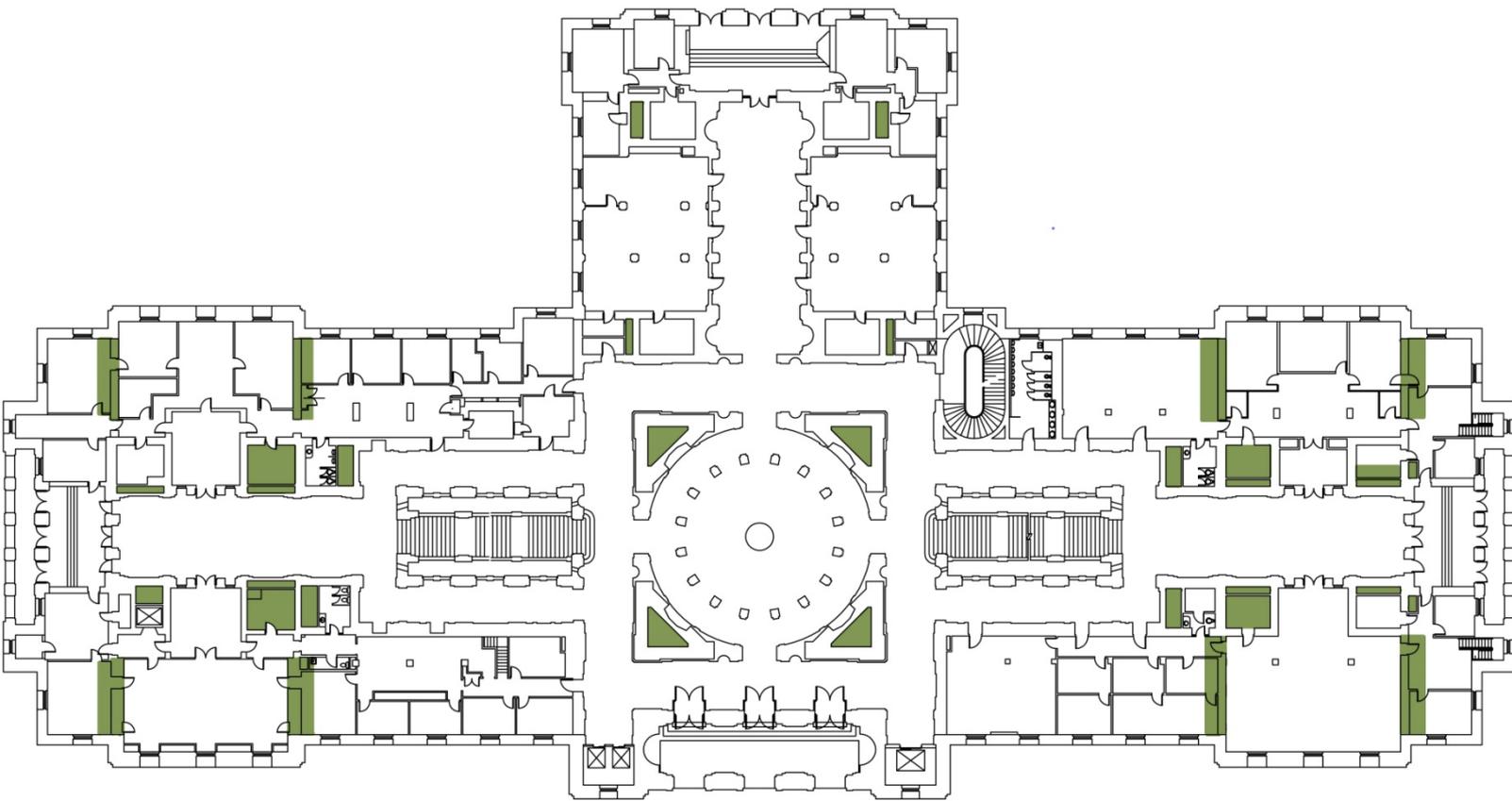
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**ENGINEERING STUDY OPPORTUNITIES**

- Blue square: Outside Air / Relief
- Orange rectangle: Equipment Space
- Yellow rectangle: Horizontal Distribution
- Green rectangle: Vertical Distribution
- Grey rectangle: Air Handling Units

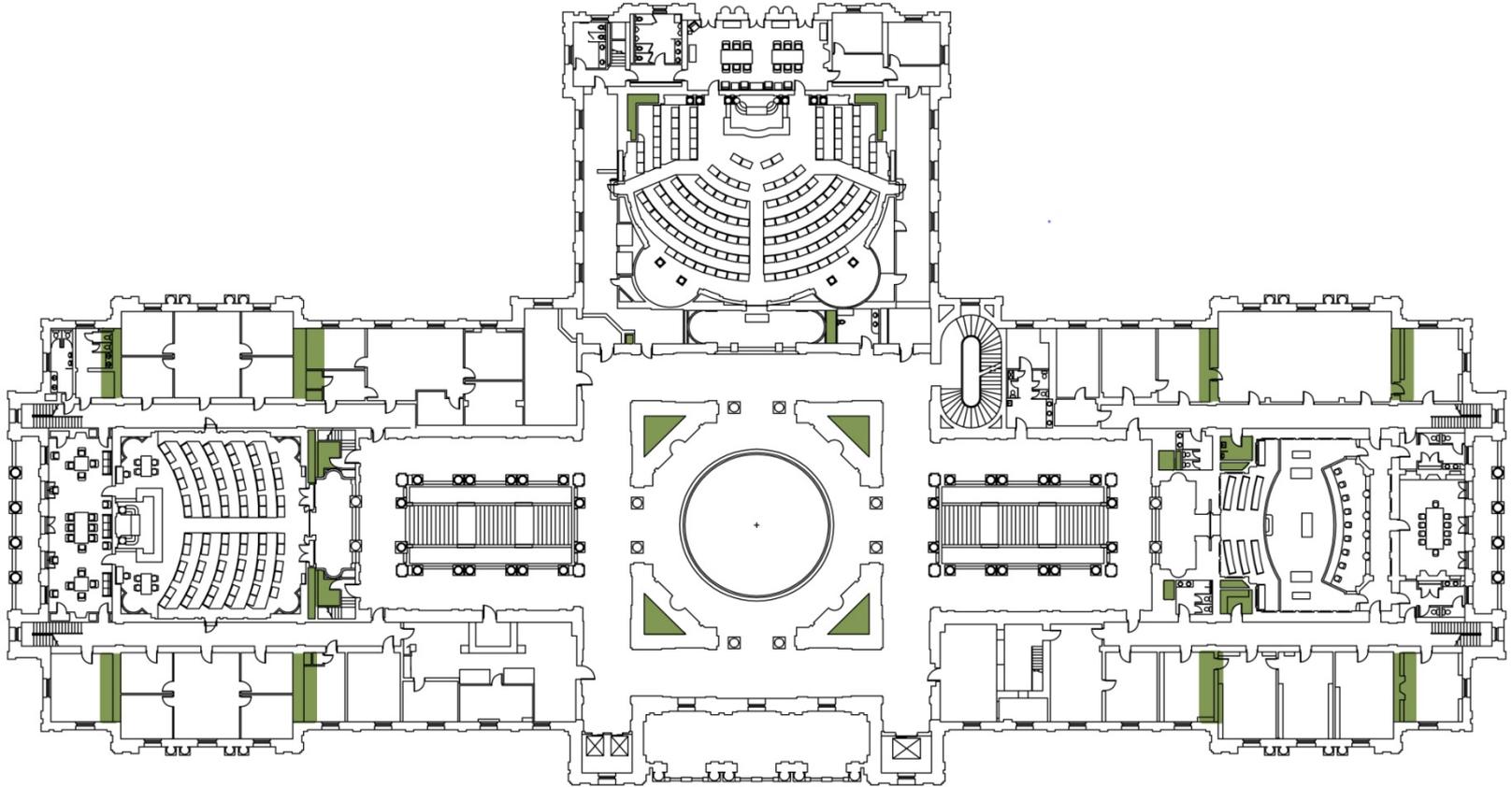
**GROUND FLOOR**



### ENGINEERING STUDY OPPORTUNITIES

- Blue square: Outside Air / Relief
- Orange square: Equipment Space
- Yellow square: Horizontal Distribution
- Grey square: Air Handling Units
- Green square: Vertical Distribution

# 1ST FLOOR



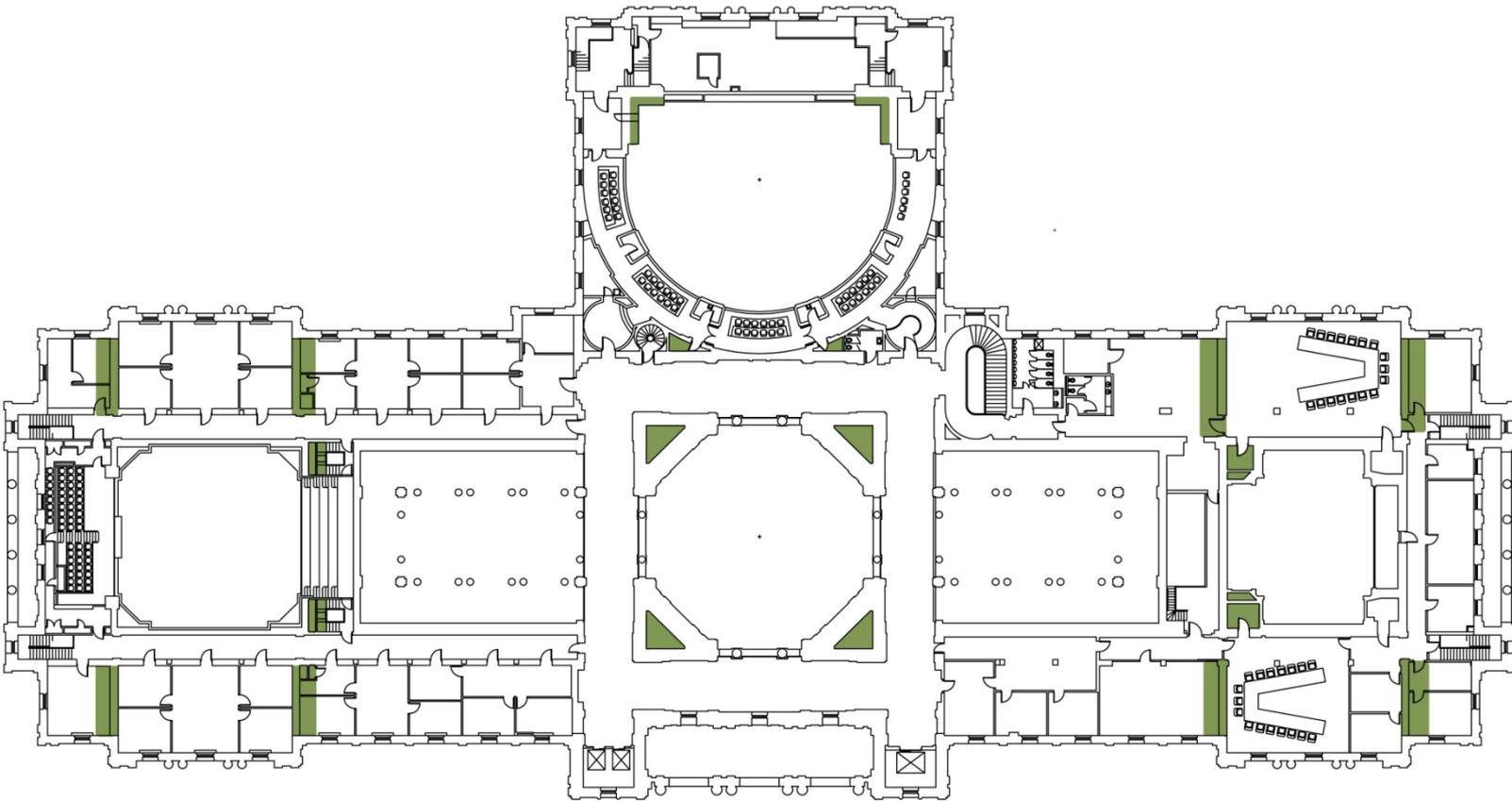
## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Horizontal Distribution
- Air Handling Units
- Vertical Distribution

