

Minnesota State Capitol

Repairs, Restoration & Preservation

SCB-02CB0015



SCHEMATIC DESIGN REPORT

Updated June 27, 2013

Prepared by:



capitol restoration collaborative

With Contributions from:

Summit Fire Consulting - Wiss, Janey, Elstner Associates - Schuler Shook
LV Engineering LLC - Sebesta Bloomberg

HGA Commission Number 0476-061-00



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1.1 Section 1 Architectural Summary Statement

1. Section 1: Summary Statement

The Minnesota State Capitol was placed on the *National Register of Historic Places* in 1972 and, therefore, special requirements for this Project include meeting all State and national historic preservation standards. The project scope is intended to be accomplished with little or no visible impact to the exterior or interior public spaces of the original Cass Gilbert design. All renovation work will meet Secretary of Interior Standards for the Treatment of Historic Properties and State Historic Preservation Office requirements and is subject to review by the Capitol Area Architectural and Planning Board (CAAPB), Minnesota Historical Society (MHS) and the State Historical Preservation Office (SHPO.)

2. The Capitol as Originally Constructed

The Capitol was constructed to house virtually all the central Administrative, Executive, Judicial and Legislative functions of the State. As built, it was occupied by a wide variety of stakeholders, the largest being the Supreme Court, the House of Representatives, the Senate, the Governor's Office, and the Historical Society.

What is now called the Basement (Terrace Level) was unfinished at the time of construction. The only occupied space at this time was the restaurant, or 'Rathskeller,' in the North end of the North Wing, and a central corridor with its access stairs beneath the grand stairs in the East and West Wing.

The floors above are all designed around an inverted T-shaped ceremonial space that includes the Rotunda at its center, with grand stairs to the East and West, rising to the Supreme Court and Senate respectively, with the House Chambers to the North facing the main entrance to the South. Offices and Support spaces cluster around each Chamber and within the length of each wing.

The Ground Floor is distinctive in having an extensive Guastavino vaulting system in its public spaces. In other respects, it is similar to the other floors.

The First Floor has the Governor's Office, Vestibule and Reception Room that are decorated and preserved to a high standard.

The Chambers of the House, Senate, and Supreme Court are on the Second Floor. Each of these Chambers has its associated retiring room, and each is distinctively and richly decorated in their own way.

The Third Floor has many office spaces that are or were originally skylit. Aside from offices, the floor also has the Public Gallery Spaces for the Senate, House, and Supreme Court. The Central Ceremonial Space which is much reduced on this level.

3. The Restoration Project Overview

There have been many renovation projects in the Minnesota State Capitol over its one hundred year history. It was originally built to house virtually every state agency. As the State Government expanded, different departments gradually departed the Capitol to newly opened office buildings. These relocations were followed by campaigns of renovations as their former Capitol spaces were converted to new use. The result of these numerous campaigns is a building with many differing treatments, finishes, conditions, and needs.

4. The restoration of the Minnesota State Capitol is based upon three principles:

- Respecting the Architectural Integrity of the Cass Gilbert design
- Improving the functional relationships of the spaces for the Legislature, Executive and Judicial branches of government.
- To provide for accessibility, life safety and mitigate security vulnerabilities.

The project construction will be phased and the building will be occupied at times during the construction process. All work within the building must provide for use of the building by Elected Officials, staff, and the general public.

The project will be bid in four to five Work Packages. The project is expected to begin construction activity in Fall 2013 and to be completed in December 2016, with Owner move-in scheduled for January – March 2017.

The project team has identified four distinct “Treatment Zones” for this project with each zone indicating a specific level and expectation of historical integrity. Refer to Appendix 8 for diagram defining Treatment Zones. The organization of spaces in the original design of the building created a hierarchy of finishes and flexibility of use. Many different organizational and functional plans exist that were created by Cass Gilbert during the years he had responsibility for the work at the Minnesota State Capitol. Some spaces in the Capitol have remained constant in use and unchanged in general character during the life of the building.

The zones are described thusly;

- Zone 1 Treatment
Included are the important public corridors and rotunda spaces on all floors, the House, Senate and Supreme Court Chambers, the Governor’s Reception Room and Ceremonial Offices for Constitutional Officers. These areas should be preserved. Preservation includes configuration, use, finishes, historic lighting, and all other elements that are original to the building. Intrusive elements that have been added over time should be removed. Life safety and security equipment should be carefully designed and placed for minimal impact on these

spaces. The integration of building systems in these areas should be carefully planned to not adversely affect the original fabric and configuration within the Zone One.

Space use in the Zone One is primarily in accordance with the original use. Little deviation from this use exists in the building today. Temporary uses such as food service carts and media connections should be carefully planned to preserve the original configuration and finishes.

- **Zone 2 Treatment**
Zone Two is significant in existing architectural character and finishes. Careful planning, design and construction activities should preserve and restore these spaces. Included are the important minor public corridors, existing exit stair paths, significant meeting rooms and other building features.
- **Zone 3 Treatment**
Zone Three offers flexibility for use and configuration. Original historic finishes in these areas have been lost or covered with newer finishes. The new finishes in these areas should be compatible in character and design with the original finishes in the building with some allowance for configuration alteration to accommodate new building systems and functions. Spaces in this zone were changed.
- **Zone 4 Treatment**
Zone Four includes reclaimed spaces in the Basement Level, and spaces that had ultimate flexibility in the original design. Spaces under the Terrace and stairs are included in this zone. All areas that are utilized in this zone for constant occupation for offices and support staff functions should be designed for access to natural light and be provided with building systems services equal to other areas in the building.

5. Design and Construction Standards

The construction standards of the original building were very high, especially in the Chambers, Governor's Offices, and Ceremonial Public Spaces. Such was the care given to the whole of the project that even remote mechanical spaces were designed and built with a quality of design and finish that is not seen in such spaces today. The care, quality, and beauty of virtually every original space show the great importance that the people of Minnesota and architect Cass Gilbert placed on the Capitol and its role as a 'Temple to Democracy.'

While design standards are very high throughout the Capitol, finish standards do vary according to the relative primacy of each space. The three Chambers of the House, Senate and Supreme Court, along with the Governor's Reception Chamber show the very highest standards. Each of these spaces is unique but thematically linked. One example is the use of the Ionic order of columns for each Chamber with different stone selections.

The public spaces throughout the building are also very grand. The standard finishes of these spaces are a Kasota Limestone wainscot over a green marble base with plaster vaults with decorative paint above on the First through Third Floor. The ceiling on the Ground Floor is the

structural Guastavino tile vaults. The floors are marble with decorative medallions of precious stone. Decorative stone columns with painted plaster capitals and marble rail supports complete the impression of tasteful opulence. On all floors, plaster panels alternate with stone; these originally served to locate the cast bronze torches that illuminated the space. Ventilation is accomplished through decorative cast iron grilles. The vast majority of public circulation space is built to these standards. It is important to note that these spaces are filled with art objects and objects of historical impact. These will only be treated within the context of changes to the Capitol's physical fabric.

Beyond the public circulation spaces, Gilbert planned a series of what he called 'Minor Corridors;' spaces that were accessed from the major circulation system and served to mediate between them and the small private spaces that they access. These Minor Corridors, on the Second and Third Floors have a tiled floor and marble base matching that of the primary circulation spaces. Walls were plaster with vaulted ceiling. On the Third Floor these Minor Corridors also had skylights.

Not every office space was accessed from the Minor Corridors. Major offices on the First Floor, originally belonging to important officers like the Secretary of State, were treated at a higher standard than other spaces. Each had a reception area with a marble floor while the office spaces had pine floor with oak base and trim, plaster walls and plaster ceiling with decorative beams. These offices were all located along the main East/West Corridor (eight total), while the offices in the North Wing were similar but lacked the marble reception areas and decorative plasterwork. This would become the standard level of finish for offices and support spaces on other floors.

Some unique spaces in the original design include the offices of the Chief Justice and House Speaker as well as the Post Office Lobby all on the Second Floor and the restaurant or 'Rathskeller' on the Basement Level.

Throughout all spaces, except for the Chambers themselves, similar doors are used. These doors are ornate oak three panel doors. The only way they differ between different spaces is that some (usually at office suites) are glazed in their upper panel and some (at restrooms) have louvers in the lower panel. There is also no discernible hierarchy of door or window trim, with windows everywhere treated the same, and the doors even to what were originally unimportant spaces having elaborate trim.

--End of Project Description and Historic Overview--



2.1 OCCUPIED BUILDING AND PHASING NARRATIVE

The Capitol Building will be occupied by tenants throughout most of the Restoration Project construction. A primary goal of the phasing plan is to ensure that the Chambers are always usable during scheduled Legislative Session. The details of the phasing and construction plan will be modified as the project develops, but the following is the outline of the predicted phasing plan. There will be four main phases of construction, each consisting of many smaller steps. Below is a brief outline of the main phases and phasing diagrams have been included in Appendix 2.

1. Phase 1 - Basement Demolition and Abatement - September 2013 to March 2014.

Most of the tenant spaces in the basement will be relocated in the fall of 2013. A few tenant spaces such as Senate Media and Senate Duplicating will continue to operate in their current locations. The Rathskeller will also stay operational during Session. Exits and circulation spaces necessary to serve these spaces will need to be maintained throughout construction and will need to meet code requirements. Fire sprinkler protection will be maintained for all spaces and associated exits in the Basement for spaces which remain occupied. A connection through the Capitol Basement for the Tunnels will be maintained, although the location may be shifted to accommodate construction.

Systems in the Basement serve the entire building. In order to maintain service to the upper floors, these systems will be maintained throughout Phase 1. Mechanical, Electrical, Telecom, Fire Protection, and Plumbing Design Assist subcontractors will work closely with the Design Team to determine which items need to be protected to serve upper floors and occupied Basement areas. Temporary connections will need to be made in many cases. Please refer to the other sections of this narrative for further information on phasing and temporary conditions.

Non-structural partitions and ceilings in spaces other than those designated above will be removed. Any equipment and systems that do not need to be maintained to serve occupied spaces will be removed. Previously abandoned equipment and systems should also be removed. Abatement work in the Basement Level and the Attic Spaces will be done during this phase.

Large areas of the Basement floor will need to be demolished to allow for installation of future under-floor Mechanical, Electrical, Telecom, and Plumbing distribution. Slab removal to accommodate these distribution paths will be made during this phase. JE Dunn will be responsible for coordinating an acceptable location for refuse to be taken out of the terrace.

Temporary parking lots will also be added during this Phase. JE Dunn will eventually need Lots O and N as well as Aurora Avenue for Construction Staging areas. To compensate for the lost parking spaces in these areas, temporary parking lots will be built on the west portions of the upper and lower lawns. These temporary parking lots will be developed to a minimal level – no

curb and gutter and least expensive lighting possible. These lots will be removed when construction is completed.

2. Phase 2 – North Basement Construction and Roof Replacement – January 2014 to October 2015.

As described in the section above, Senate Media and Duplicating will remain in the basement during construction. Any work to be done in the Duplicating area will be done while they occupy the space, for instance on evenings and weekends. Specific times and protection for their equipment will need to be arranged. No work will take place in the existing Senate Media Spaces and services to these spaces will be maintained using temporary connections as necessary. Fire sprinkler protection for Senate Media, Senate Duplicating, and associated exit paths will be maintained in areas where sprinkler protection is currently installed.

New Air Handling Units (AHUs) will be initially installed in the North corners of the East and West wings. These units will temporarily be used to back-feed existing ductwork to upper floors, and will eventually be used as part of the permanent system. Once these temporary units are operational, some of the existing AHUs can be removed, and their locations abated and prepared for either new mechanical spaces or for occupied spaces. Foundation underpinning and modifications to accommodate under-floor ductwork and other systems will begin during this phase. Installation of under-floor ductwork, electrical, and other systems will follow the foundation work. Additional new AHUs will be installed as spaces are ready, generally progressing from the East and West ends towards the center of the building. JE Dunn will be responsible for identifying locations where this new equipment can be brought into the terrace level and will need to review any modifications necessary to accomplish this with the Design Team and client.

The new fire pump will be installed in the West Vault area. Once the new fire pump installed and operational, the existing fire pump located existing Room B19B can be disconnected and removed. Existing standpipe distribution piping within the basement will be connected to the new fire pump to temporarily serve sprinkler systems in other areas which are to remain active until the new standpipe system is installed. The fire pump change over may occur under Phase 3 depending on the timeline for required removal of the existing fire pump.

The Rathskeller will remain open during session for all of construction. Replacement of the AHU serving the Rathskeller and any other work done in the Rathskeller area will take place during off-session times. Fire sprinkler protection for the Rathskeller and associated exit paths will be maintained in areas where sprinkler protection is currently installed.

Any demolition and abatement needed in the attic spaces will continue during this phase. Roof replacement will begin during this phase. The mechanical equipment located on the roof will mostly have to stay in place during this phase, as they are serving existing equipment for occupied spaces.