# 2ND FLOOR



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### ENGINEERING STUDY OPPORTUNITIES

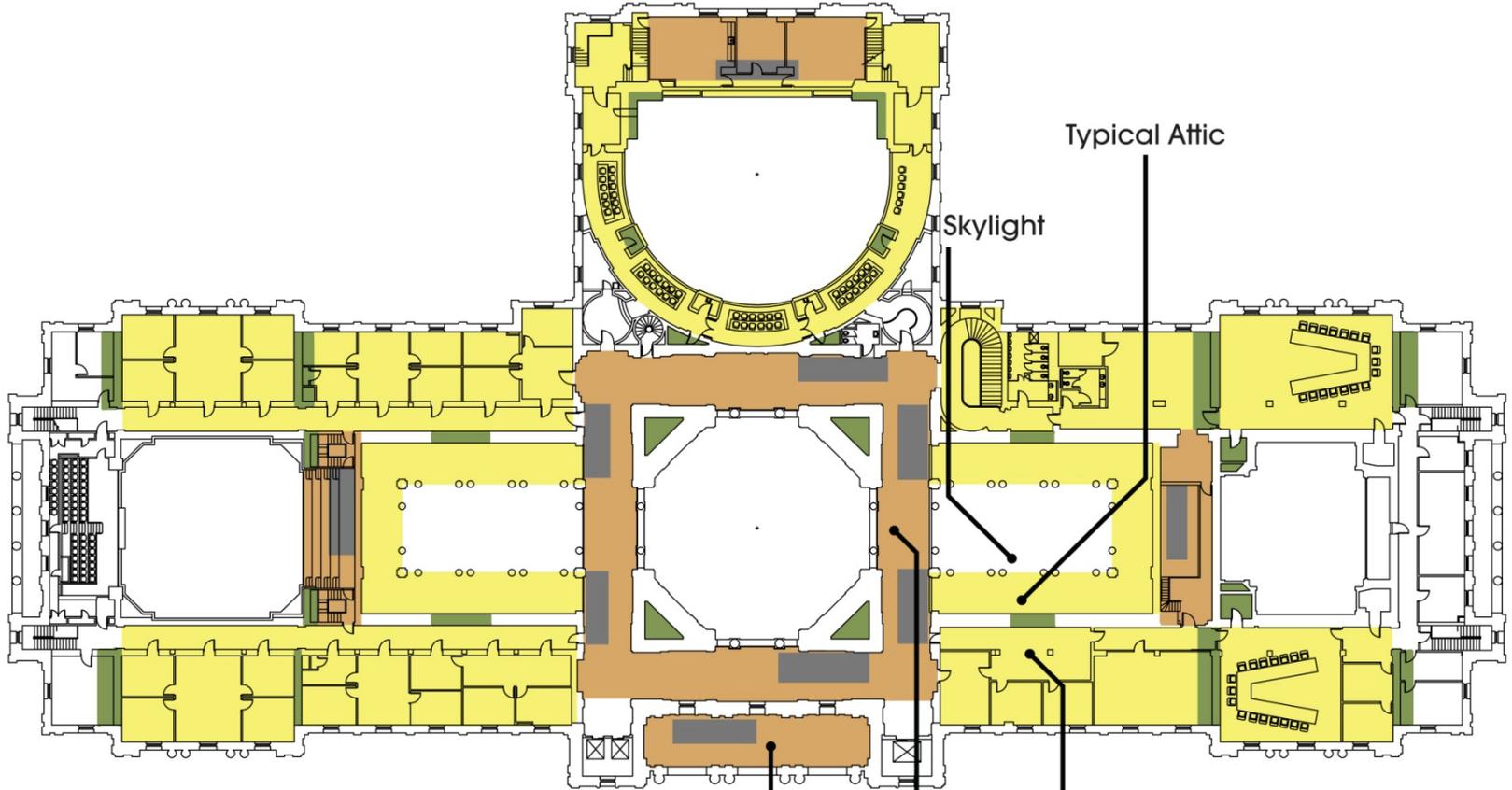
- Outside Air / Relief
- Equipment Space
- Horizontal Distribution
- Air Handling Units
- Vertical Distribution

# 3RD FLOOR





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## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Air Handling Units
- Horizontal Distribution
- Vertical Distribution

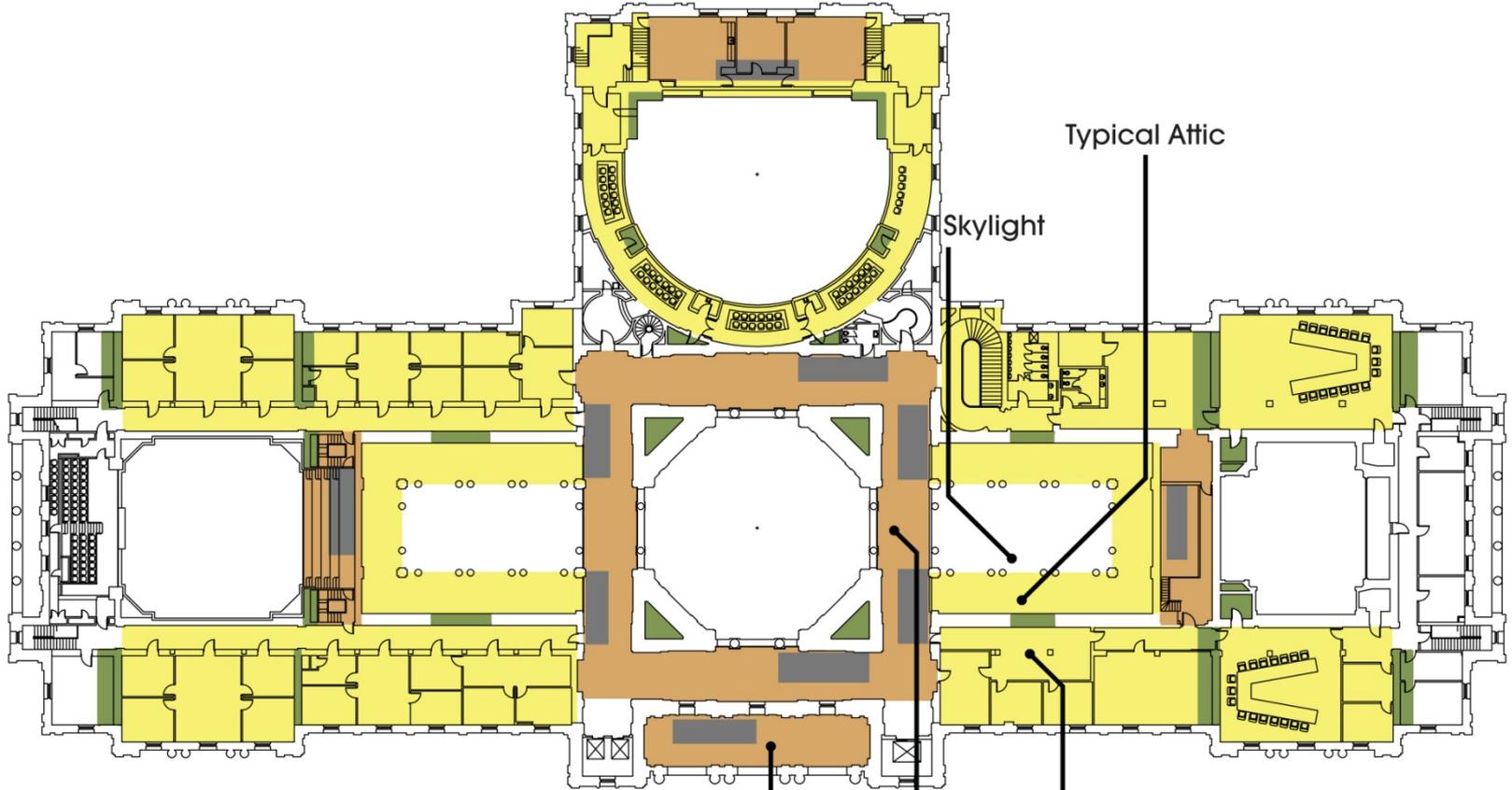
# 4TH FLOOR

# Base of Dome





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## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Horizontal Distribution
- Air Handling Units
- Vertical Distribution