3. Phase 3 – Basement, North and West Wing Construction – July 2014 to February 2016.

Work in the Basement described above will continue. Construction of new tenant spaces in the south portion of the Basement will begin. Senate Duplicating still remains in their existing

space. Senate Media will remain in their existing location until construction is complete on their new permanent space. Proper access to occupied spaces will be maintained at all times and a path for the tunnel will be maintained at all times, even if the location may need to temporarily change. Re-roofing and attic work will also continue.

Tenants in the North and West wings will be relocated to either another building or to a temporary space within the Capitol building. Details on which functions will move where are still being developed.

Demolition, abatement, and construction in the North and East wings of Ground, First, Second, and Third floors will occur. Work needed on the West Elevator will be completed during this period.

The Chambers and some supporting spaces will be opened during the 2015 Legislative Session. The scope of work to be completed prior to the session is yet to be determined.

4. Phase 4 – Basement, East Wing, and Rotunda Construction - June 2015 to December 2016
Tenants in the East wing will be relocated to either another building or to a temporary space within the Capitol building. Details on which functions will move where are still being developed.

Construction in the North and West wings will continue through the first portion of Phase 4 while demolition and abatement in the East Wing begins, meaning majority of the Capitol will be closed for construction during this time. Only the south portion of the Basement may be completed and operational at this time. The North and West wings will complete in March of 2016. Work on the East elevator will commence once the West Elevator is operational. The East Wing and Rotunda will complete in December of 2016.

Substantial completion of the entire Restoration Project will be prior to the 2017 Legislative Session.

--End of Occupied Building Phasing--



3.1 LIFE SAFETY NARRATIVE

1. Code Application

The building code currently adopted by the State of Minnesota is the 2007 Minnesota State Building Code¹ (MSBC); and, the currently adopted code for existing buildings is the 2007 Minnesota State Building Conservation Code² (MSBCC). Further, the fire code currently adopted by the State of Minnesota is the 2007 Minnesota State Fire Code³ (MSFC). However, given the design schedule of the project, the proposed codes of record include the 2012 International Building Code (IBC), 2012 International Fire Code (IFC), and 2012 International Existing Building Code (IEBC). In addition, the State of Minnesota Amendments to these codes, which are currently published in “Draft” format, will be utilized. The codes (and amendments) are intended to be adopted by the State of Minnesota in Winter 2013/2014.

Where referenced by the applicable codes, standards from the National Fire Protection Association (NFPA) will also apply to the project, including primarily the following.

- NFPA 13 *Installation of Sprinkler Systems* (2010 edition)
- NFPA 14 *Installation of Standpipes and Hose Systems* (2003 edition)
- NFPA 20 *Installation of Stationary Pumps for Fire Protection* (2010 edition)
- NFPA 25 *Inspection, Testing and Maintenance of Water-based Fire Protection Systems* (2008 edition)
- NFPA 72 *National Fire Alarm Code* (2012 edition)
- NFPA 92B *Smoke Management Systems in Malls, Atria, and Other Large Spaces* (2005 edition)

It should be noted that the adoption of the 2012 IBC, 2012 IFC and 2012 IEBC is not expected to impact the editions of these standards that are applicable to the project.

The Authority Having Jurisdiction for the project is the City of St. Paul. Based on meetings with the City of Saint Paul, use of the 2012 IBC, 2012 IFC and 2012 IEBC as the design codes of record for the project is acceptable. Please refer to Appendix Section 3, Attachment A for the meeting minutes from the May 1, 2013, and see Attachment B for the meeting minutes from May 10, 2013. Also included in Appendix 3 is Attachment C, the Building Code Analysis for the 2012 IBC.

¹ The 2007 Minnesota State Building Code includes the 2006 International Building Code (IBC) with Minnesota amendments.

² The 2007 Minnesota State Building Conservation Code includes the 2000 Guidelines for the Rehabilitation of Existing Buildings (GREB) with Minnesota amendments.

³ The 2007 Minnesota State Fire Code includes the 2006 International Fire Code (IFC) with Minnesota amendments.

2. Occupancy Classifications

The primary occupancy classifications in the building are Group B (Business) and Group A-3 (Assembly). Assembly spaces include House of Representative, Senate, and Supreme Court, gathering areas, etc. In addition, when the building is occupied for demonstrations, hearings, or other public gatherings, such use is considered Group A-3 (Assembly). Miscellaneous storage rooms in the building will be considered Group S-1 (Moderate-Hazard Storage).

3. High-Rise

At this time, *approximate* elevations for the building are as follows:

- Terrace Level: 869'-3"
- Ground Level: 878'-7"
- First Level: 892'-3"
- Second Level: 910'-9"
- Third Level: 927'-9"
- Gallery/Balcony/Fourth Level Offices: 937'-3"

For the purposes of this analysis, the Quadriga is not proposed as an "occupied floor."

The assumed "lowest level of Fire Department vehicle access" is the adjoining access street on each side of the building. Elevations listed below correspond to the elevations of each street adjoining the access points into the building. Since the site is comprised of sloping grade, these elevations may not correspond to the lowest elevation on each street, but are considered the likely locations where a fire apparatus would actually park to service the building.

- Aurora Avenue: 870 feet
- Rev. Dr. Martin Luther King Jr. Boulevard: 865 feet
- University Avenue West: 880 feet
- Cedar Street: 875 feet

Please see the figure included in Attachment D for a graphical representation of these elevations.

The height above the lowest level of Fire Department vehicle access to the Gallery/Balcony/Fourth Level Office areas is approximately 72'-3". This maximum height occurs on the west side of the building at the Rev. Dr. Martin Luther King Jr. Boulevard access point.

A "high-rise" classification is only required where the highest "occupied floor" is located more than 75 feet above the "lowest level of Fire Department vehicle access." Because the height above the lowest level of Fire Department access to the Gallery/Balcony/Fourth Level Offices does not exceed 75 feet, it is proposed that the building is not classified as a high-rise.

4. Atrium

Floor openings are currently located in the central Rotunda in the Minnesota State Capitol Building which requires classification as an "atrium." The proposed atrium connects the First

Level through the Third Level through a set of primary floor openings. It should be noted that the atrium is also “open” to the Terrace Level and Ground Level through multiple open stair floor openings.

The atrium in the Rotunda is not currently provided with a smoke control system; however, a smoke control system is proposed as part of this project. Please refer to Section 13, “Mechanical System Narrative” and referenced “Atrium Smoke Control Narrative” for detailed information on the new smoke control system.

For the purposes of this analysis, the entirety of First Level, Second Level, and Third Level are considered part of the atrium. In these spaces, reduced exit access travel distance is required (i.e., 200 feet), and interior finishes must meet a minimum Class B rating. On these levels, the central Rotunda is separated from the adjacent office areas by “smoke-resistant” construction. Although multiple new and existing stairways connect Terrace Level and Ground level to areas within the atrium, such floor openings are relatively small with limited fuel loading. All existing open stairs are required to be protected with draft curtains and closely-spaced sprinklers around each floor opening, *where the historic fabric in these areas is not impacted*; and, all new open convenience stairs are required to be protected with draft curtains and closely-spaced sprinklers around each floor openings. See *Protection of Vertical Openings* section below for additional discussion on protection of these open stairs.

5. Construction Type And Allowable Height And Area

The existing construction type of the building is currently unclassified; however, the building appears to be constructed primarily of noncombustible components – including limestone, clay tile, brick/mortar, concrete, plaster, etc. A majority of these components likely carry existing fire ratings. The total building height is approximately 80 feet – which does not include the dome because “roof structures” are not required to be included in the allowable height calculation per IBC 504.3.

For *perspective* purposes, the required construction type of the building (if it was new construction) is Type I-B. The Minnesota State Capitol Building is an existing building. The scope of work does not include a change of occupancy or additions to the building. Therefore, it is proposed that existing construction is to remain as-is (i.e., existing construction will not be required to be upgraded); and, all new construction is proposed to meet the requirements of Type I-B. The fire-resistance ratings required for new construction is as follows (where applicable):

- New primary structural frame: 2 hours
- New exterior bearing wall elements: 2 hours
- New interior bearing wall elements: 2 hours
- New nonbearing wall elements: 0 hours
- New floor construction and associated elements: 2 hours
- New roof construction: 1 hour

All new construction is required to be noncombustible, unless specifically permitted by IBC 603 for Type I construction.

6. Protection of Vertical Openings

The primary floor opening located in the central Rotunda connecting First Level, Second Level, and Third Level are considered part of the “atrium.” Please see *Atrium* section above for additional discussion.

There are also a variety of open stairs that create floor openings in the building. Some of these stairs are required for egress while the remaining open stairs are classified as “convenience” stairs. Such stairs are not required for egress, but are still readily available to building occupants as an additional means of escape in an emergency situation. Please see *Means of Egress* section below for additional discussion.

All new floor openings that include convenience stairs will meet the requirements of Exception 4 in IBC 1009.3. The area of the floor opening between stories will not exceed twice the horizontal projected area of the stair, and the opening will be protected by a draft curtain and closely spaced sprinklers. For all existing convenience stairs, draft curtains and closely spaced sprinklers will be provided where possible, *without impacting the historic fabric in these areas*.

New shafts are required to comply with the IBC. As discussed above, for new building elements, the required construction is Type I-B, which requires 2-hour fire-resistance rated floor assemblies. As such, new shaft enclosures are required to have a fire-resistance rating of 2-hours as well – regardless of the number of stories connected, per the provisions IBC 713.4. The fire-resistance rating of existing floor assemblies are not proposed to be upgraded where such floor assemblies do not support new 2-hour fire-rated shaft enclosures (or other new 2-hour fire-rated construction). For any new shaft enclosures that bear on existing floor assemblies, however, the floor assembly will need to be confirmed that it has a fire-resistance rating of 2-hours – and upgraded as necessary. Refer to Appendix 3 for additional information regarding locations of rated walls.

Existing 1-hour shaft enclosures that are being maintained as part of this project are proposed to remain, as-is. It should be noted that a shaft is proposed as “existing” when the size/shape of the floor opening or the number of floors that the shaft connects does not change from the existing condition. In addition, not more than 50% (by area) of the existing shaft enclosure walls are permitted to be impacted by the modifications in order to be considered “existing.” Such an approach is at the discretion of the Authority Having Jurisdiction.

For instance, if an existing shaft enclosure is removed in order to modify or replace equipment, it is proposed that the entire shaft enclosure is not required to be upgraded to the requirements of the IBC, as long as the floor openings do not change; and, the piece of existing shaft enclosed that was removed may be replaced with materials consistent with the remainder of the existing shaft construction, provide a 1-hour fire-resistance rated shaft enclosure is maintained.

Regardless of whether the shaft is existing or new, all duct and air transfer penetrations of the shaft are required to be protected with fire and smoke dampers unless specifically exempt by the IBC. In addition, all penetrations of a shaft enclosure that are permitted by the IBC are required to be protected in accordance with the IBC.

7. Interior Finishes

Existing interior finishes that are historic in the Minnesota State Capitol Building are proposed to remain as-is per the 2012 IEBC. All new interior finishes will comply with the 2012 IBC. Note that the entirety of First Level, Second Level, and Third Level are considered part of the atrium; and as such, the new interior finish requirements of the walls and ceilings throughout those levels shall be not less than Class B – with no reduction for fire sprinkler protection.

8. Fire Protection Systems

The building is provided with existing fire sprinkler protection in various areas – although it is not provided with fire sprinkler protection throughout. As part of this project, the building will be provided with new fire sprinkler protection throughout, as required to be considered “fully sprinklered” by the IBC. In addition, a new standpipe system will be installed throughout the building, with hose connections provided at various locations. Refer to Section 14, “Fire Protection System Narrative” for additional information.

Similarly, an existing fire alarm system is provided in the building. New fire alarm components, including an emergency voice/alarm communication system will be provided throughout as part of this project. Refer to the fire alarm portion of Section 15, “Electrical System Narrative” for additional information.

There is no existing smoke control in the building. As previously noted above, an atrium smoke control system will be provided in the central Rotunda. Please refer to Section 13, “Mechanical System Narrative” and referenced “Atrium Smoke Control Narrative” for detailed information on the new smoke control system.

9. Means of Egress

There are seven existing stairs that can be accessed from the Third Level of the Capitol Building: Far West Stair (North), Far West Stair (South), West Gallery Stair (North), West Gallery Stair (South), Elliptical Stair, Far East Stair (North), and Far East Stair (South). Refer to Appendix 3 for additional plans showing stairs and egress information.

Two of those stairs – West Gallery Stair (North) and West Gallery Stair (South) are “enclosed”; however, the enclosures do not appear to have a fire-resistance rating. The remaining stairs are considered “open” stairs. The Elliptical Stair in the central Rotunda serves the Third Level through the Ground Level. The discharge is to an exterior door on Ground Level for this stair. The remaining stairs from Third Level currently discharge on Second Level (including the “enclosed” stairs). It should be noted that most of these stairs are marked as “exits” through signage.