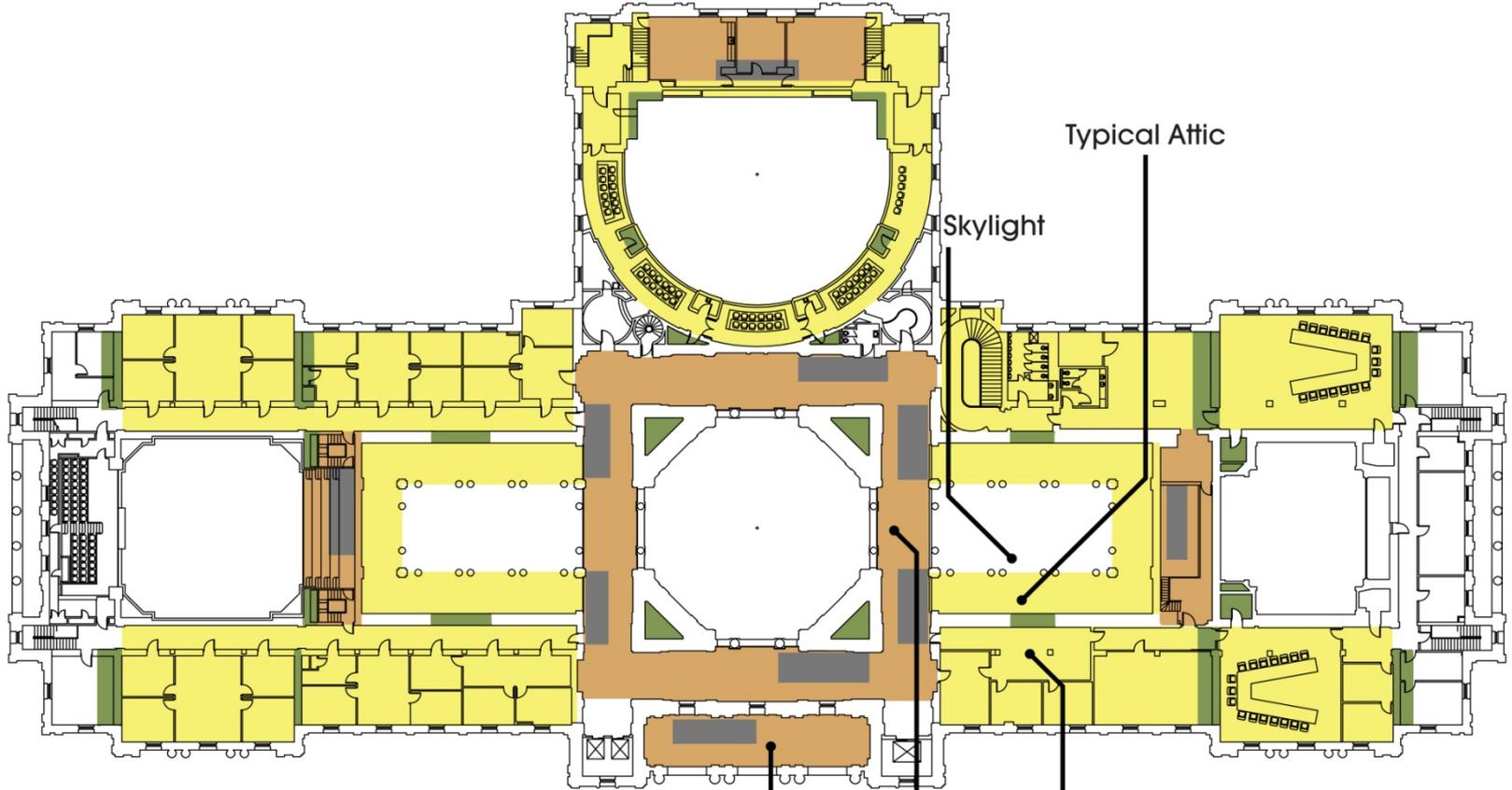
# 4TH FLOOR

# Under Horses





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## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Horizontal Distribution
- Air Handling Units
- Vertical Distribution

Under Horses

Base of Dome

Typical Attic

Skylight

Typical Attic

# 4TH FLOOR

Typical Attic

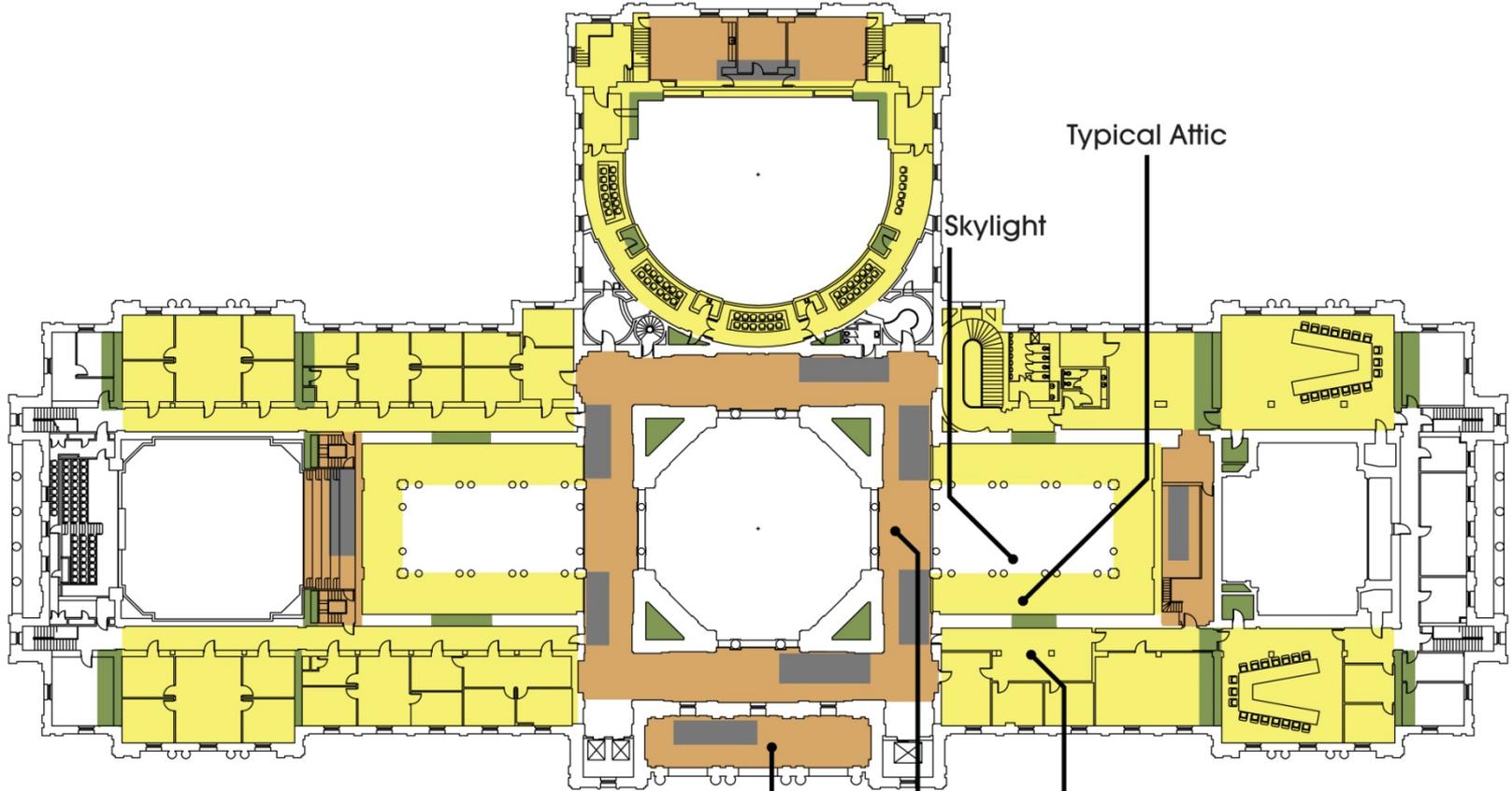


# Typical Attic





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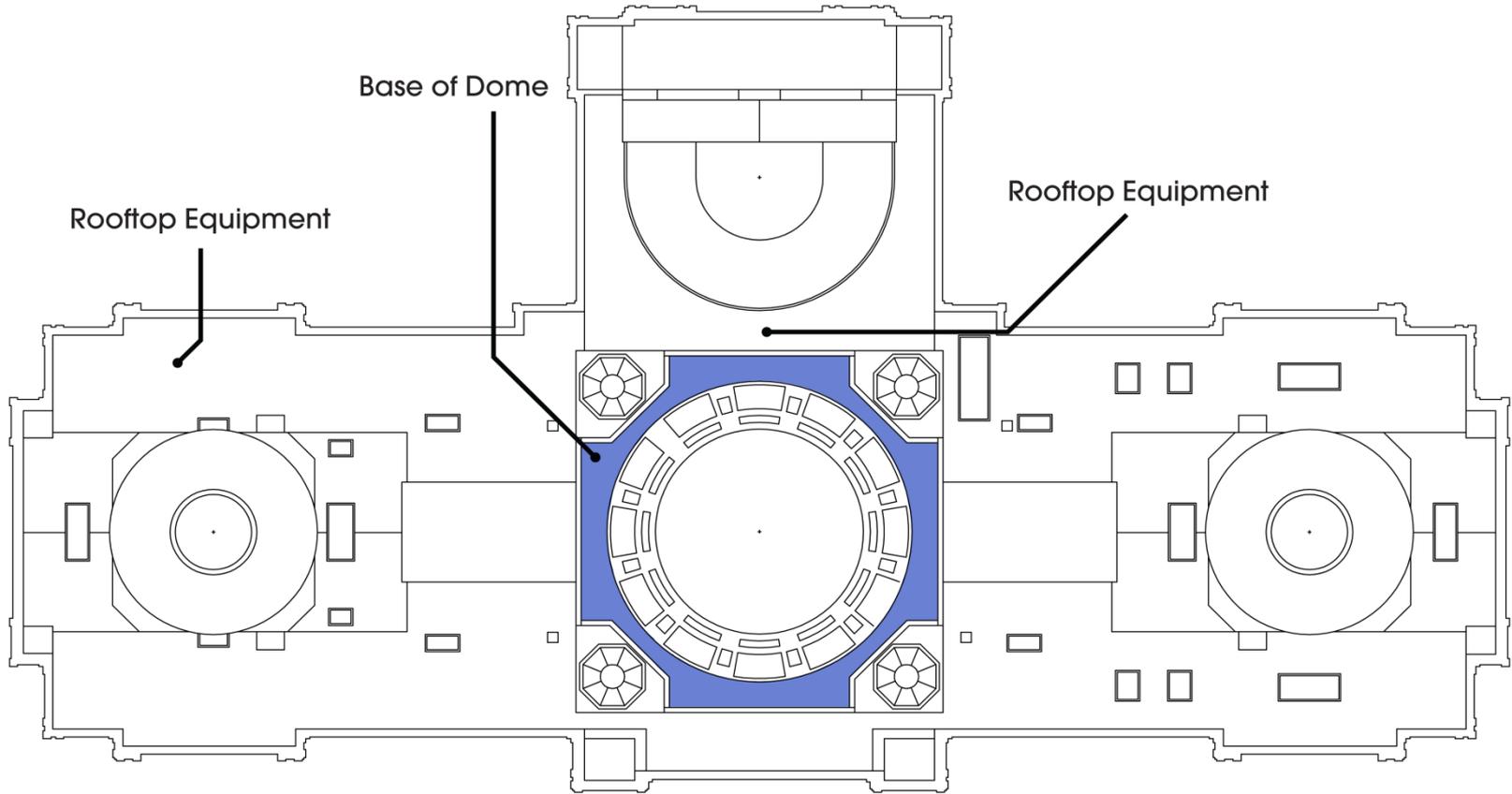
## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Air Handling Units
- Horizontal Distribution
- Vertical Distribution