There are nine existing stairs that can be accessed from the Second Level of the Capitol Building. In addition to the seven stairs described above for Third Level, Second Level of the Capitol Building also has access to Grand Stair (East) and Grand Stair (West).

Grand Stair (East) and Grand Stair (West) are two-story stairs located in the central Rotunda that discharge on First Level. It should be noted that the floor openings for these two stairs ultimately continue to the Terrace Level via additional open stairs.

The exits from First Level discharge directly to the exterior of the building (i.e. exterior doors). Exterior stairs serve a majority of the exterior doors.

The means of egress from the Ground Level is comprised of exterior doors. However, the north end of the building includes an open stair that leads to the café area in the Terrace Level. This open stair is not currently signed as an “exit.”

The Terrace Level includes open stairs in the middle portion of the building that lead to Ground Level, stairs that lead to an exterior door on the north and west end of the building, and exterior doors that lead to exterior stairs on the east end of the building. The stairs in the middle of the Terrace Level are not marked as “exits” while the exterior doors on the north, east, and west ends mentioned above are marked as “exits” through signage. It should be noted that the tunnels that lead to other buildings on the campus are not marked as “exits.”

Because of the current discharge configurations and openness of the existing means of egress system from the upper floors (i.e., Second and Third Level), upgrades to the means of egress system are proposed as part of this project.

Specifically, a new exit enclosure will be added in the central Rotunda. The exit enclosure will comply with the requirements of the 2012 IBC as an “interior exit stairway” (e.g., egress width, fire rating, etc.). The interior exit stairway will connect Third Level through Terrace Level, and will discharge on Terrace Level through the tunnel. The tunnel does not connect to another building on the Capitol Campus, but provides access, under University Avenue, to an exterior exit stairway to grade.

In addition, the Far East Stairs (North and South) will be extended to Ground Level and discharged to the exterior of the building. The Far East Stairs (North and South) will be enclosed with “smoke-resistant” construction on Ground Level and First Level; and draft curtains with closely-spaced sprinklers will be provided at the stair entrance on Second Level and Third Level – where the openness of the stairs is required to be maintained for historic reasons.

Similarly, the Far West Stair (North) will be extended to Ground Level and discharged to the exterior of the building. The Far West Stair (North) will be enclosed with “smoke-resistant” construction on Ground Level and First Level; and draft curtains with closely-spaced sprinklers will be provided at the stair entrance on Second Level and Third Level – where the openness of the stairs is required to be maintained for historic reasons.

Finally, the West Gallery Stair (South) will be extended to Ground Level and enclosed with smoke resistant construction on all levels. The West Gallery Stair (South) will discharge on Ground Level in the interior of the building.

The Grand Stairs (East and West) and the Elliptical Stair in the central Rotunda will remain as-is (open stairs) and are proposed as “exit access stairways.” Open exit access stairways are permitted as a component in a means of egress system by the 2012 IBC. Specifically, IBC 712.1.12 allows vertical floor openings created by unenclosed stairs, provided IBC 1009.2 and

1009.3 are satisfied. Exception 5 in IBC 1009.3 allows exit access stairways within an atrium to be open. As noted above in the *Atrium* section, a new smoke control system in the central Rotunda is proposed as part of this project.

It should be noted that the West Gallery Stair (North) and the Far West Stair (South) are proposed to remain as-is and are not considered required egress stairs. Nonetheless, these stairways will be maintained and are readily available to building occupants as an additional means of escape.

In addition, the means of egress system for First Level, Ground Level and Terrace Level described above are proposed to remain as-is. The Terrace Level will also be provided with additional means of egress into the tunnel under University Avenue described above.

Travel distance, common path of travel, and dead end corridor limitations will be reviewed against the requirements of the 2012 IBC throughout. In particular, the following restrictions apply to the various areas of the building:

- Travel distance
 - Group A portions of the building: 250 feet
 - Group B portions of the building: 300 feet
 - First Level, Second Level, and Third Level (all occupancies): 200 feet
- Common path of travel
 - Group A portions of the building: 75 feet
 - Group B portions of the building: 100 feet
- Dead-end corridor
 - Group A portions of the building: 20 feet
 - Group B portions of the building: 50 feet

Where open exit access stairways are utilized in the central Rotunda, the travel distances noted above may be exceeded in select locations – when considering the distance travelled along the open stairways, as required by IBC 1016.3.1. Such an approach is proposed as acceptable, as part of the overall package of fire life safety features provided in the building – including (but not limited to) fire sprinkler protection, fire alarm with voice alarm/communication, and smoke control in the central Rotunda. In addition, a new interior exit stairway is provided in the central Rotunda serving all levels that will be well within the permitted travel distance.

Utilizing the exiting strategy described above, adequate egress width is available for all levels of the building. Such egress widths are based on the worst-case occupant load scenario which assumes that all areas of the building are simultaneously occupied, including all gathering areas in the central Rotunda that are open to the general public during hearings, demonstrations, etc. The required egress widths are currently being calculated based on the increased width factors of 0.30 in./occ. on stairs and 0.20 in./occ. on level surfaces (i.e., doors, corridors, etc.) for Ground Level, First Level, Second Level, Third Level, and the Gallery/Balcony/Fourth Level Office areas.

On Terrace Level, reduced egress width factors of 0.20 in./occ. (stairs) and 0.15 in./occ. (level surfaces) are utilized for all non-Assembly occupants, as permitted by the Exceptions to IBC 1005.3 for fully sprinklered buildings provided with a voice alarm/communication system throughout. These Exceptions do not apply to Group A occupants; and, as such, have a more limited application on the other levels of the building. Nonetheless, the potential to utilize reduced egress width factors in other areas of the building for non-Assembly occupants will be further reviewed as the means of egress design progresses.

--End of Life Safety--



4.1 HISTORIC BUILDINGS AND ADAAG

Per ADA Accessibility Guidelines for Buildings and Facilities, (ADAAG), “*Alterations to a qualified historic building must comply with ADAAG unless it is determined in accordance with procedures described in ADAAG 4.1.7(2) that compliance with certain requirements would threaten or destroy the historic significance of the building or facility. In such a case, alternative requirements may be used. The alternative requirements are discussed in 28 CFR 36.405 and ADAAG 4.1.7(3) and on Minimum Requirements Summary Sheet J: Accessible Buildings – Historic Preservation.*”

If it is determined, in accordance with the required procedures in 4.1.7(2), that it is not feasible to provide physical access to a qualified historic building or facility using the alternative requirements in 4.1.7(3) without threatening or destroying the historic significance of the building or facility, alternative methods of access must be provided. See 36 CFR _36.405(b).

In accordance with the required procedures in 4.1.7(2), that the proposed alterations would threaten or destroy the historic significance of the building or facility, the following alternative requirements in 4.1.7(3) may be utilized:

- **Site Accessible Route** - Minimum Number: At least one accessible route complying with 4.3 must be provided from a site access point to an accessible entrance.
- **Ramps** - Slope and Rise: A ramp with a slope no steeper than 1:6 may be used as part of an accessible route to an entrance but the run must not exceed 2 feet.
- **Entrances** - Minimum Number and Primary Entrance: At least one accessible entrance complying with 4.14 and which is used by the public must be provided. If no public entrance can be made accessible, then access may be provided at any entrance which is open (unlocked) when directional signage is provided at the primary public entrance. The alternative accessible entrance must have a notification system, and where security is a concern, remote monitoring may be used. Building Accessible Route - Access to Other Floors: Accessible routes from an accessible entrance to all publicly used spaces must be provided at least on the accessible entrance level. Access must be provided in compliance with 4.1 to all levels of a building and facility whenever practicable.
- **Toilet Rooms** - Unisex: If toilets are provided, then at least one toilet facility, which may be unisex in design, complying with 4.22 and 4.1.6, must be provided on an accessible route.
- **Displays**: Displays and written information should be located so as to be seen by a seated person.

ADAAG 4.1.7 Accessible Buildings: Historic Preservation.

(1)* Applicability:

(a) General Rule. Alterations to a qualified historic building or facility shall comply with [4.1.6](#) (Accessible Buildings: Alterations), the applicable technical specifications of section 4 and the applicable special application sections unless it is determined in accordance with the procedures in [4.1.7\(2\)](#) that compliance with the requirements for accessible routes (exterior and interior), ramps, entrances, or toilets would threaten or destroy the historic significance of the building or facility in which case the alternative requirements in [4.1.7\(3\)](#) may be used for the feature. [Appendix Note EXCEPTION: \(Reserved\)](#).

(b) Definition. A qualified historic building or facility is a building or facility that is:

- (i) Listed in or eligible for listing in the National Register of Historic Places; or
- (ii) Designated as historic under an appropriate State or local law.

(2) Procedures:

(a) Alterations to Qualified Historic Buildings and Facilities Subject to Section 106 of the National Historic Preservation Act:

(i) Section 106 Process. Section 106 of the National Historic Preservation Act (16 U.S.C. 470 f) requires that a Federal agency with jurisdiction over a Federal, federally assisted, or federally licensed undertaking consider the effects of the agency's undertaking on buildings and facilities listed in or eligible for listing in the National Register of Historic Places and give the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking prior to approval of the undertaking.

(ii) ADA Application. Where alterations are undertaken to a qualified historic building or facility that is subject to section 106 of the National Historic Preservation Act, the Federal agency with jurisdiction over the undertaking shall follow the section 106 process. If the State Historic Preservation Officer or Advisory Council on Historic Preservation agrees that compliance with the requirements for accessible routes (exterior and interior), ramps, entrances, or toilets would threaten or destroy the historic significance of the building or facility, the alternative requirements in [4.1.7\(3\)](#) may be used for the feature.

(b) Alterations to Qualified Historic Buildings and Facilities Not Subject to Section 106 of the National Historic Preservation Act. Where alterations are undertaken to a qualified historic building or facility that is not subject to section 106 of the National Historic Preservation Act, if the entity undertaking the alterations believes that compliance with the requirements for accessible routes (exterior and interior), ramps, entrances, or toilets would threaten or destroy the historic significance of the building or facility and that the alternative requirements in [4.1.7\(3\)](#) should be used for the

feature, the entity should consult with the State Historic Preservation Officer. If the State Historic Preservation Officer agrees that compliance with the accessibility requirements for accessible routes (exterior and interior), ramps, entrances or toilets would threaten or destroy the historical significance of the building or facility, the alternative requirements in [4.1.7\(3\)](#) may be used.

(c) Consultation With Interested Persons. Interested persons should be invited to participate in the consultation process, including State or local accessibility officials, individuals with disabilities, and organizations representing individuals with disabilities.

(d) Certified Local Government Historic Preservation Programs. Where the State Historic Preservation Officer has delegated the consultation responsibility for purposes of this section to a local government historic preservation program that has been certified in accordance with section 101(c) of the National Historic Preservation Act of 1966 (16 U.S.C. 470a (c)) and implementing regulations (36 C.F.R. 61.5), the responsibility may be carried out by the appropriate local government body or official.

(3) Historic Preservation: Minimum Requirements:

(a) At least one accessible route complying with [4.3](#) from a site access point to an accessible entrance shall be provided.

EXCEPTION: A ramp with a slope no greater than 1:6 for a run not to exceed 2 ft (610 mm) may be used as part of an accessible route to an entrance.

(b) At least one accessible entrance complying with [4.14](#) which is used by the public shall be provided.

EXCEPTION: If it is determined that no entrance used by the public can comply with [4.14](#), then access at any entrance not used by the general public but open (unlocked) with directional signage at the primary entrance may be used. The accessible entrance shall also have a notification system. Where security is a problem, remote monitoring may be used.

(c) If toilets are provided, then at least one toilet facility complying with [4.22](#) and [4.1.6](#) shall be provided along an accessible route that complies with [4.3](#). Such toilet facility may be unisex in design.

(d) Accessible routes from an accessible entrance to all publicly used spaces on at least the level of the accessible entrance shall be provided. Access shall be provided to all levels of a building or facility in compliance with [4.1](#) whenever practical.

(e) Displays and written information, documents, etc., should be located where they can be seen by a seated person. Exhibits and signage displayed horizontally (e.g., open books), should be no higher than 44 in (1120 mm) above the floor surface.