# 4TH FLOOR

Skylight

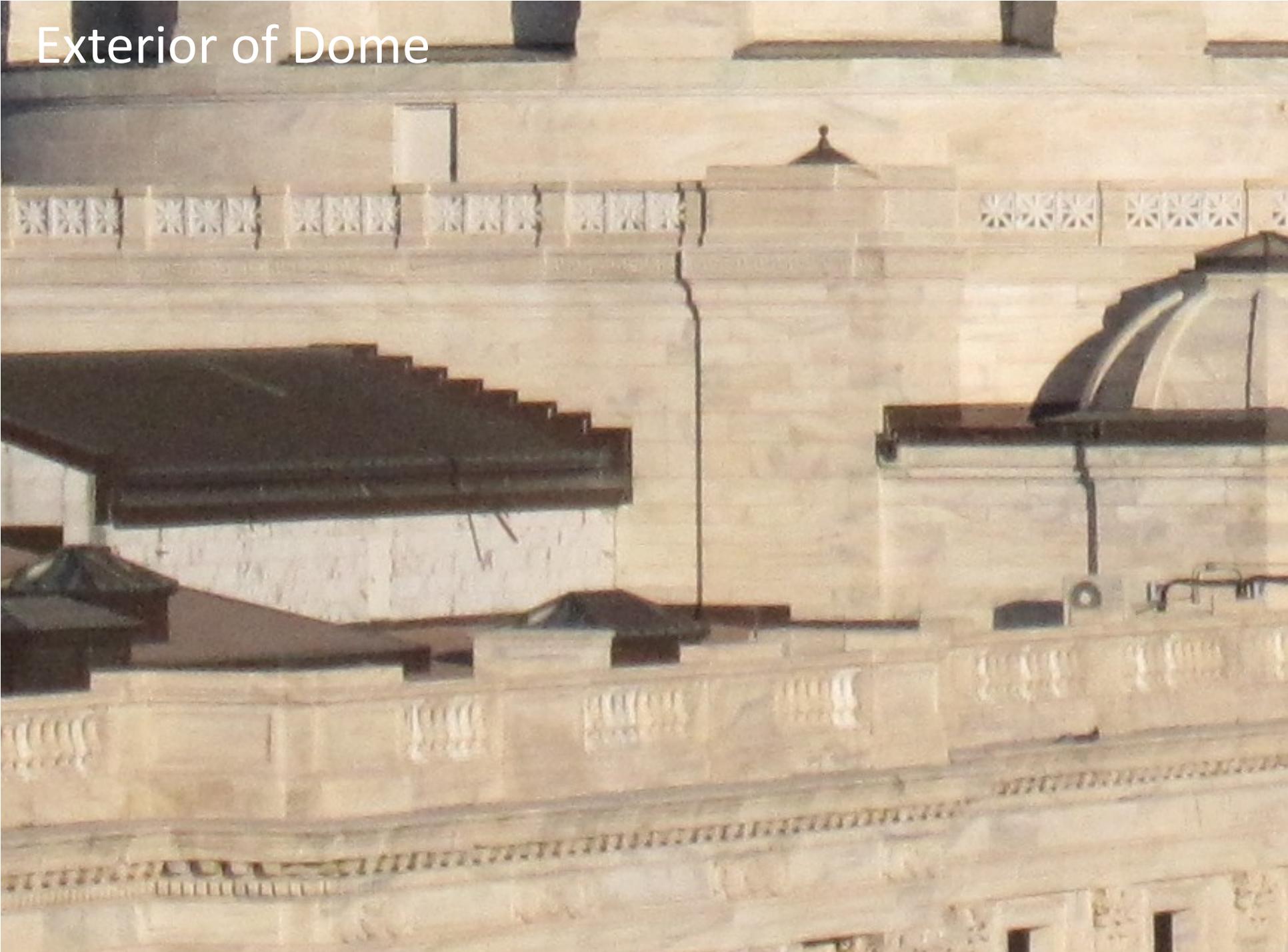


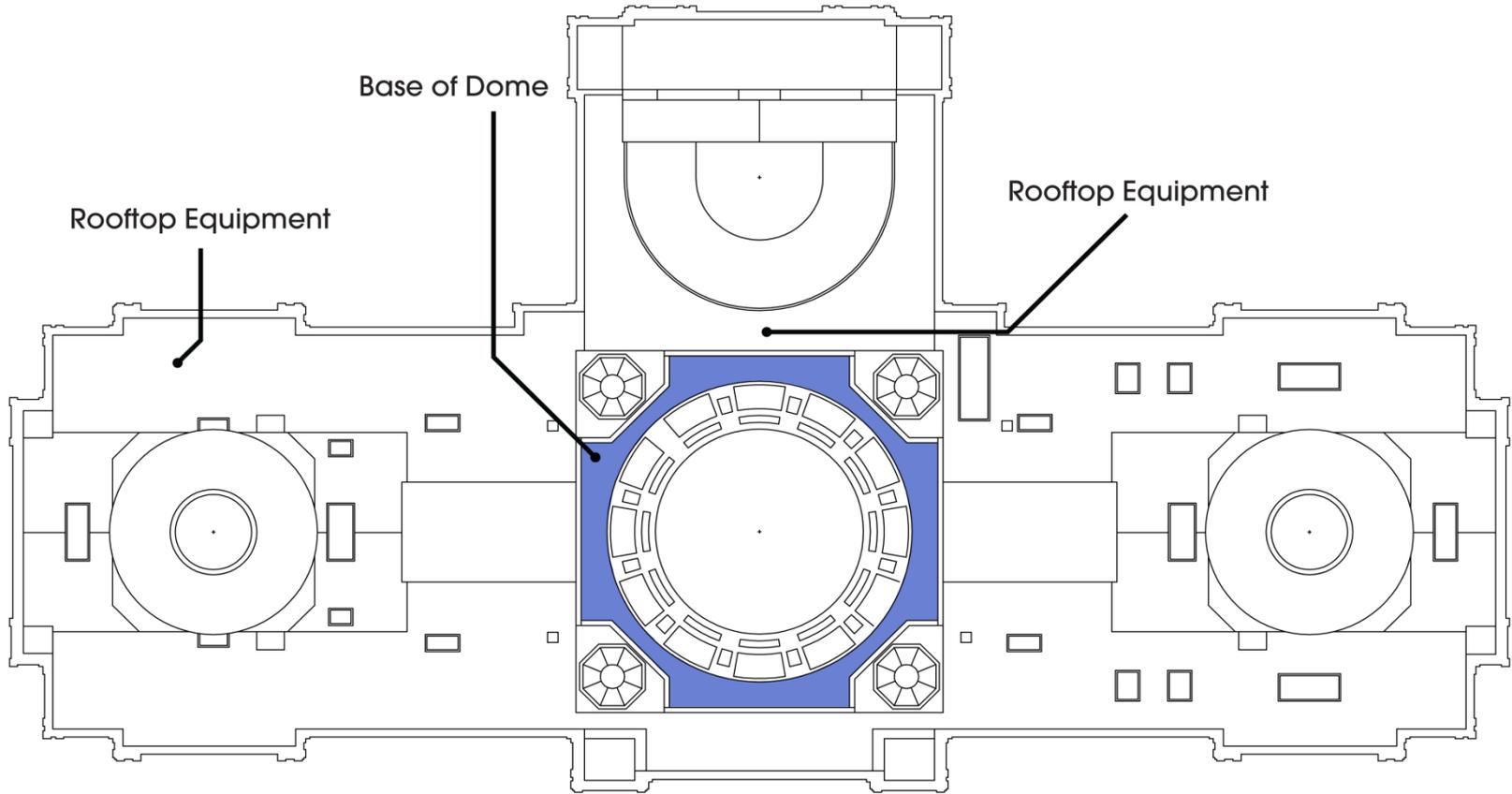


## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Air Handling Units
- Horizontal Distribution
- Vertical Distribution

Exterior of Dome





## ENGINEERING STUDY OPPORTUNITIES

- Outside Air / Relief
- Equipment Space
- Air Handling Units
- Horizontal Distribution
- Vertical Distribution

# Rooftop Equipment



# Rooftop Unit



# Building Needs Summary

FLOOR	AREA SERVED	DESCRIPTION	SYSTEM TYPE	AREA (SQ FT)	MIXED AIR SYSTEM SUPPLY AIR CFM	DE-COUPLED COOLING	
BASEMENT	BASEMENT NORTH	CAFETERIA	ZONED	11,590	8,700	2900	
	BASEMENT CAPITOL SECURITY	OFFICES	ZONED	8,945	6,700	2240	
	BASEMENT WEST STORAGE	STORAGE/MECHANICAL	ZONED	17,938	6,700	2240	
	BASEMENT WEST OFFICES	OFFICES	ZONED	7,217	5,400	1800	
	BASEMENT CENTER	STORAGE/MECHANICAL	ZONED	20,047	7,500	2500	
	BASEMENT EAST OFFICES	OFFICES	ZONED	7,277	5,400	1800	
	BASEMENT EAST STORAGE	STORAGE/MECHANICAL	ZONED	31,497	11,800	3940	
	BASEMENT HISTORICAL SOCIETY	OFFICES	ZONED	987	800	270	
	BASEMENT MAINTENANCE OFFICES	OFFICES	ZONED	1,082	800	270	
GROUND	GROUND FLOOR NORTHEAST	SENATE OFFICES	ZONED	8,260	8,700	2900	
	GROUND FLOOR SOUTHEAST	SENATE OFFICES	ZONED	5,600	7,100	2370	
	GROUND FLOOR NORTHWEST	SENATE OFFICES	ZONED	5,590	5,500	1840	
	GROUND FLOOR SOUTHWEST	GOVERNOR'S OFFICES	ZONED	5,845	7,000	2340	
	GROUND FLOOR CENTER-WEST COMMON	CORRIDORS	CV	8,864	4,500	N/A	
	GROUND FLOOR CENTER-EAST COMMON	CORRIDORS	CV	7,320	3,700	N/A	
	GROUND FLOOR CENTER	MULTIPURPOSE	CV	3,200	3,200	N/A	
1ST	GROUND FLOOR NORTH	SENATE OFFICES	ZONED	5,050	6,200	2070	
	1ST FLOOR NORTHEAST	HOUSE OFFICES	ZONED	5,230	5,500	1840	
	1ST FLOOR SOUTHEAST	SENATE OFFICES	ZONED	5,705	7,300	2440	
	1ST FLOOR NORTHWEST	ATT. GEN. OFFICES	ZONED	5,880	5,700	1900	
	1ST FLOOR SOUTHWEST	GOVERNOR'S OFFICES	ZONED	5,735	6,900	2300	
	1ST FLOOR CENTER-WEST COMMON	CORRIDORS/ATRIUM	CV	11,145	5,600	N/A	
	1ST FLOOR CENTER-EAST COMMON	CORRIDORS/ATRIUM	CV	11,165	5,600	N/A	
	1ST FLOOR NORTH	SENATE OFFICES	ZONED	6,410	7,700	2570	
	2ND FLOOR NORTHEAST	HOUSE OFFICES	ZONED	4,400	4,600	1540	
2ND	2ND FLOOR SOUTHEAST	SENATE OFFICES	ZONED	4,920	4,900	1640	
	2ND FLOOR NORTHWEST	SENATE OFFICES	ZONED	4,830	4,700	1570	
	2ND FLOOR SOUTHWEST	SENATE OFFICES	ZONED	4,740	5,700	1900	
	2ND FLOOR CENTER-WEST COMMON	CORRIDORS/ATRIUM	CV	9,100	4,500	N/A	
	2ND FLOOR CENTER-EAST COMMON	CORRIDORS/ATRIUM	CV	9,045	4,500	N/A	
	2ND FLOOR WEST	SENATE RETIRING ROOMS	ZONED	1,008	1,500	500	
	2ND FLOOR NORTH	HOUSE RETIRING ROOMS	ZONED	3,953	4,700	1570	
	2ND FLOOR EAST	SUP. COURT RETIRING ROOMS	ZONED	1,017	1,500	500	
	2ND & 3RD FLOOR SENATE CHAMBERS	SENATE CHAMBERS	CV	3,080	4,300	N/A	
	2ND & 3RD FLOOR HOUSE CHAMBERS	HOUSE CHAMBERS	CV	4,166	5,600	N/A	
	2ND & 3RD FLOOR SUPREME COURT	SUP. COURT CHAMBERS	CV	2,280	3,600	N/A	
	3RD	3RD FLOOR NORTHEAST	HOUSE OFFICES	ZONED	6,385	7,000	2340
		3RD FLOOR SOUTHEAST	SENATE OFFICES	ZONED	4,275	5,500	1840
3RD FLOOR NORTHWEST		SENATE OFFICES	ZONED	4,810	4,700	1570	
3RD FLOOR SOUTHWEST		SENATE OFFICES	ZONED	4,705	5,700	1900	
3RD FLOOR CENTER-WEST COMMON		CORRIDORS/ATRIUM	CV	8,490	4,200	N/A	
3RD FLOOR CENTER-EAST COMMON		CORRIDORS/ATRIUM	CV	8,845	4,400	N/A	
3RD FLOOR HOUSE BALCONY		HOUSE CHAMBERS SEATING	ZONED	2,765	2,300	N/A	
3RD FLOOR NORTH		HOUSE MISC.	ZONED	2,517	3,000	1000	
4TH	4TH FLOOR NORTH	HOUSE MISC.	ZONED	1,280	1,500	500	