4.2 ACCESSIBILITY WORKSHOP

During the week of December 11, 2012, the design team hosted a design workshop to focus on Capitol building accessibility issues. The workshop goals focused on describing and developing improved accessibility throughout the Capitol. The outcome of the workshop was to:

- Identify the accessibility goals for the project and to develop a plan for how they will be accomplished
- Study vertical circulation including the introduction of new means of egress from upper levels with regards life safety
- Address the elevator locations of the building and develop a plan for both the introduction of a new service elevator and the restoration of the goals of Cass Gilberts original elevator design (Light wells and window openings) with new elevator systems

1. The workshop included representatives from the following groups:

- **Capitol Preservation Commission Members**
- **The Department of Administration RECS (Owner)** – the individuals that will oversee building and building maintenance
- **Tenant Advisory Committee Members** – the individuals that typically use the building on a day-to-day basis
- **Disability Council Representatives** – the advocates that can speak for disability groups (hearing, blind and physical) that will help top define appropriate approaches and recommendations
- **Owner 's Program Manager** – the individuals that will oversee inclusion of programmatic elements into the overall project scope
- **Owner's Project Representative** – the individuals that will oversee the contracting processes and scope for the Owner
- **Architect and Engineering Team** – the individuals who will implement the conclusions
- **Construction Manager** - the individuals/subcontractors who will oversee construction of the recommended conclusions and design

2. Current Building Conditions

The existing building lacks sufficient accommodations for the disabled individuals that work in the building or visit the building. There are three existing entries that accommodate the disabled:

- **South Entry at the Porte Cochere.** This entry has a ramp system (constructed in 1993) that provides wheel chair access to the entry, but problems exist with the narrow width of the porte cochere area at the doors. The width restricts side vehicular exiting and hence covered access to the ramp system. The doorway has two modes on entry – voice call-in box and handicapped touch panel device. It is the intent of this project to make this entry more accessible (touch panel device operable) at all times. Review of the drive lane indicates that the slopes do meet ADA access requirements. It has been suggested that a few handicapped parking spaces be provided at the east end of Aurora with access to the drive walk lane.

- **East Entry ramp under stair.** This ramp was constructed in 1985 for handicapped use, but this vestibule space currently house a mechanical unit and the central corridor is not public access, but houses Senate Office space. The mechanical unit and office space make the ramp unusable for handicapped. The current project will reopen this entry for public use and provide an additional ADA access option. An intercom may be provided if needed.
- **Northeast Entry.** The northeast entry (by the elliptical stair) enters at grade and has a handicapped opening device. Once inside the building, the entry area is above the Ground Floor level. There is a “temporary” ramp (1992-1993 ADA modifications?) that provides access to the Ground Level area. The purpose of this ramp was to provide access for deliveries at this entry. A subsequent project installed a new elevator and loading dock access at Lot B to handle the majority of deliveries. The current project will utilize the new loading dock area north of University Avenue and the new service tunnel. The north east entry will not need to provide a ramp.
- **Northwest Entry.** This entry is currently favored by the handicapped due to its ease of adjacent parking. The entry is at grade level, but once inside the entry – you are above Ground Floor level. Here too is a ramp that was constructed (1992-1993 ADA modifications?) to provide access to the Ground Floor Level, but this ramp is constructed of a more permanent nature. This entry will also be near the light rail station that is under construction. The current project will locate a new enclosed stair and a new elevator at this entry area. Accommodations are being planned to provide interior access from the west entry level to the Ground Floor Level as part of these modifications, thereby not requiring a handicapped access point at this entry.
- **West Entry under stair.** There is currently no existing ADA access at this area. The current project is planning to provide a similar ramp as that on the East side of the building to provide close access from the light rail station and entry into the building.

3. Building Restrooms

The current conditions for restrooms are confusing and difficult to locate. There are no central locations for restrooms and locations tend to be by floor (men’s rooms on one floor and women’s on another floor) and often in differing locations by floor.

This project will provide adjacent men’s and women’s restrooms on every floor located in a typical location at each floor (Northeast quadrant of the floor plan.) Restrooms will be fully accessible.

4. Door Hardware

The State Capitol had a large Interior ADA Modifications project completed in 2000 that involved removal of original door hardware (knobs and escutcheon plates) and replacement with ADA approved door levers and escutcheon plates. In total 225 sets of door hardware were removed. (These were catalogued into the Capitol Historic Site’s collection and stored on site.)

5. Water Fountains

New water fountains will be ADA compliant. A prior 1994 ADA project installed new ADA compliant water fountains.

6. General

Hearing rooms will provide ADA access as well as provisions for people with disabilities (hearing, sight) to allow for participation in hearing activities.

--End of Accessibility--



5.1 BUILDING TENANTS

As with most State Capitols built 100 years ago, there is not adequate space for all the functions that would like to be located in this important building. Secondary circulation and space utilization beyond the grand public spaces have changed dramatically over time to respond to changing demand and political processes. This evolution is common as government has grown to serve increasing populations and more complex issues. With just 378,825 GSF in the building, the allocation of space is challenging. The renovation will provide adequate safe, efficient comfortable workspaces for employees and visitors to the Capitol to facilitate the orderly and efficient work of the government.

1. Grand Historic Spaces

The proposed solution seeks to retain the grand historic spaces and the most prominent building function – that is as the **People’s House**. The Governor’s Reception, the Legislative Chambers, the Supreme Court, the Rotunda and other major spaces are all critical areas that support public participation. These spaces have been labeled as Zone 1 which is the most protected, significant areas of the building which should be given the highest priority for architectural integrity. The use is primarily in accordance with the original use and little deviation exists today. These historically significant spaces will all be restored or renovated to reflect the original character of the space.

- Primary Public Corridors and the Rotunda
- The House Chambers
- The Senate Chambers
- The Supreme Court
- The Governor’s Reception Room
- Ceremonial Offices for Constitutional Officers (Governor and Attorney General and their staff)
- The Rathskeller

2. Hearing Rooms

Also critical to public participation are public Hearing Rooms for the House and Senate. In 1905, these spaces were small meeting rooms that would have accommodated less than 20 people. These spaces have become an important part of our government’s operation with public participation growing every year. Given the number of legislative committees, there is a need for three Hearing Rooms of various sizes in the Capitol and six Committee Rooms in NLOB. These spaces will be carved out of secondary space, and two will be assigned to the Senate and one to the House, although joint committees may make use of them. The remainder of the House Hearing Rooms will remain in the State Office Building just to the East of the Capitol Building and North in the NLOB.

The Hearing Rooms will feature daises that seat 20 to 30 members. There will also be testimony tables, staff seating, press areas, and public seating. The rooms will be fully accessible for committee members, staff, and the public. They will also be equipped with AV equipment and designed with acoustics and noise separation in mind.

3. Legislative Offices

While all members of the Legislature (67 Senators and 134 House Members) might prefer to have an office in the Capitol, it is not possible. The proposed solution provides office suites for 16 Senators. These offices will be allocated to leadership and senior members from both parties and accommodate two to four staff members for each legislator. The Speaker of the House will also have an office in the building for use during session. The remaining legislators and staff will be located in the State Office Building located just west of the Capitol.

4. Legislative Support and Staff Offices

Senate and House support staff such as the Secretary of the Senate and the House Clerk are vital to the day-to-day operation of the legislature, and these offices will be accommodated within the Capitol, and where necessary they will be located within easy access to their respective chambers.

- House of Representatives
 - House Clerk & Assistant Clerks
 - House IT
 - Indexing
 - Pages
 - Caucus Rooms
 - Business Center
 - Storage
 - Senate
 - Secretary of the Senate
 - Sergeant at Arms
 - Duplicating
 - Senate at new Legislative Office Building
- Note: Will be moved to NCOB
- Engrossing
 - Counsel, Research & Fiscal Policy
 - Fiscal Services
 - Mail
 - Senate Media
 - Press Room
 - Majority Research
 - Majority Media
 - Storage

5. Governor / Lt. Governor

The Governor's Office constitutes the Executive Branch of the Minnesota State government. It has maintained a historic location in the West Wing of the First Floor adjacent to the Reception

Room. Over the years, the office has expanded and now occupies the entire Southwest quadrant of both the First and Ground Floors. The office has outgrown this space and will now occupy a portion of the Southeast quadrant at the Ground Level as well. A new office area for the Lt. Governor will be developed on the Ground Floor Northwest quadrant. The Governor's Historic Business Office will be restored to use as a Private Office and the Historic Private Office will now be used as a Conference Room. Flexibility will be provided for future Administrators' use. The rest of the office space will be reorganized to make better use of the three floors that the suite will now consist of. The Lt. Governor, a more recent addition to the Executive Office, will occupy space on the Ground Floor Northwest quadrant, with a distinctive entrance from the main hallway.

6. Attorney General

The Attorney General's space within the Capitol is only a small portion of the Attorney General's entire operation; the majority of the staff is housed downtown. It is an important presence to maintain, though, as it provides public access and services as an indicator of the Attorney General's role in State government. The Attorney General will retain their historic office location on the First Floor opposite the governor. In addition to the Attorney General's private office, there will be a reception area, staff offices and workrooms and conference rooms that will be divided between the Ground and First Floors of the Northwest Wing of the building connected by an internal stair.

7. Supreme Court

The Supreme Court moved the majority of its operations into the neighboring Judicial Center in 1991. The court maintains its presence in the Capitol with the use of the Historic Court Room and the associated Consultation Room and Robing Rooms the first week of each month they are in public session. This presence in the Capitol helps to reinforce the Courts' role in State government. The original Chief Justice office will be returned to the Supreme Court.

8. Press Corps

Local and regional print and broadcast press organizations desire office space within the Capitol. Various size offices are leased to each organization and they provide their own furnishings and equipment. There is also a small press room for impromptu press conferences. The desired location is convenient for reporters covering activities in the Capitol and the State Office Building. The proposed space is the North Wing Ground Floor on both sides of the Public Corridor.

9. Visitor Services / Minnesota Historical Society

As the People's House, facilities to accommodate the public are extremely important. These spaces not only help to facilitate public participation, but they support the education process for citizens of all ages. The Minnesota Historical Society (MHS) began operating the Capitol as a State Historic Site in 1969, and they continue to oversee this aspect of its operation today. They welcome approximately 120,000 visitors a year including 60,000 school children. In addition to the grand public spaces noted above, the Capitol will include the following:

- Visitor Center (Information Desk and Gift Shop) – First Floor South
- Visitor Center Staff Offices (MHS and Docent offices) – Ground Floor Northeast quadrant

- Exhibit Space Ground Floor – Northeast quadrant.
- Training Room – Ground Floor Northeast quadrant.

MHS also supplies furniture and equipment for the many special events that take place in the Capitol every year. A storage room to accommodate that equipment as well as historic artifacts will also be required.

10. Government Relations

The State Capitol is the people’s house. Public assembly is an important tradition – a “day-on-the-hill” to participate in governing our State. This participation is encouraged; and to that end, the needs of the citizens, the general public, including advocacy groups, individual constituents and lobbyists, must be considered as the Capitol is renovated. Traditionally, the House has provided a space in the Capitol building for lobbyists to use as a “home base”. Citizens and public advocacy groups can also rent out areas of the Capitol for public gatherings such as the Rotunda and Great Hall.

11. Capitol Security

Capitol Security will be moving the majority of their operations across University Avenue to the Administration Building at the beginning of construction and will stay there even once construction is complete. They will continue to have a presence in the building in a small suite adjacent to the Governor’s suite on the Terrace Level. Their suite will have a small office area and a conference room/safe room.

12. Plant Management

Plant Management runs and maintains the building on a daily basis. Their space consists of Locker Rooms, a Break Room, Storage Rooms, Offices, and a Workshop grouped together on the Terrace Level. In addition to this group of spaces, they also have housekeeping closets on each floor. The trash and recycling areas that used to be in the building have been relocated to the new service building at the north end of the new University Avenue Tunnel.

13. Food Service

The historic Rathskeller (Capitol Café) is currently operated by an outside vendor. The Café and associated support spaces will remain where they are currently located with expanded dining space to the South.

Minnesota Services for the Blind currently operates vending services on the Terrace Level as well as a fast food operation in the South Rotunda Corridor on the Second Floor during session. The corridor food operation will move into two bays of the East Wing of the Second Floor to become a lunch counter or grab-and-go operation that can operate year round if desired.

When completed, the renovated Capitol will be able to better serve both tenants and visitors. Refer to Appendix 5 for square footage information for programmed spaces.

--End of Tenant Narrative Area Tabulation and Program Analysis--



6.1 DEMOLITION

1. Lot O
 - Remove all walls, pavement, base materials, curbs, loading dock structure, power lines and trees as documented on the plans. Protect all vegetation to remain with chain link fencing.
 - Salvage all site luminaires and return to Owner.
 - Salvage all signs and return to Owner.
 - Remove irrigation as required.
2. Upper Mall
 - Remove concrete walks as documented.
 - Strip lawn and topsoil in Temporary Parking Lot and Staging areas.
 - Remove irrigation as required.
 - Remove pavement as required to install entry drives off of MLK Boulevard for Temporary Parking Lot and Staging Area.
 - Remove all Green Ash (*Fraxinus pennsylvanica*) trees in their entirety within the Upper Mall as documented on the plans.
3. Lower Mall
 - Strip lawn and topsoil in Temporary Parking Lot area.
 - Remove irrigation as required.
 - Remove concrete curb and pavement to create opening in traffic island along MLK Boulevard for Lower Mall Temporary Parking Lot.
4. Tree Protection
 - Install 6' height chain link fence to protect trees. Refer to plans. Consult with Owner and landscape architect for precise locations.

6.2 TEMPORARY CONDITION

1. Upper Mall Temporary Parking Lot
 - Install bituminous pavement access road off of MLK Boulevard.
 - Install bituminous pavement over minimal aggregate base. Stripe stalls with white paint.
 - Install bituminous walks for pedestrian connection to adjacent walks.
 - Install temporary Shoebox type Luminaires.
 - Install perimeter erosion control bio-log barriers along edge of lot as documented and required.