# MEP Systems Study

- Two System Approaches:
  - **Mixed Air System** – a traditional approach of re-circulating building air mixed with a portion of fresh air. Requires standard size ductwork and equipment.
  - **De-coupled Cooling Systems** – new more efficient approach delivers a high concentration of fresh air for ventilation. Less air is circulated requiring smaller equipment and ductwork. Devices located in each room provide temperature control.

# Mixed Air Systems

- **Advantages**

- Chilled water piping routed to centralized locations
- All new systems work within the building footprint
- Reasonably efficient to operate
- Systems capable of air side free cooling
- Cleans up roof of existing mechanical equipment

- **Challenges**

- Maintaining effective mechanical service areas
- Integrating horizontal/vertical distribution into the design
- Integration of the exterior duct enclosures
- Smoke management system approach

# De-coupled Cooling Systems

- **Advantages**

- Smaller equipment and ductwork easier to integrate into design
- All new systems work within the building footprint
- Central unit heat recovery/better energy performer
- Most outside air intakes located on the roof
- Smaller outside air connections
- Cleans up roof of existing mechanical equipment

- **Challenges**

- Integration chilled beams into ceiling or wall design
- Integration of the exterior duct enclosures
- Integrating horizontal/vertical distribution into the building
- Smoke Management Systems approach.

Agenda Item 3

# **INTERVIEWS & FUNCTIONAL DIAGRAM FINDINGS**

# Finding From the Diagramming Exercise

## Committee Rooms and Conference Committee Rooms

- There is a majority that feel that additional rooms that are well organized would serve the public and legislature better.
- The building columns impose limitation on these spaces.

*In the Restoration, spaces should be identified that limit the number and location of columns.*

# Finding From the Diagramming Exercise

## The Capitol's configuration limits collaboration with Members and Constituents

- Having Senators spread throughout the Capitol makes it hard on constituents and first time visitor to easily find senators.
- Collaboration between Senators is planned rather than naturally occurring due to physical locations.

*Restoration should consider improving the physical relationships.*

# Finding From the Diagramming Exercise

## The Capitol is the Peoples House

- School Buses and loading and unloading creates problems for both security and tours, staging and movement.
- Visitors expect to see government in action in the capitol and see the Capitol as the focal point of the legislative session.

*The restoration should accommodate school buses as well as providing better accommodations for visitors to witness the session.*

# Finding From the Diagramming Exercise

## Acoustics and Technology is lacking

- Acoustics within the Committee rooms and some Conference Committee rooms need to be improved for the Public to better participate.
- Technology for Presentation needs to be provided as a standard for the Committee Rooms.
- Communications systems (wifi) should be provided

*Restoration should improve on acoustics and technology.*

# Finding From the Diagramming Exercise

## Proximity of House Chamber to the Senate Chamber

- Critical to move information physically between the bodies quickly (minutes).
- Physical configuration of the building limits this by forcing people to move through the crowded public spaces.

*The building remodel should facilitate this movement.*

# Finding From the Diagramming Exercise

## 100 year Focus – the Capitol will benefit Minnesota for many years to come

- “...it is about doing what is right for the people of Minnesota for the next 100 years.”
- All decisions from office location and occupancy to materials and equipment should be considered to be 100 years decisions.

*The restoration should be a 100 year restoration*

Acceptance

# ACCEPTANCE OF FINDINGS

Agenda Item 4

# **FUNCTIONAL COMPARISON WITH OTHER CAPITOLS**

# Functional Comparison with other Capitols

The following Capitols were used in the analysis because they have been through some level of Restoration:

- California
- Idaho
- Kansas
- Michigan
- Oklahoma
- South Carolina
- Texas
- Utah
- Virginia
- Washington
- West Virginia
- Wisconsin

# Minnesota Legislature

	<b>Average of the 13 Comparison Capitols</b>	<b>Minnesota Capitol</b>
<b>Total Senators</b>	38	67
<b>Senators in Capitol</b>	46% Have All (37) 31% Leaders (38) 23% Have None (47)	55% of the Senate (37)
<b>total House members</b>	102	134
<b>House in Capitol</b>	54% Have All (103) 31% Leaders (96) 15% Have None (112)	0% of the House (134)
<b>Committee Rooms</b>	10	5 CR, 2 CCR, 1 swing

# Minnesota Executive/Judiciary

	<b>Average of the 13 Comparison Capitols</b>	<b>Minnesota Capitol</b>
Governor office	100% in Capitol	yes
Lt. Governor	100% in Capitol	Yes
Courts in Capitol	15% in Capitol	Yes Monthly
Attorney General	31% in Capitol	Yes
Secretary of State	38% in Capitol	No
Auditor	23% in Capitol	No
Treasurer	31% in Capitol	No
Tours and History	85% in Capitol	Yes
Classroom for Edu.	31% in Capitol	No
Gift Store	85% in Capitol	No