2. Lower Mall Temporary Parking Lot
 - Install bituminous pavement access road off of MLK Boulevard.
 - Install bituminous pavement over minimal aggregate base. Stripe stalls with white paint.
 - Install temporary Shoebox type Luminaires.

6.3 NEW CONSTRUCTION

1. Tour Bus Drop-off (Lot O)
 - Install concrete retaining wall as documented.
 - Install concrete pavement, curb and walks as documented.
 - Install historic luminaires as documented.
 - Install planting and infiltration soils.
 - Aerate soil as required.
 - Plant trees and shrubs as documented.
 - Repair irrigation.
2. Site Utilities
 - Install quick couplers in valve boxes in areas around building as directed by Owner.
 - Install new power lines from generator as documented.
 - Install new Century Link conduits for telecomm as documented.
 - Install overflow roof drain piping as documented.
 - Install stormwater piping as required.
 - Install sanitary sewer piping as required.

6.4 RESTORATION

1. General
 - Remove tree protection fencing.
 - Replace any dead or damaged trees and plantings that have been disturbed or damaged during construction activities.
 - Repair and or replace any walks, drives, luminaires etc. that have been disturbed or damaged during construction activities.
2. Upper Mall Temporary Parking Lot
 - Remove bituminous pavement access road off of MLK Boulevard.
 - Remove bituminous pavement and aggregate base.
 - Remove bituminous walks.
 - Remove temporary Shoebox type Luminaires.
 - Remove perimeter erosion control bio-log barriers.
 - Repair irrigation.
 - Install topsoil, lawn sod and trees as documented.

3. Upper Mall Staging Area
 - Remove bituminous pavement access road off of MLK Boulevard.
 - Remove any pavement or aggregate base.
 - Remove temporary lighting.
 - Remove perimeter erosion control bio-log barriers.
 - Repair irrigation.
 - Install topsoil, lawn sod and trees as documented.

4. Lower Mall Temporary Parking Lot
 - Remove bituminous pavement access road off of MLK Boulevard.
 - Remove bituminous pavement and aggregate base.
 - Remove temporary Shoebox type Luminaires.
 - Repair irrigation.
 - Install topsoil and lawn sod as documented.

--End of Site Work--



7.1 SECURITY DESIGN NARRATIVE

Electronic Security Systems

1. General Requirements:

- Overall emergency power is required for security systems for their continued operation in times of duress.

2. Access Control Systems

- Access Control System Demolition: Existing access control panels are located on walls that will be demolished during the interiors renovation process. New access control panels shall be located in the Northwest Terrace level mechanical room on a wall that is existing to remain. Existing card access doors shall be cabled to the new access control panels. A coordinated cutover from the existing access control panels to the new panels shall take place to ensure that there are no service disruptions during business hours. All abandoned cabling shall be removed per NEC requirements.
- Existing security monitoring consoles will be moved out of the building under a separately funded project, along with digital, networked security equipment.
- Access Control System Architecture: The Access Control System is monitored by Capitol Security staff at a facility located off-site of the Capitol Building. System monitoring, management, and control is thru Honeywell EBI platform. Within the Capitol Building, PCSC IQ-400 access control panels (up to 4 readers) and PCSC IQ1200 access control panels (up to 12 readers) shall be networked together using RS-485 serial connections. The network of access control panels shall be connected to the “security” IP network. Connections from door hardware and monitoring points shall be wired to access control panels located in the Northeast Terrace level mechanical room. Security panels shall include memory expansion for a capacity of 20,000 card holders minimum. Security panels shall be installed in accordance with specification set in the PSCS IQ-400/1200 Installation Manual 33-10057-001 Rev B (or most recent edition), no exceptions.
- Provide door contact on access control panel doors. Access control panel door position shall be monitored by Capitol Security staff at off-site monitoring station.
- Extensive coordination between the Owner and the design team will be required to determine the threats and vulnerabilities the security system is intended to address. Plan for a quantity of 118 new card readers and 118 new electronic locking devices. Electrical, mechanical, and telecom rooms shall be equipped with card access; additional locations to be determined.
- Provide all required software, hardware, and channel licensing.
- Provide 12VDC power supplies for card readers, request to exit (REX), etc, and provide dedicated 12VDC power supplies for each access control panel. Provide 24VDC power supplies for electric strikes, electric locks, and magnetic locks. Altronix brand power supplies used as basis of design.

- Wall mounted card readers shall be HID Thinline II Proximity readers. Mullion mounted card readers shall be HID Mini Proximity readers.
 - REX motion sensor shall be manufactured by Detection Systems, Model DS150 Series.
 - All Electrified Locking Hardware shall have Noise Suppression Devices installed. Noise Suppression Devices shall consist of a Metal-Oxide-Resistor (MOV), Siemens S10K30 or equivalent and Diode (1N4004-1N4007) wired in parallel with the load (IE, the door strike). If this Noise Suppression is not installed, damage to the Control Panel can occur.
3. Video Surveillance System
- Video Surveillance System Demolition: Existing Video Surveillance System headend equipment is located in the Capitol Security space in the northwest corner of Terrace level. The headend equipment shall be relocated to allow for installation of mechanical equipment in what is now Capitol Security space. The existing coax camera cabling shall be extended to a temporary location within the west wing of the Terrace level and existing equipment racks and headend equipment shall be relocated to the temporary location. As existing analog cameras are replaced by IP cameras they may be disconnected from the system. When all cameras connected to an NVR have been replaced with IP cameras, the NVR shall be decommissioned and turned over to the Owner. If there are any existing analog cameras remaining after work package 4, the analog video surveillance camera equipment shall be relocated to the west Terrace telecom room and new coax cabling shall be provided for connections to the existing analog camera(s) as part of work package 4. All abandoned cabling shall be removed per NEC requirements.
 - Video Surveillance System Architecture: The Video Surveillance System is monitored by Capitol Security staff at a facility located off-site of the Capitol Building. System monitoring, management, and control is thru Bosch Video Management System (BVMS) platform. The video surveillance system shall be a hybrid of analog and IP cameras. All new cameras shall be IP capable. A mix of standard definition (D1 = 720 x 468 pixels) and megapixel resolution cameras shall be used. Cameras shall be located at typical areas including building entrances and exits, elevator lobbies, stair landings, public spaces and corridors, and roof cameras for viewing the site in addition to locations determined during coordination meetings with the Owner. Existing analog cameras that are not replaced will continue to be supported via coax connections to existing Bosch network video recorder (NVR) for conversion to digital signals. The digital signals are connected to the Video Surveillance IP network where the video is recorded by the Bosch digital server. New IP cameras will connect directly to the Video Surveillance IP network for recording on both new and existing digital servers. Upgrade of existing analog cameras to IP cameras and replace existing NVR's with network switches.
 - Add camera coverage as identified thru future coordination with the Owner and Owner's security consultant to mitigate risks identified by threat and vulnerability analysis.
 - Provide a quantity of (40) D1 resolution surveillance cameras, and (32) megapixel cameras. Megapixel cameras shall be an even mixture of 1MP, 3MP, and 5MP cameras. Some cameras may include microphones for monitoring audio.
 - Provide layer 3 network switches to connect 125% of new IP cameras.
 - Provide video surveillance servers and storage with adequate capacity to record all D1 resolution cameras at 30FPS on low video compression settings and all megapixel cameras at 15FPS on low video compression settings for a minimum of 30 days.
 - Provide all required software, hardware, and channel licensing.

- Provide full camera coverage of temporary corridors on Terrace level. Relocate cameras as necessary when temporary corridors are relocated.
 - Consider the use of video surveillance system analytics for determining if vehicles are parked past a threshold predetermined time anywhere on the perimeter and especially under the building stairs.
4. Intrusion Detection System
- Provide intrusion detection system including intrusion detection panel. Provide motion sensors to cover building perimeter doors and windows. Provide all required system and channel licensing.
 - Intrusion detection should be considered for server rooms, certain electrical rooms, certain offices, and other locations to be identified.
5. Duress System
- Replace existing wired duress buttons with wired duress system. Duress buttons shall connect to intrusion detection system and shall report to Capitol Security. Provide all required system and channel licensing.
 - Locate duress alarm at the chair location in Committee rooms, plus one other clerical location.
 - Locate duress buttons in all meeting rooms where permanent installs can be done; certain offices to be included such as governor, attorney general, leaders of both senate and house, and others as appropriate.
 - Where wired duress buttons cannot be physically installed, wireless duress buttons shall be installed, pending Capitol Security approval. Wireless duress buttons shall be Ademco model 269.
 - Provide relay interface between Duress and Video Surveillance Systems for automatic camera call-up upon duress alarm (in locations where video surveillance cameras are present).
6. Intercom System
- Intercom System Demolition: Existing Intercom System headend equipment is located in the Capitol Security space in the northwest corner of Terrace level. A new headend shall be installed in a new location to allow for installation of mechanical equipment in what is now Capitol Security space. The existing twisted pair analog intercom cabling shall be extended to a temporary location within the west wing of the Terrace level and existing equipment rack and headend equipment shall be relocated to the temporary location. The existing analog intercoms will be replaced with digital IP intercom stations. After the existing analog intercom stations are no longer in service, the existing analog headend shall be decommissioned and turned over to Owner. All abandoned cabling shall be removed per NEC requirements.
 - Intercom System Architecture: The Intercom System is monitored by Capitol Security staff at a facility located off-site of the Capitol Building. System monitoring, management, and control is thru Zenitel/Stentofon platform via both software and existing hardware master stations. Intercom substations shall be located throughout the Capitol Building and will communicate with the headend equipment through IP connections. A central Intercom System server shall be located in the main telecom room and networked to the master and substations.
 - New intercom headend shall be Stentofon XE7 hybrid digital/analog exchange. Existing Capitol System programming shall be loaded onto new exchange and modify as required.

Existing analog substation cards will be relocated to the new exchange chassis and connected to existing intercom substations. Headend cutover will be coordinated with Capitol Security prior to installation to minimize system disruption.

- New intercom substations shall be IP based and shall be connected to the intercom network and shall be managed by the XE7 exchange.
 - Temporary intercoms shall be mounted on temporary corridor walls for every 250' of travel. Relocate temporary intercom stations to provide specified coverage as temporary walls are relocated.
7. Portable Body Scanners
- Portable magnetometer body scanners should be available at 16 entrances for use under heightened security conditions. Scanners by Others.
 - Make provisions for enhanced temporary lighting for visual acuity at 16 building entrances.
 - Provide power and data outlets for portable body scanners at sixteen building entrances.
8. Security Kiosks
- Provide cabling and connectors for security kiosks at 16 building entrances. Kiosks by others.

Operational Security

This narrative provides a description of the security systems that will be either provided with this project, or have provisions made for rough in of systems provided by others. In addition to these electronic security systems, there are operational security procedures and practices that could be implemented to enhance security. This information will be communicated with appropriate State security representatives in separate meetings and documentation.

--End of Security Design--



8.1 Architectural Narrative – Interior Work and Finishes

The amount of historic fabric that is left in the building varies greatly around the building. Refer to the “Treatment Zones” as defined in Section 1 and illustrated in Appendix 8. In some public Zone 1 spaces such as the Rotunda, the building is nearly intact. Other areas, such as the Terrace level which is almost entirely Zone 4, the building has changed greatly over the years. The extent to which the building will be ‘restored’ versus sensitively renovated varies according to the Zone and the use. Prior to demolition, a walk-through with the architect, owner, and contractor will occur to note materials such as doors, trim, grilles, millwork, etc. to be salvaged. This material will be inventoried and either reused within the building or put into storage for future projects. All framed art is being considered ‘fine art’ and conservation of those pieces is not included in the scope of this project.

1. Zone 1

- General
 - Devices: modern devices such as thermostats, sprinkler heads, security cameras, WiFi antennas, light switches, etc. will be hidden from view to the greatest extent possible. In some locations it may make sense to hide sprinkler heads and some other devices ‘in plain sight’ by incorporating them into decorative painting or other ‘busy’ decorations.
 - Grilles: Historic grilles will be reused in their original place as much as possible. Where additional grilles are needed, they will be designed to match the originals or incorporated into the overall decorative scheme for the space.
- Public Spaces
 - Floors: restore existing stone (lightly clean, minor restoration work).
 - a. Walls: restore existing stone (lightly clean, minor restoration work). Repair plaster, repaint solid panels. Repaint and re-stencil red panels scattered throughout building.
 - Ceilings: decorative painting on plaster – touch up as needed
 - a. Third Floor corridor ceilings – repair and touch-up 10% of ceiling and do a final cleaning on entire ceiling. Capitols on columns will be re-finished with appropriate gold color but not stripped.
 - b. 1st floor corridor ceilings – clean entire ceiling and touch-up 10%.
 - c. Stair ceiling between Ground and 1st Floor (grapevine painting) – clean to remove varnish.
 - d. Ground Floor, North Hall – restore original decorative paint.
 - e. Restore Gustavino tile ceilings (primarily at Ground Floor). Where tile has been painted, repaint to match original appearance of original glazed tile.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary.