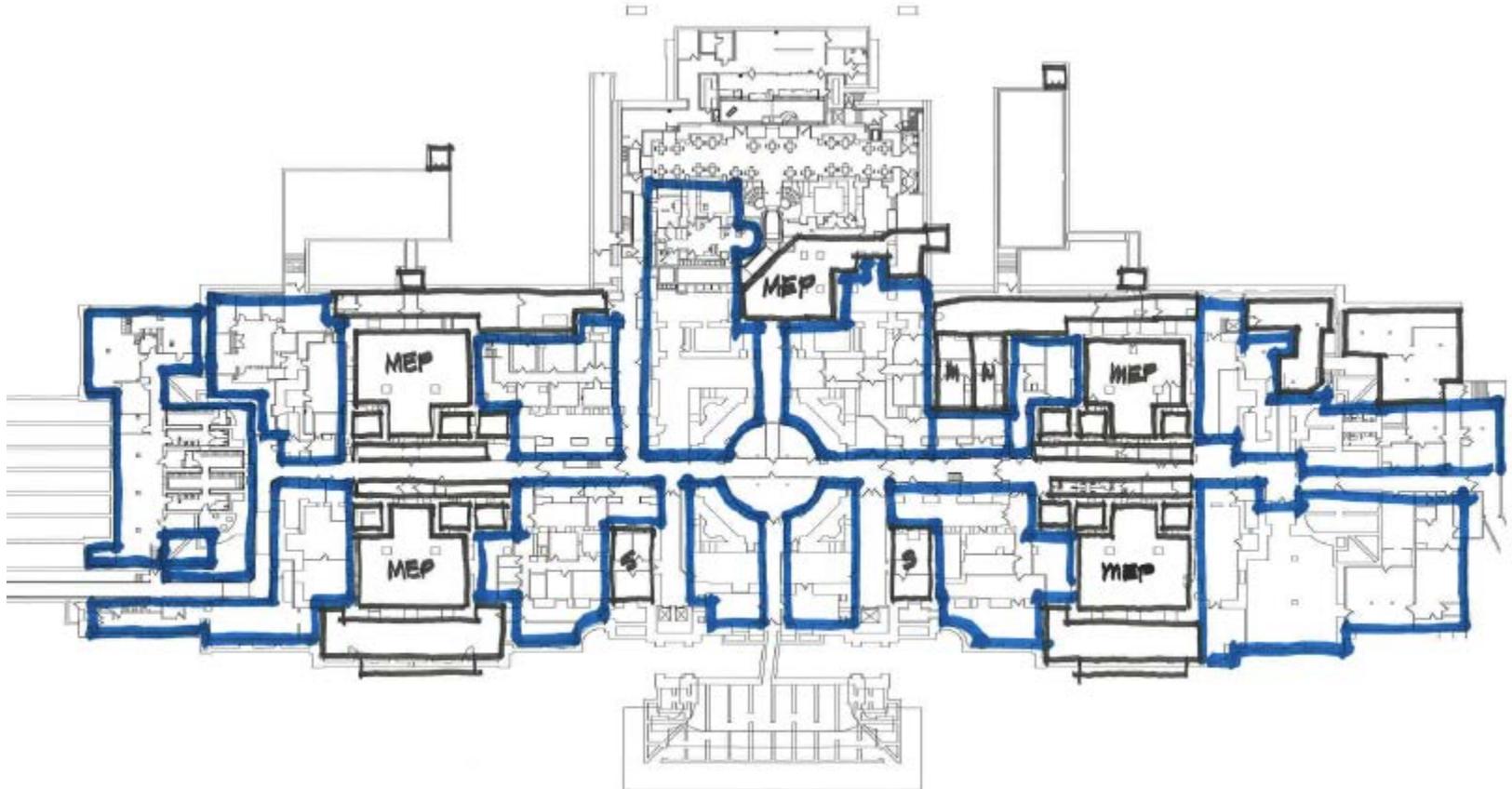
Agenda Items 5

# SCENARIO DISCUSSION

# Reduced Useable Square Footage

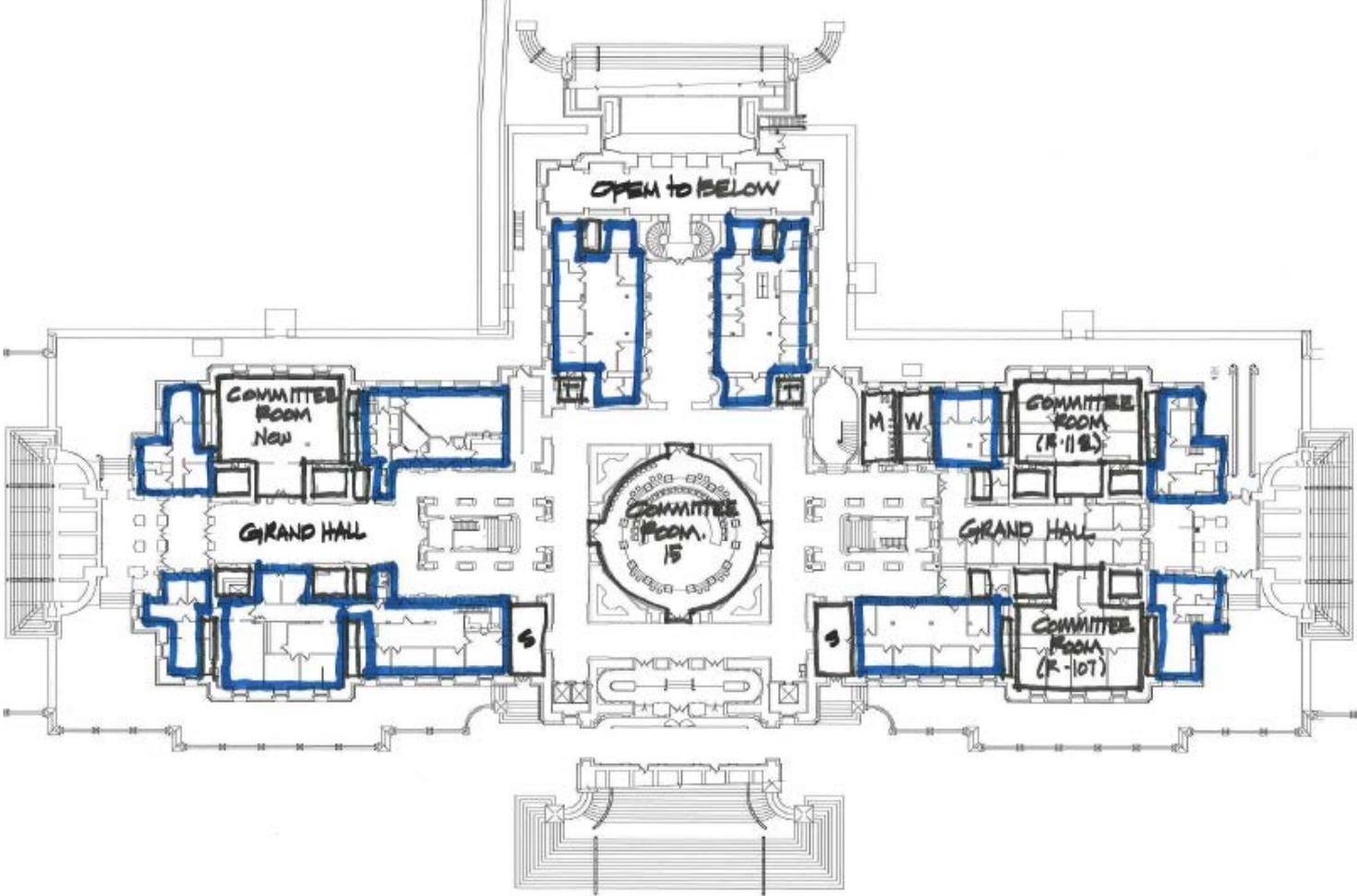
- Mechanical & Electrical
- Restrooms
- Exit Stairways
- Returned Public Space
- Possible additions or expansions to existing Committee and Committee Conference Rooms

# Basement Available Space

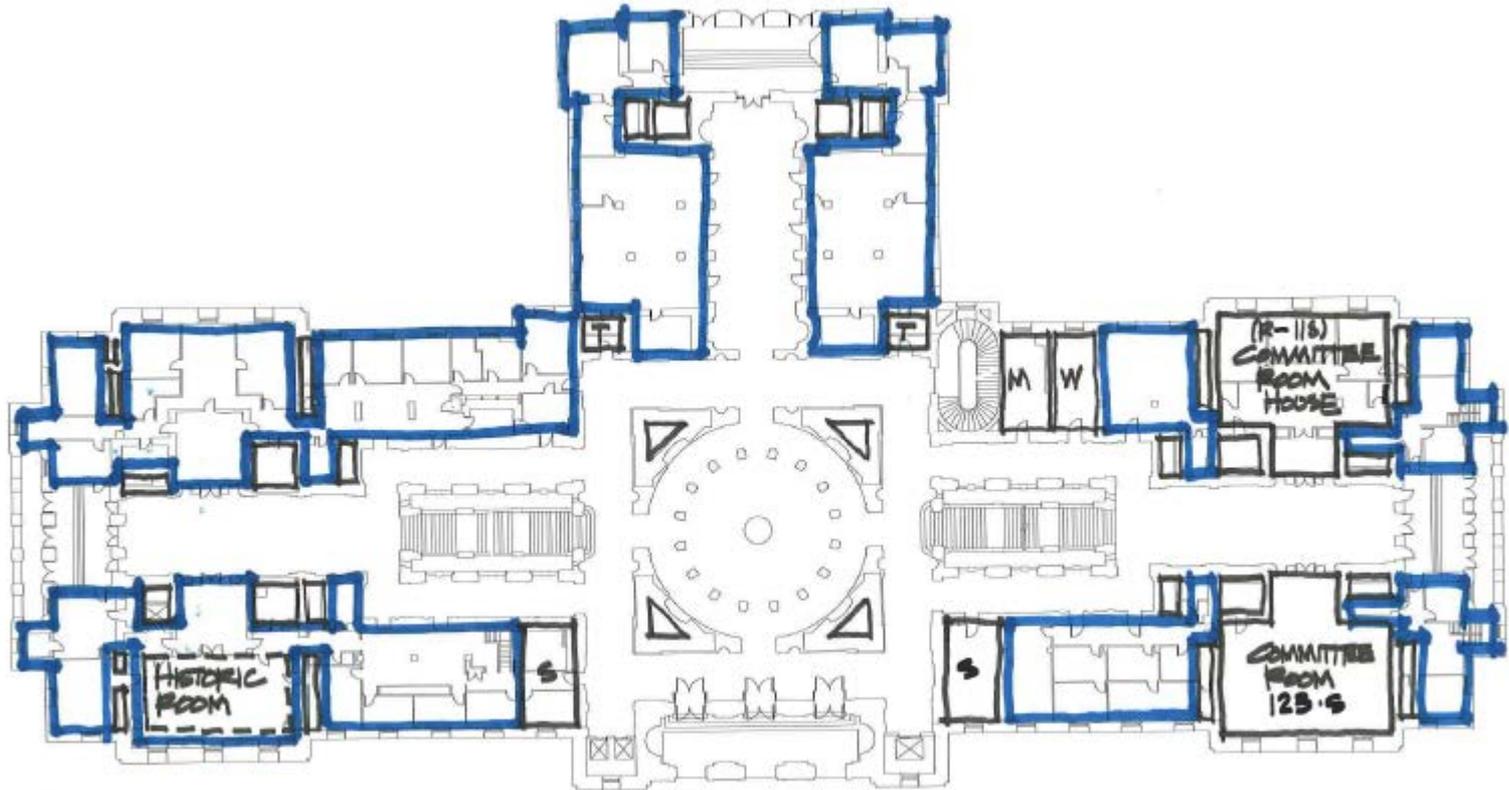


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# Ground Floor Available Space