- Chambers
 - Senate
 - a. Floor: new reproduction Axminster to match original carpet
 - b. Walls: clean and repair wall surface at high-wall diffusers. New plaster and paint at niches.
 - c. Ceiling: replace plaster rosettes around ring of lights with new rosettes made of a more durable material (the existing ones are easily broken when the bulbs are changed).
 - d. Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Restore leather doors and metal gates. Door hardware to be restored / repaired as necessary.
 - e. Millwork: conserve millwork and integrate new technology as required
 - f. Miscellaneous: replace seating in galleries with historically appropriate seating (part of FF&E budget).
 - House
 - a. Floor: new reproduction Axminster to match original carpet
 - b. Walls: repair plaster and touch-up paint as needed. Re-gild lettering above the dais. Clean sculpture above dais and touch-up decorative painting behind it. Replace existing fabric acoustic panels with new custom-color panels to match the wall color.
 - c. Ceiling: repair plaster and repaint ceiling in five places.
 - d. Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Restore leather doors and metal gates. Door hardware to be restored / repaired as necessary.
 - e. Millwork: conserve millwork and integrate new technology as required
 - f. Miscellaneous: restore seating in galleries (part of FF&E budget), reconfigure as necessary to make more accessible.
 - Supreme Court
 - a. Floor: new reproduction Axminster to match original carpet
 - b. Walls: touch-up paint on lower portion of walls.
 - c. Ceiling: no work.
 - d. Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Restore leather doors and metal gates. Door hardware to be restored / repaired as necessary.
 - e. Millwork: conserve millwork and integrate new technology as required. The existing modern bookcases behind the bench will be replaced with historically appropriate bookcases.
 - f. Miscellaneous: a portable lift will be purchased to make the bench accessible from the east corridor as required by the justices.
- Retiring Rooms / Consultation Room
 - Floor: new reproduction Axminster to match original carpet
 - Walls:
 - a. Senate: repaint 5% of existing decorative wall paint. Polish the metal plaques at the fireplaces.
 - b. House: clean and re-varnish the existing murals by Elmer Garnsey, which are considered part of the decorative paint. Re-gild the lettering.

- c. Supreme Court: Touch-up decorative paint at wreaths above dais and at south pendantive.
 - Woodwork: lightly clean clear finishes, repaint painted finishes
 - Doors: historic wood doors and trim in Retiring Rooms to be striped, repaired, stained, and receive a new clear coat. Doors in Consultation room to be repaired and repainted. Door hardware to be restored / repaired as necessary.
- Governor's Suite
 - Floors: Repair and restore wood floors. Reception Room to receive a new custom Axminster carpet.
 - Walls: Repair plaster and repaint all solid-colors. Touch-up decorative painting. Lightly clean clear finished woodwork and apply a new coat of varnish.
 - a. Ante Room: repaint. Decorative paint research is underway.
 - b. Reception Room: repair damage at all gold plaster and painted frames. Re-gild the perimeter of the wood paneling. Clean the seventy lunettes.
 - c. Governor's Offices: repaint. Decorative paint research is underway.
 - Ceilings: repaint the ceiling in the Ante Room.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored/repaired as necessary.
 - Miscellaneous: the murals and paintings in the Ante Room and Reception Room are fine art and are not part of the Scope of Work.
- Dining Rooms
 - Rathskeller
 - a. Floor: protect existing tile floor.
 - b. Walls / Ceiling: correct the water infiltration issue and repair damaged paint at north wall. Touch-up 5% of decorative paint area. Repair existing chair rail as necessary.
 - c. Doors: Existing doors, trim, and hardware to remain.
 - Governor's Dining Room
 - a. Floor: new tile floor, similar to the existing tile floor in the Rathskeller.
 - b. Walls / Ceiling: new / restored plaster. Existing crown to remain, repaint. Restore existing mural. Existing mural is considered fine art and is not part of the scope of work.
 - c. Doors: new solid wood stile and rail wood doors and trim to match the original entry doors at for the dining room. New hardware as required..
 - Justice's Dining Room
 - a. Floor: new tile floor, similar to the existing tile floor in the Rathskeller.
 - b. Walls / Ceiling: extensive plaster restoration. Restore existing murals and decorative painting. Existing crown to remain, paint. Existing mural by Carl Olson is considered fine art and conservation / restoration is not part of the scope of work.
 - c. Doors: new solid wood stile and rail wood doors and trim to match doors at Rathskeller. New hardware to match historic hardware.
 - d. Miscellaneous: restore existing millwork and mirrors.

2. Zone 2

- General
 - Devices: modern devices such as thermostats, sprinkler heads, security cameras, WiFi antennas, light switches, etc. will be hidden from when possible. In some locations it may make sense to hide sprinkler heads and some other devices ‘in-plain sight’ by incorporating them into decorative painting or other ‘busy’ decorations.
 - Grilles: Historic grilles will be reused where possible. Where additional grilles are needed, they will be designed to match the grilles original to the building.
- Public Spaces / Secondary Corridors
 - Floors: restore tile where possible. Where tile no longer exists or is too damaged to restore, new custom Axminster carpet with a pattern similar to the historic tile pattern. Remove carpet from stairs and restore stone treads.
 - Walls: existing / new plaster walls. Decorative paint research is underway. Restore running trim(strip, stain, clearcoat), replicate where missing.
 - Ceilings: existing plaster to remain. New ceilings to be gypsum board but are to match original height and profile. Decorative paint research is underway.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
- Offices and Conference Rooms
 - Floors: patterned Axminster carpet. Two patterns to be used in Senator Suites. Two other patterns to be used in other office suites.
 - Walls: existing / new plaster walls. New picture rail to be clear-finished oak to match existing wood trim. Restore running trim(strip, stain, clearcoat), replicate where missing.
 - Ceilings: existing plaster ceilings to remain. New gypsum board ceilings where original ceilings are missing or are being replaced.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
 - Miscellaneous: borrowed lights with quarter-sawn, clear-finished oak trim at walls between inner and outer offices. Built-in millwork at Senator offices and some staff offices to be clear-finish quarter sawn oak.
- Hearing Rooms
 - Floors: patterned Axminster carpet. Two patterns to be used amongst hearing rooms.
 - Walls: existing / new plaster walls. New picture rail to be clear-finished oak to match existing wood trim. Replicated wood base, clear-finish oak. May have some simple decorative painting such as a pin-stripe.
 - Ceilings: combination of veneer plaster, acoustic plaster, and acoustic panels. Painted wood crown.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
 - Miscellaneous: the daises will be custom built millwork made of quarter-sawn oak, finished to match historic millwork.

- AG's Suite
 - Floor: patterned Axminster carpet. One of two patterns to be used in non-Senate, elected official's suites. Clean stone floor in Ante Room.
 - Walls: repair existing and new plaster walls. New picture rail to be clear-finished oak to match existing wood trim. Restore base (strip, stain, clearcoat), replicate where missing. Decorative paint research is underway.
 - Ceilings: existing plaster ceilings to remain. New gypsum board ceilings where original ceilings are missing or are being replaced.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.

3. Zone 3

- General
 - Devices: modern devices such as thermostats, sprinkler heads, security cameras, WiFi antennas, light switches, etc. will be sensitively incorporated into spaces and purposely laid out.
 - Grilles: Modern interpretations of the historic grilles, such as stamped metal grilles, will be used. When diffusers are needed, they will be placed behind the grille.
- Caucus Rooms
 - Floor: patterned Axminster carpet. Same two patterns as are being used in the Hearing Rooms.
 - Walls: restored plaster and painted gypsum board walls. New picture rail to be clear-finished oak to match existing wood trim. Restore base (strip, stain, clearcoat), replicate where missing within the room
 - Ceilings: existing plaster ceilings to remain. New gypsum board ceilings where original ceilings are missing or are being replaced. *Crown? Acoustic plaster?*
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
- Offices and Conference Rooms
 - Floor: patterned Axminster in elected officials' suites. Two patterns to be used in Senator suites and two other patterns in other elected officials' suites. Suites for non-elected officials' to have a tufted carpet.
 - Walls: painted gypsum board walls. New picture rail to be clear-finished oak to match existing wood trim. Restore base (strip, stain, clearcoat), replicate where missing within a room. Rooms with no existing base to have a similar but simpler version of the base that is still finished to match the original.
 - Ceilings: existing plaster ceilings to remain. New gypsum board ceilings where original ceilings are missing or are being replaced. Some non-elected officials' offices that are not along the exterior wall may be required to have acoustic-tile ceilings to provide access to mechanical system components.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.

- Miscellaneous: borrowed lights with quarter-sawn, clear-finished oak trim at walls between inner and outer offices. Built-in millwork at Senator offices and some staff offices to be clear-finish quarter sawn oak.
- Restrooms
 - Floors: salvaged existing marble slabs where possible. New floors may be marble tiles of the same type of marble (Tennessee Pink).
 - Walls: existing / salvaged / new marble wainscot to match existing height and profile. Walls above wainscot are to be veneer plaster.
 - Ceilings: full-height gypsum board ceilings in public restrooms. Small private restrooms that are not along an outside wall may be required to have acoustic-tile ceilings to provide access to mechanical system components.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
 - Miscellaneous: toilet partitions are to be salvaged and replicated versions of the original marble partitions including the nickel hardware and stile and rail oak stall doors. The countertops are also to match the original detailing and materials but be higher to meet modern height requirements. The existing mirrors and frames are to be salvaged and reused. When new mirrors are needed, reproductions, possibly simplified, of the originals are to be made.
- Kitchenettes and Workrooms
 - Floors: carpet to match the suite if located in an open office. When they are enclosed rooms, kitchens are to have tile floors but workrooms are to have carpet to match the suite.
 - Walls: painted gypsum board walls. Simpler version of the existing base that is still finished to match the original base..
 - Ceilings: New gypsum board ceilings where original ceilings are missing or are being replaced. Some enclosed rooms that are not along the exterior wall may be required to have acoustic-tile ceilings to provide access to mechanical system components.
 - Doors: historic wood doors and trim to be striped, repaired, stained, and receive a new clear coat. Door hardware to be restored / repaired as necessary. Replicate historic doors, trim, and hardware where new doors are needed.
 - Miscellaneous: cabinets with quarter-sawn oak fronts, clear-finished to match existing millwork and stone countertops. Appliances are part of the FF&E budget.
- IT and Electrical Rooms
 - Floors: VCT
 - Walls: painted gypsum board with vinyl base.
 - Ceilings: acoustical tile ceilings
 - Doors: as appropriate for outside of the room

A special statement about the Terrace Level: an Architectural Opportunity

When the Capitol opened in 1905, the basement level was just that – a cellar. Mostly, it was raw, unfinished space used for mechanical equipment, wiring, plumbing, storage, and the like. It was accessed from the Ground Floor by small iron stairs, fitting access to a basement service area. Over the years, pressure to use this space increased, and various areas were finished at various times and

to various degrees. In many areas (but not all) the floor level was lowered a bit to create greater headroom. This has the effect of lowering the existing floor slab to approximately the top of the level of the stone footings (this is currently being investigated). While the current height from slab to structure is not generous, it is adequate (average: 8' – 8 ½ ').

The other major change to this area occurred in conjunction with connection of the Capitol to other buildings on the campus via underground tunnels. When the tunnel system was extended through the basement of the Capitol, it was done as a corridor, defined by glazed, structural clay tiles. The result of this is that it is possible to transverse the entire building without even realizing you are in the State Capitol. A convoluted hallway connection was also made from the main (tunnel) corridor, north to the Rathskeller and, more recently, to the new pedestrian tunnel to the North loading facility and the Admin Building.

The basement level is larger than the footprint of the building above, because the building is surrounded by a raised terrace. At one time, this terrace contained a series of “prism lights” that let natural light down in to the basement level. Due to deterioration over the years, most of the terrace (except for the Northwest quadrant) has been re-built, including a concrete structural deck and new columns and beams. One result of this is a change in character of these areas; another is a higher slab to underside of deck dimension.

The current project is treating the entire basement – referring to it now as the “Terrace Level,” as “found space” – underutilized space that can be re-purposed, helping us meet the high demand for space in the Capitol. This area is considered use Zone 4, allowing for a great deal of flexibility of design.

The general architectural effect of this space will be to express the rather “gritty” and powerful architecture which supports the grand building above. Rather than creating an artificial environment by covering up the structural elements, the design will expose and celebrate them to the greatest extent possible. The demolition phase of the project will begin by stripping away almost all of the anachronistic walls and ceilings that have been added to the original structure.