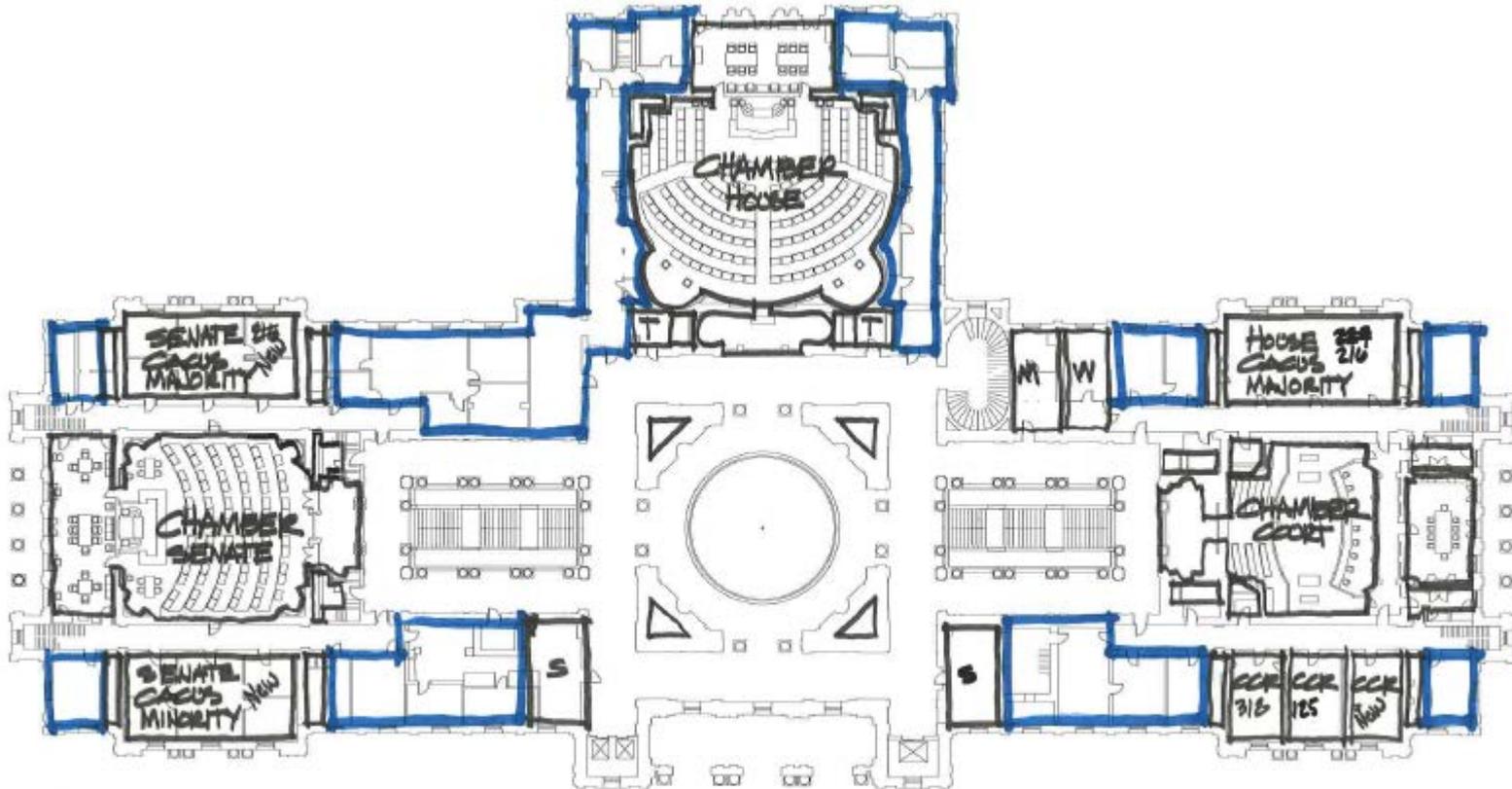


# First Floor Available Space



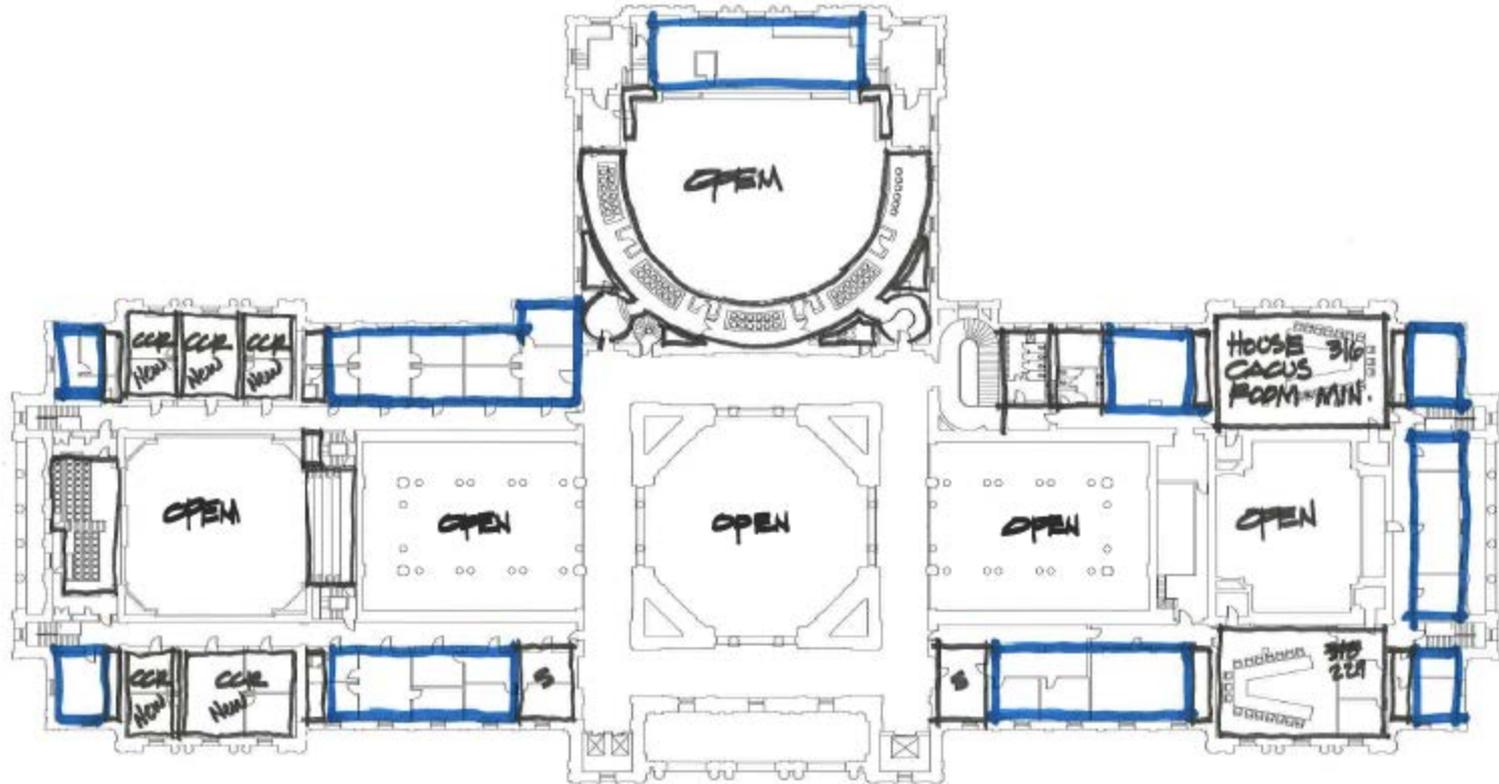
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# Second Floor Available Space



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# Third Floor Available Space



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# Other Space Changes

Floors	Current	Future	Percent change
Basement	105,946 SF	92,043 SF	-13%
Ground	37,811 SF	28,114 SF	- 26%
First	24,908 SF	28,566 SF	14%
Second	19,562 SF	12,036 SF	-38%
Third	20,324 SF	13,515 SF	- 34%
<b>Totals</b>	<b>208,551 SF</b>	<b>174,272 SF</b>	<b>- 16%</b>

A General Reduction of Square Footage is due to:

1. Stairs (Required – Code)
2. Restrooms (Required –Code)
3. Mechanical, Electrical and Plumbing (Required by Code, Life Safety)
4. Meeting Space (Flexibility)

# Possible Proposed Uses

- Staff – Legislative – Partisan vs. Non Partisan
- Senate Leadership
- Senate Committee Chair
- Senate Majority
- Full Senate
- Constitutional Office Holders
- More Meeting Space
- Education Space
- Public Space

# Scenarios

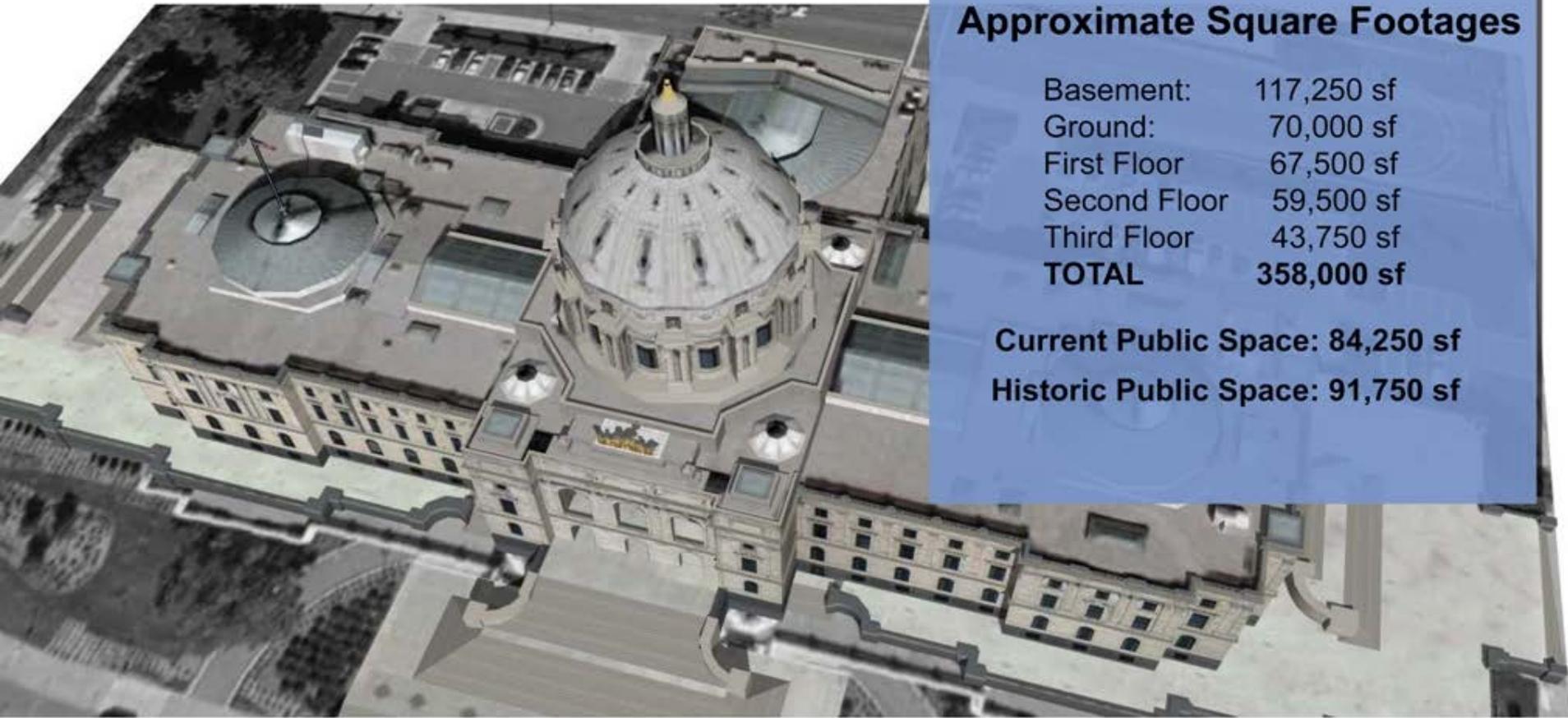
What Scenarios Should be investigated?

Agenda Item 6

# **NEXT STEPS**

# Estimating Process

- Benchmark study for general understanding
  - Average \$163,000 at \$600.00 SF
  - Minnesota \$198,000 at \$523.00 SF
- Estimator has walked the building
- Building Square footage breakdown
  - Historic
  - Public
  - Functional
- Mechanical/Electrical concept progressing
- Scope Development is underway (Discussions)



## Approximate Square Footages

Basement:	117,250 sf
Ground:	70,000 sf
First Floor	67,500 sf
Second Floor	59,500 sf
Third Floor	43,750 sf
<b>TOTAL</b>	<b>358,000 sf</b>

**Current Public Space: 84,250 sf**

**Historic Public Space: 91,750 sf**

Minnesota State Capitol  
Public Space Allocation

**MOCA**

**MOCA**

Approximately 117,292 sf Total

Public Space: 8,015 sf

Historic Space: 3,331 sf

Meeting Space: 0 sf

Office Space: 105,946 sf



Minnesota State Capitol - Basement Floor  
Restoration Space Definition

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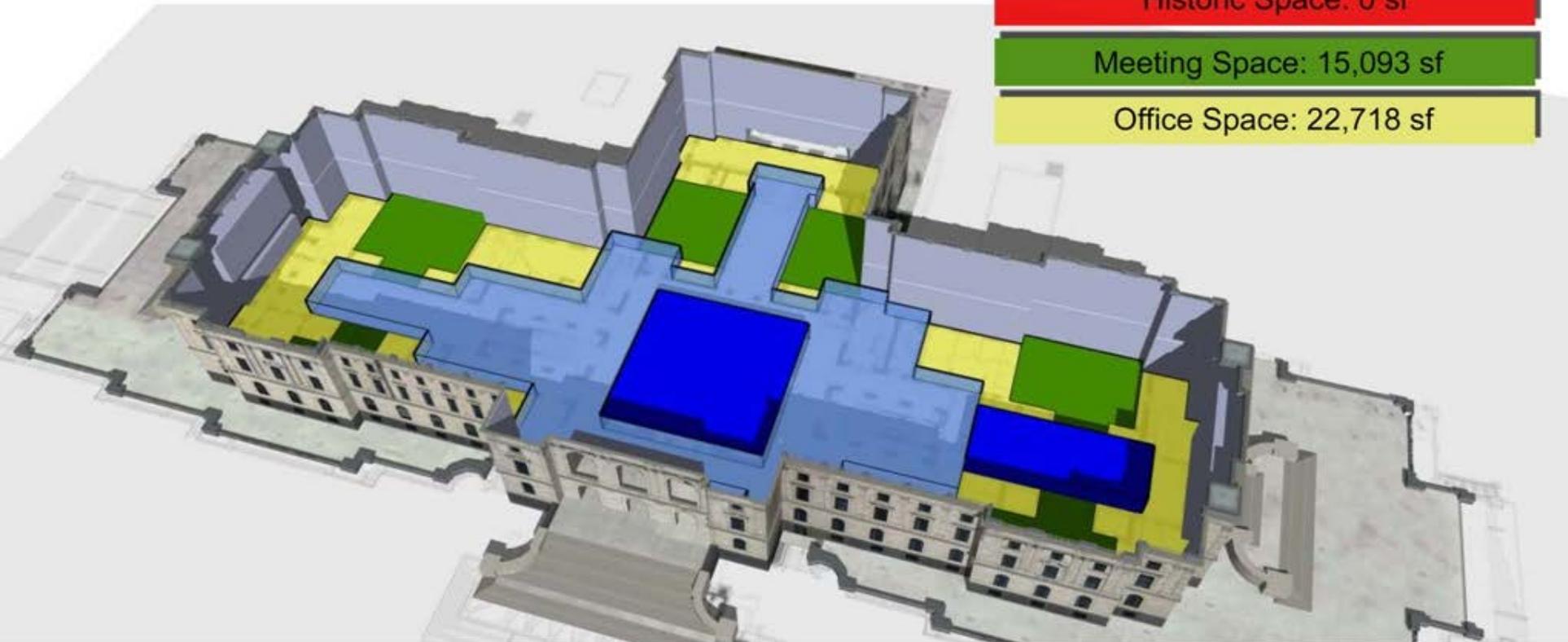
Approximately 68,460 sf Total

Public Space: 30,649 sf

Historic Space: 0 sf

Meeting Space: 15,093 sf

Office Space: 22,718 sf



Minnesota State Capitol - Ground Floor  
Restoration Space Definition

**MOCA**

Approximately 67,140 sf Total

Public Space: 29,067 sf

Historic Space: 3,548 sf

Meeting Space: 9,617 sf

Office Space: 24,908 sf



Minnesota State Capitol - First Floor  
Restoration Space Definition

**MOCA**

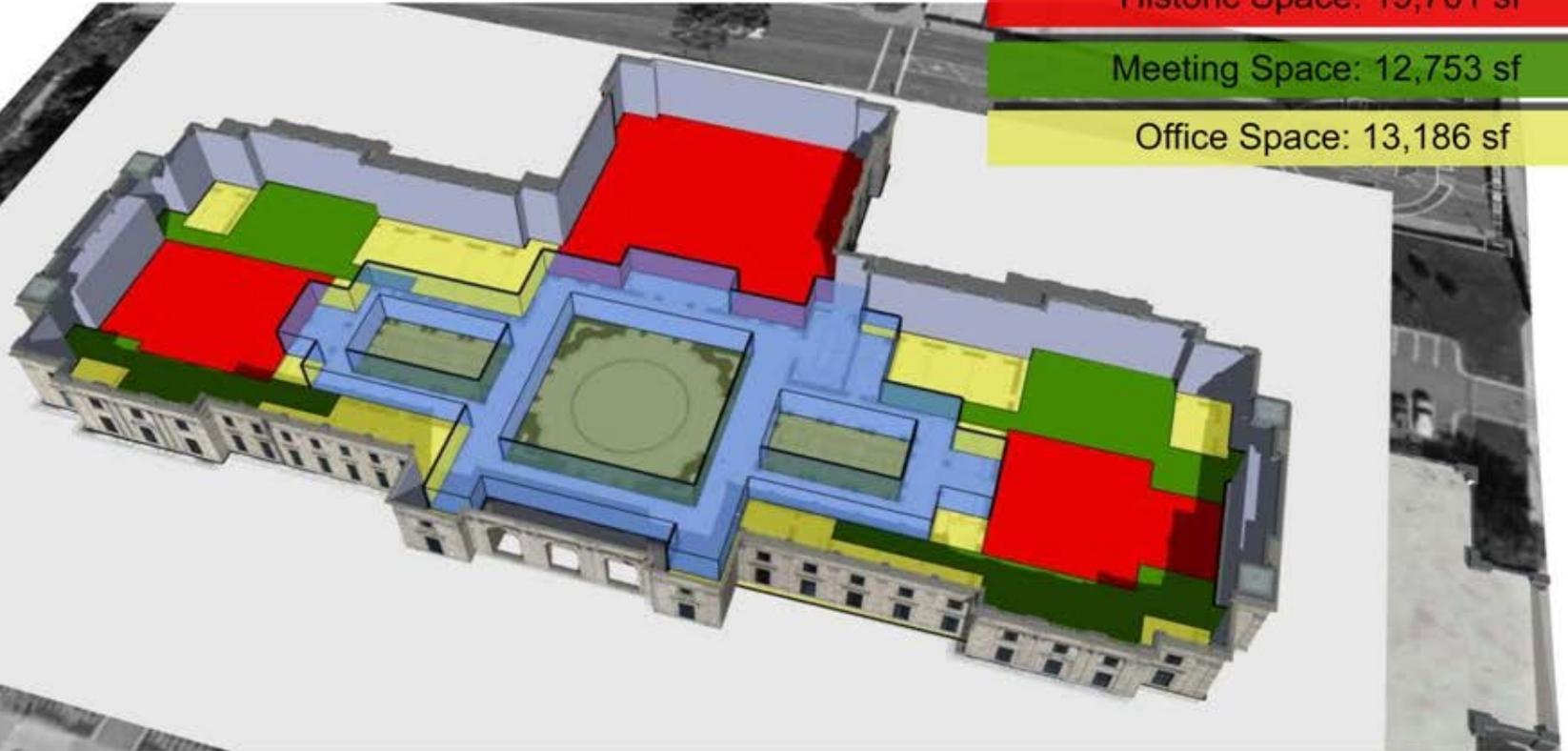
Approximately 59,609 sf Total

Public Space: 13,969 sf

Historic Space: 19,701 sf

Meeting Space: 12,753 sf

Office Space: 13,186 sf

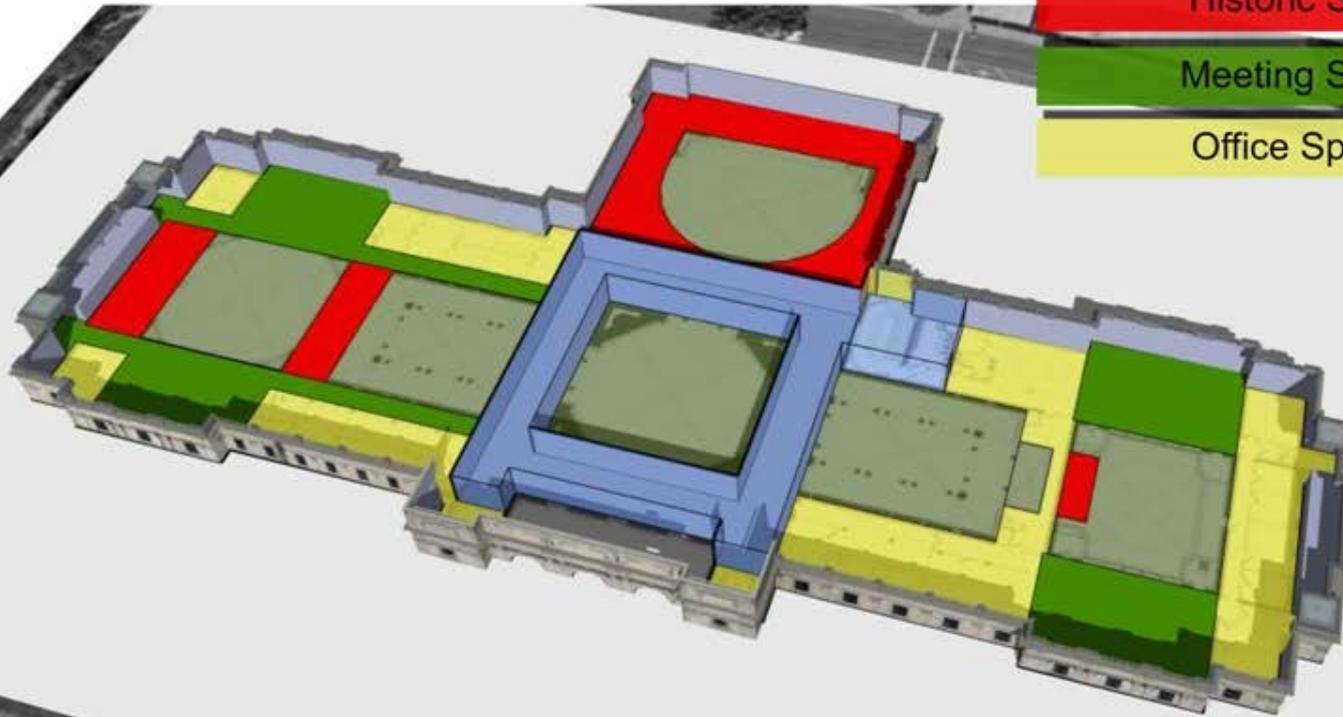


Minnesota State Capitol - Second Floor  
Restoration Space Definition

**MOCA**

Approximately 43,778 sf Total

- Public Space: 8,088 sf
- Historic Space: 9,706 sf
- Meeting Space: 11,319 sf
- Office Space: 14,665 sf



Minnesota State Capitol - Third Floor  
Restoration Space Definition



# Budget Next Steps

- Identify large cost Items
  - Decorative Painting
  - Historic Materials Restoration
    - Windows, Stone & Plaster
  - Lighting
    - Historic Restoration
    - New Historic Family Fixtures
    - New High performance fixtures
  - Exterior Stone Restoration and Repair

# Non Code Compliant items

## **Stairways and doors**

- Handrails on the steps
- Tread to riser ratio
- Panic hardware on the doors
- Obstructions in the hallways
- Travel distance (evacuation route)

## **Lighting, Signage, Cameras, Notification Systems**

- Emergency lighting
- Emergency exit signs
- Security cameras
- Motion detectors
- Notification system

# Budget Wrap Up

- Determine Rough order magnitude costs from both existing work on Capitol and other similar project on other capitols.
- Compute general space costs
- Mechanical/Electrical Costs
- Repair and Renovation Costs
- Provide Contingency of 10% for unknown conditions
- Escalate to mid point of Construction
- Finalize the Budget.

# Budget Questions

- Furniture – Provide New or Reuse Existing?
- Technology – Teleconference, Video Meetings?
- Swing Space – Should this be included?
- Opening Costs – What type of grand reopening do you want?
- Communication or Public Relation costs?

# Next Steps

- Scheduling Subcommittee Meetings
- Next Full Commission Meeting January 11, 10am-12pm
- Report to Legislature due January 15, 2012
- Resources:  
[www.admin.state.mn.us/recs/capitol/capbldg.html](http://www.admin.state.mn.us/recs/capitol/capbldg.html), and  
Future Legislative Coordinating Commission website