The massive, hand-tooled granite piers will have multiple layers of paint chemically removed, exposing the rich detail of this stone. New partitions will generally be painted brick (if in hallways or other public spaces) or drywall (within office suites) contrasting with the structural stone. The terra cotta arched ceiling, rough as it is, will be patched where needed and painted white – whitewashed surfaces could easily have been the norm in the basement, to facilitate light reflectance. Small internal office may have either drywall or some sort of accessible ceiling, to conceal mechanical equipment. Some areas, especially in the perimeters under the terrace, where the structural ceiling is significantly higher, may have suspended drywall or acoustical ceiling “clouds” suspended within the space but not entirely concealing the structure above.

A combination of simple, contemporary light fixtures and some “black iron” historic replica fixtures will provide light to the spaces. Electrical conduits and fire suppression pipes will be carefully laid out, exposed and painted. Ductwork will generally be concealed in new partition walls and above dropped ceilings in internal office spaces. Ducts will not generally be run overhead, due to height limitations. Grilles will be in the walls. In office suites they will be made of painted, stamped metal;

in public spaces they will be simple cast iron. During the workshop it was decided that public area floors will be slate tile. Offices will be carpeted – most likely carpet tile. Shops and behind the scenes spaces will have finished concrete floors. Locker rooms and similar spaces will have some sort of resilient flooring, probably linoleum or rubber.

Doors and trim will be simple. Doors will be a simple, wood, stile-and-rail type, painted, with surface mounted rim locks. In some cases, the doors will have vision or obscure glass. A 4 inch (wide) by 8 inch (high) cast in place concrete base will be formed around exposed granite piers and walls. This simple base will provide a consistent line for floor finishes, as well as a location for conduits in which to run electrical and communications wiring without channeling the granite. Drywall partitions will have a simple, painted, 8 inch wood base. Some partitions may have borrowed lights and/or transoms, to share the light from space to space.

Casework will also be simple, compared to the more finished spaces upstairs. Natural finished or painted cabinets, bookshelves, and other built-ins may be made from tongue-and-groove, machined boards (beaded board, or v-groove paneling, or equivalent).

The Terrace Level (plinth) has some original window openings (now generally filled with louvers) along the south elevation. The design will provide for new windows in these openings, as well as the addition of several new, similar, openings to bring additional natural light into the Terrace level offices.

All-in-all, the character of the Terrace Level will be designed to complement the more refined Cass Gilbert designed spaces in the building. Visitors will understand that they are in original basement space that has been adapted for modern use. The attempt will be to be sensitive to the historic architecture, fairly timeless in feel, spatially flexible for future alterations (offices), generally reversible and all without creating a false sense of history. When one enters the Terrace level from one of the tunnels, he or she will immediately realize that they are in the Capitol. When visitor descend into this level from the Ground Floor, they will transition gracefully from the somewhat simplified lower level original space (with its Guastavino tile arches), to the simple but sophisticated “new” Terrace Level.

4. Zone 4

- General
 - Devices: modern devices such as thermostats, sprinkler heads, security cameras, WiFi antennas, light switches, etc. will be sensitively incorporated into spaces and purposely laid out.
 - Grilles: Simplified modern interpretations of the historic grilles, such as stamped metal grilles, will be used. When diffusers are needed, they will be placed behind the grille. In non-public and non-office areas, modern grilles and diffusers may be used.
- Terrace Level – Public Corridors
 - Floor: slate tile floor
 - Walls: exposed granite foundations where possible (remove paint). Existing openings to be infilled with painted brick and gypsum board. Simple painted wood base at gypsum

- board walls. A concrete base should be poured against all of the existing stone foundations and be painted.
- Ceilings: exposed structure painted out.
 - Doors: painted and simplified versions of the stile and rail wood doors in the rest of the building. New but historically appropriate hardware.
 - Terrace Level – New Dining Areas
 - Floor: slate tile floor
 - Walls: exposed granite foundations where possible (remove paint). Existing openings to be infilled with gypsum board. Simple painted wood base and chair rail at gypsum board walls. A concrete base should be poured against all of the existing stone foundations and be painted.
 - Ceiling: exposed structure painted out.
 - Doors: the dining areas will be open to the corridor but any doors off of them should be painted and simplified versions of the stile and rail wood doors in the rest of the building. New but historically appropriate hardware.
 - Miscellaneous: acoustic treatments in the form of suspended banners or ‘clouds’ of acoustic plaster will be added to this space to help control the noise.
 - Terrace Level – Offices
 - Floors: tufted carpet.
 - Walls: painted gypsum board walls and painted stone foundation. Simple painted wood base at gypsum board walls. A concrete base should be poured against all of the existing stone foundations and be painted.
 - Ceilings: exposed structure painted out in open areas. Small offices to have a gypsum board ceiling or acoustic tile ceiling.
 - Doors: painted and simplified versions of the stile and rail wood doors in the rest of the building. New but historically appropriate hardware.
 - Kitchenettes and Workrooms
 - Floors: carpet to match the suite if located in an open office. When they are enclosed rooms, kitchens are to have tile floors (slate tile at terrace level) but workrooms are to have carpet to match the suite.
 - Walls: painted gypsum board walls and painted stone foundation. Simple painted wood base at gypsum board walls. A concrete base should be poured against all of the existing stone foundations and be painted.
 - Ceilings: New gypsum board ceilings where possible. Some rooms may be required to have acoustic-tile ceilings to provide access to mechanical system components.
 - Doors: painted and simplified versions of the stile and rail wood doors in the rest of the building. New but historically appropriate hardware.
 - Miscellaneous: painted wood cabinets with black plastic laminate countertops. Appliances are part of the FF&E budget.
 - Mechanical, Electrical, and IT rooms
 - Floors: sealed concrete.
 - Walls: exposed, painted foundation walls. New walls to be painted gypsum board with vinyl base or painted CMU with vinyl base as required.
 - Ceilings: existing ceiling structure to be left exposed and painted out.

- Doors: doors completely within Mechanical/Electrical service areas can be painted hollow metal with hollow metal frames. Entry doors off of corridors or offices are to be painted wood stile and rail doors to match the other doors in those spaces.

--End of Architectural –Interior Architecture and Finishes--



9.1 ROOFING

1. Introduction

The roof at the Minnesota State Capitol Building comprises a wide variety of materials, levels, profiles, and configurations. The Roofing Replacement Project will address all of these aspects (except for the marble-roofed portions) to varying degrees, from complete replacement in most areas to minor repair and rehabilitation in others.

2. Existing Conditions and Demolition

Roofing demolition will include removal of existing mechanical equipment that is no longer part of the proposed new HVAC systems, removal of all roof drains and much of the connected piping (see Plumbing Narrative,) and removal of the current primary protected membrane system and the layers beneath it. The existing lightning protection system and flood lighting fixtures will also be removed, stored, and reinstalled after the roofing replacement is complete.

The existing roofing materials over the original concrete roof deck that must be removed and discarded include:

- 2" concrete pavers and support pads
 - Filter fabric
 - 3" extruded polystyrene
 - 60 mil neoprene sheet membrane
 - Another filter fabric
 - Another 60 mil neoprene sheet membrane
 - 1/2" wood fiber board
 - 4 ply BUR roofing system with ACM (Asbestos Containing Material)
 - KMM aluminized roll roofing (Koppers Multipurpose Membrane)
 - Coal tar pitch

The quarry tile-paved Quadriga plaza level and the associated concrete filler slabs and single-ply membranes will also need to be removed, as well as similar tiled surfaces at second floor loggias and balconies. The exposed original concrete roof deck at all areas where roofing has been removed will require thorough preparation for new materials.

3. New Primary Protected Membrane Roofing

The major low slope portions of the Capitol roof that currently have pavers and a protected membrane system will receive a new hot-applied, fabric reinforced, rubberized asphalt protected membrane applied directly to the cleaned and primed existing concrete roof deck, along with a protection board, drainage mat, 4" of extruded polystyrene insulation, and an open paver ballast system. Along the roof edge perimeter behind the balustrade where the roof drains are located, the pavers will not be used. Instead, a 2' to 3' wide band of river rock will be installed over the

tapering insulation to increase the speed and efficiency of water movement around the roof drains. New roof drains and associated piping will be installed in the plumbing contract, along with a separate overflow drain system with outlets to daylight at appropriate locations. (See Plumbing Narrative.)

4. New Metal Roofing

At the steeper sloping areas of the east and west roofs between the grand stair skylights and the Senate and Supreme Court domes, and at the areas around the House half-dome, the current protected membrane system with pavers will be replaced with a flat locked-seam copper roof over half-lapped 30 lb. felt and red rosin paper on fire-retardant treated nailable sheathing over 3” of polyisocyanurate insulation and a vapor retarder that is fully adhered to the concrete roof deck. At the small roofs surrounding the marble “beehive” domes, the paved membrane installation will be replaced with minimally sloping, flat soldered-seam copper roofing over sheathing, insulation, and vapor retarder to match similar conditions nearby and improve the drainage from these areas.

5. New Tile Walking Surfaces

The Quadriga level plaza tile slabs and membrane installation will be replaced with a fully-adhered vapor retarder, membrane drainage mat, insulation, topping slab, waterproofing underlayment, and modified thin-set tile with epoxy grout. The second floor balconies and loggia areas will be similarly repaired and resurfaced with concrete deck repair, waterproofing membrane, and modified thin-set tile with epoxy grout.

6. Existing Standing Seam Metal Roof

The 1994 copper standing seam (batten) metal roofs over the Senate and Supreme Court domes, and at both the half-dome and gable portions of the House roof are in good condition, other than having been considerably dented by hail, and will remain as they are. Work on those metal roofs will be limited to patching and/or repair of loose battens, flashing, and trim.

7. Existing Soldered Flat Seam Metal Roofs

The 1994 flat copper roofing with soldered seams at the base of the drum windows between columns, at the south elevator overrun plinths, at the east and west façade parapet corners, at the flat roof areas at the base of the Senate and Supreme Court dome drums, and around the base of the marble “beehive” domes will not be replaced. All surfaces will be repaired, patched, and/or re-soldered as necessary.

8. Existing Metal Flashing, Gutters, Suppers, and Downspouts

Most if not all existing metal flashings that need to be removed to facilitate repairs and reroofing will be replaced with matching new material when reinstalled. Existing gutters, scuppers, and downspouts will be repaired as required, and added to when and where necessary to improve direction, speed and/or consequence of water drainage.

9. Existing Skylights

There is no work proposed for any of the twenty-eight skylights of various sizes around the Capitol roof, other than patching and/or repair of loose or damaged materials.

10. Access Walkways, Stairs and Ladders

The current raised metal walkways for access to flag poles and other portions of the roof will be temporarily removed where necessary for roofing demolition and new roofing installation. Related roof-mounted posts and supports at re-roofed areas will be re-flashed. All metal portions of the walks and railings will be repaired and refinished. Over each new sloping metal roof adjacent to the grand stairway skylights, a new galvanized and painted walkway with railings similar to existing will be installed next to the skylight end wall. Additional fixed access ladders or other access means will be provided at currently inaccessible roof areas, like the north corner “beehive” roofs.

9.2 LIGHTNING PROTECTION

Refer to drawing sheet E115 for roof plan showing location of existing air-terminals. Temporary removal, and reinstallation of existing air-terminals located on the roof elements shall be included in the scope of this project. The removal and reinstallation of the air terminals that are currently mounted to the stone elements at the perimeter of the roof are included in the scope of the separate Stone Repair project (see paragraph below).

9.3 TERRACE LEVEL WINDOWS

Existing louvers at the south elevation at the terrace level will be removed during demolition. The louvers will be replaced with wood windows with fixed wood sashes. Provide brick mold trim and wood sills at the exterior and wood trim at the interior. Glazing to be approximately 1-1/4” thick laminated, insulated, low-e coated glass unit, with a PVB fragmentation film.

9.4 TERRACE LEVEL LIGHTS

Sidewalk lights similar to the original prism lights will be reintroduced at the south plaza to introduce additional natural light at the terrace level. Additionally, one sidewalk light will be added where the new tunnel enters the building to help create a sense of arrival. Refer to drawings for locations. The terrace lights will utilize a glass paver system, similar to one produced by Circle Redmont, or equal.

9.5 EXTERIOR WALL

Note that insulation will not be added to the exterior wall. Modifications to the exterior wall associated with this project will be limited to necessary work for building systems replacement, such as power, data, etc.

9.6 EXTERIOR STAIRS & PLAZA

A separate investigative effort is under consideration to review the current condition of the exterior stairs, waterproofing and plaza elements. This effort is not in the scope of this project at this time.

9.7 INTERFACE WITH SEPARATE EXTERIOR PROJECTS

There are currently separate projects underway at the Capitol for the following exterior building components.

1. French Doors: *CP-D1, French Door Repair & Restoration*, RECS Project No. 02CB0022 (*dated August 9, 2012*): All of the building’s original wood French doors, hardware, and associate

transom windows or transom panels are being removed and restored. The doors and transom windows are being re-glazed with insulated glazing. Original hinges are being restored. The French doors will be finished to match the original finishes of the spaces in which they are currently located. For example, French doors at the Supreme Court Conference Room are to be painted to match the original off-white, based on the Conservator's (Wiss, Janney, Elstner) reported Munsell number, 2.5Y 8.5/2. The remaining painted wood in those rooms will be painted the same Munsell number as a part of the Interior Restoration project. The WJE report, *Minnesota State Capitol Analysis of Select Interior Door and Transom Finishes*, dated November 9, 2012 is available for use by this project team.. J.E. Dunn is the Construction Manager and HGA is the design architect. Wiss, Janney, Elstner, is the Conservator.

2. Windows at Ground, First, Second and Third floors: *CP-W1, Window Replacement and Restoration, RECS Project No. 02CB0022 (dated Feb 7, 2013)*: Existing aluminum windows and aluminum panning covering the original wood window frames will be removed. New wood window sashes with insulated glazing with fragmentation film will be installed within the restored original wood frames. In locations where operable windows are needed, the lower sash will be operable, and the upper sash will be fixed. CP-W1 window work will be done in conjunction with the Stone Repair project over a three year period, beginning in 2013. J.E. Dunn is the Construction Manager and HGA/SCA are the design architects for this work effort.
3. Exterior Stone Repair: *CP-S1, Stone Repair Trials & Testing, RECS Project No. 02CB0022 (dated August 28, 2012)*: This trial phase of construction aided in evaluating repair techniques and identified repair strategies for the following three tiers of stone repair:

Tier 1 (T1) repairs focus on life safety issues. All unsound material is removed or stabilized to support life safety. The building is cleaned, and joints are re-grouted.

Tier 2 (T2) repairs focus on water management. These repairs restore the functional water shedding components of the building in order to slow future deterioration of adjacent exterior building material and to protect interior finishes from water damage. The work includes Dutchman replacement of some water shedding features. Joints are restored, and cracks are repaired.

Tier 3 (T3) repairs includes a focus on the carved building elements which typically exhibit the most severe damage, including select Dutchman replacement of highly deteriorated character defining features of the building to aid in preserving the visual character of the original architecture.

Cleaning of the stone for the first phase of repair efforts is currently underway at the following locations at the Capitol: the East façade, the North façade of the East Wing, and the East façade of the North Wing. Contract Documents are nearing completion for *CP-S2, Exterior Stone Repair*, associated with the 2013 stone construction work effort. Three additional phases of stone repair work are planned for 2014, 2015, and 2016 (upcoming CP-S3, CP-S4, and CP-S5 sets respectively). J.E. Dunn is the Construction Manager and HGA/WJE are the design architects and engineers for the stone work effort.

--End of Architectural-Exterior--



10.1 FURNITURE / FITTINGS / EQUIPMENT

1. Design Intent

Furnishings for the restored Capitol will include a mix of historic furniture, original to the building, custom adaptations and new mass-produced pieces. The design intent is to create a harmonious environment; saving for all time the best of what we already have, while making sensitive additions to create state-of-the art office space for today and for years to come. The criteria used to make furniture selections will include; the preservation zone for each space, functional needs, ergonomic considerations, durability, maintainability, and of course, budget. Guiding principles for furnishings include the following:

- Use original Gilbert furniture wherever feasible, particularly in Zone 1 spaces, typically the public and ceremonial areas.
- Create custom adaptations to fulfill technology and ergonomic requirements where practical.
- Utilize mass-produced pieces (such as systems furniture) that is harmonious with the historic interiors.

2. Original Furnishings

Cass Gilbert was directly involved in determining furniture styles and selections for the Minnesota State Capitol. He designed much of the furniture used in public and ceremonial spaces. Over 1600 pieces of furniture were manufactured and purchased for the building in 1905. Today we are fortunate to have approximately 800 of those original pieces, and approximately 700 are currently in use in the Capitol.

In addition to designing some 42 styles of custom furniture that were built primarily by Herter Brothers of New York (and its subcontractors), Cass Gilbert also selected furniture available commercially at the turn of the century. Examples of this commercially available furniture include roll-top desks from Derby Desk Company and revolving bookcases from John Danner Manufacturing Company.

In 1984, the Minnesota Historical Society (MHS) assumed the responsibility for inventorying these original pieces. By September 1989, approximately one-half of the original order had been located in fifteen different State buildings. MSH tagged all surviving pieces and completed an inventory that thoroughly documents all details, thereby fulfilling their role in the placement and preservation of works of art, including this furniture in the Capitol. MHS updates this inventory annually. Through review of 1905 and later photographs MHS has successfully reconstructed original floor plans, illustrating where various pieces were originally used and how their use changed over time.

Fortunately, most of the surviving Gilbert pieces have remained in the Capitol building, however, some have migrated to other buildings and are in use by legislators or other State officials. Often these pieces provide an emotional link to the Capitol building, so it may be difficult to reclaim these as a part of this renovation. If these pieces cannot be returned to the Capitol now, perhaps this can occur in the future as personnel change.

Over the years, the Minnesota Historical Society has refurbished a number of items and they have had several pieces reproduced to enhance historic spaces, such as the Governor's Ante and Reception Rooms. Careful preservation and restoration work on original furniture will continue through this project by developing exacting specifications and identifying qualified craftspeople to complete the work. Staff members from MHS have been involved in the early planning and budgeting for this preservation work.

The design intent is to use as many of these original pieces as possible, particularly in Zone 1 spaces, and more specifically where they can be appreciated by the public.

3. Other Types Of Furniture For The Restoration

- Reproductions: In some Zone 1 and 2 spaces, new custom reproductions of a historic piece may be required. As noted above, in the past MHS has had some pieces reproduced to enhance specific rooms. These pieces are clearly inventoried as reproductions for future reference.
- Custom Adaptations: Some Zone 1 and 2 spaces will require new custom pieces that accommodate today's needs. For example, a Legislative Chamber might require a new console to accommodate current technology, or a Hearing Room might require an adjustable height lectern to meet ADA requirements. The design of these custom pieces will be informed by the design of the original furniture and built as high-quality legacy pieces, using similar materials and details.
- New Mass-Produced Pieces: In office spaces, which are typically Zone 3 or 4, mass-produced office furniture will be used. This may include oak desks, ergonomic task chairs and file cabinets. Some office space might include built-in oak casework incorporating appropriate worksurfaces, and efficient storage. Large work areas might require "systems" furniture that provides visual privacy between workstations and some level of flexibility – this can be accomplished by using hutch-top storage units on desks or wood-trimmed acoustic panels, so that furniture meets current needs, but is still in harmony with the historic building.
- Existing Furniture: There will also be areas where existing late 20th century furniture will be reused. An inventory will be taken of existing pieces and the "best" will be identified for reuse, primarily in non-public areas. For example, existing wood furniture currently in a Senator's office may be re-purposed in a staff office. This might require some refinishing and reupholstering to blend with the restoration, and once again harmony will be the goal.

4. Furnishings By Zone

- Zone 1 protects the most significant areas in the building. These spaces (such as the Governor's Reception Room) are given the highest priority for architectural integrity and shall be furnished primarily with original Cass Gilbert pieces, reproductions and custom adaptations. Textiles and finishes will be as close to original as possible. For example, in the Legislative Chambers, original desk chairs upholstered in leather, might be modified to have a 5-star pedestal base of the same design to improve stability and safety (original 4-star pedestal bases will be preserved in the archives).
- Zone 2 spaces have significant architectural character (such as spaces used as Hearing Rooms) and the design will preserve and restore these spaces. Furnishings may include original Cass Gilbert pieces (if available), and custom adaptations with textiles and finishes to replicate the original period. For example, seating in a Hearing Room might include a custom wood chair, similar to one of Cass Gilbert's original pieces, but modified for mass production.
- Zone 3 spaces offer flexibility for use and configuration (such as areas assigned as Legislative Office space). Original historic finishes have been lost or covered with newer finishes, however the newer finishes in these areas should be compatible in character and design with the original. Furnishing will include a combination of original Gilbert pieces (if available), custom adaptations and new mass-produced pieces. Finishes and textiles will be durable, but harmonious with the building period. For example, a task chair in a legislative office might be a mass-produced adjustable chair with good ergonomic features, upholstered in dark leather and without chrome details. In an open office suite multiple staff might sit at wood desks with hutch tops that divide the space, creating individual workstations. There may also be existing late 20th century guest chairs that are appropriate to the building that can be re-purposed in these staff areas.
- Zone 4 includes reclaimed spaces on the Terrace Level and spaces that had ultimate flexibility in the original design. These spaces will include building systems and service areas, as well as staff office space. Furnishings will include new mass-produced pieces and re-purposed existing furniture. For example, a Manager's office might be furnished with a hand-me-down desk and credenza from an existing Senator's office.
- When completed, the renovated Capitol will be furnished with a combination of new and old pieces, creating a functional and elegant space, with the historic character of Cass Gilbert's original design.

--End of Furniture, Fittings and Equipment--



11.1 Painting Narrative

1. Definition of Decorative Paint

The Minnesota Statutes, 138.67-69 defines the works of art in the building as follows;
Subd. 2. Work of art

“Works of art” in all spaces of the Capitol, means paintings, portraits, mural decoration, stained glass, statues and busts, bas-relief, ornaments, furniture, plaques, and any other article of structure of a permanent character intended for decoration or commemoration placed in the Capitol in 1905 or placed subsequently for historic purposes or decoration.

This restoration project has defined a portion of this art as “Decorative Paint”. This shall include all painted plaster and canvas surfaces that are an integral part of the architecture including; stencil work, free-hand patterns, repetitive designs, gold leaf, faux finishes, glazes and lettering. For the most part, this includes decoration originally designed by artist Elmer Garnsey. Framed murals, portraits (typically commissioned pieces); plaques and other decorative elements are considered Fine Art and shall not be addressed in this summary.

2. Design Process

The restoration design team conducted a walk-through of the building in March 2013. Included were representatives from the Minnesota Historical Society, architectural firms HGA and SCA, historic materials consultant WJE, historian William Seale and representatives from decorative paint consultant, Conrad Schmitt Studios. Previous documentation was reviewed including an Inventory of Art in the Minnesota State Capitol, the Furnhoff Study of 1985 regarding decorative paint analysis, and other documentation from previous restoration campaigns. During this walk-through, each decorative surface was visually reviewed for condition and signs of active or inactive distress. (For example: peeling plaster and paint is considered active distress; discolored varnish is considered inactive distress.) Selected areas were identified for further research. In some cases, exposures were needed to determine previous paint schemes and colors. In other cases, sampling was needed to conduct further analysis in a lab. The firms of WJE and Conrad Schmitt conducted this research during the first quarter on 2013.

3. Design Intent

Philosophically, the intent of the restoration project includes; creating a functional and safe Capitol Building; maintaining and restoring the architectural integrity of the building; and respecting and enhancing the visitor and user experience. Decorative paint work is a critical part of meeting these goals.

There are several approaches to treatment of the decorative paint in the Capitol. The choice of treatment will depend on the Preservation Zone and the condition of the existing fabric. For purposes of this summary, the following treatment definitions are offered:

- Conservation: Preserve as much of the historic fabric as possible. Stabilize it, but let it look old.
- Restoration: Repair the original and return it to its original appearance. It looks original.
- Replication: Recreate the original without regard for the historic fabric. It all looks new.
- New Sympathetic Decoration: Create new designs in new spaces.

With these guidelines, decorative paint work will be refreshed throughout the building. Refer to the detailed preliminary report by Conrad Schmitt Studios for proposed treatment and cost estimates for each area. A summary of activities on each floor is as follows:

- Basement
There are three dining rooms on the basement level that originally featured decorative paint. The Rathskeller, the 1935 Governor's Dining Room, and the 1937 Justice's Dining Room. The Rathskeller was previously restored and will require only refreshing. The other two smaller rooms are in very poor condition and replication of decorative paint is proposed. The mural in each of these small dining rooms is considered Fine Art – they are in poor condition and are not addressed in this summary.
- Ground Floor
This level includes public hallways, public hearing rooms, and staff offices. In general, current finishes are stable, however there is some indication that some stenciling on both walls and ceiling in public halls have been painted over. Restoration or replication of these surfaces is proposed. Hearing rooms on this level are not original and therefore do not have original decorative paint, however given their new use, new sympathetic decoration might be considered in these areas.
- First Floor
This floor is the historic entrance level and includes the offices for elected officials, public hearing rooms, the rotunda floor and public hallways. Current finishes are stable at this level however there is some indication that work is needed in all entry vestibules, partially due to water infiltration and in part due to low quality of previous repairs. Conservation is recommended for the vaulted ceilings of the central public hallways, however if these vaults are affected by sprinkler installation, complete conservation will not be possible and some restoration will be needed. In some areas correction of color and the removal of discolored varnish is recommended, along with touch-up. In the Governor's reception area proposed work addresses damaged plaster, and gild and varnish replacement.
- Second Floor
The second level includes the floor of the House and Senate Chambers, the Supreme Court Chamber, office space and public hallways. In the House Chambers, current decorative paint is generally in good condition – only touch-up is needed. The side corridors adjacent to the House Chambers have a 1930s treatment on

the vaulted ceiling, and although it does not date to the original building, maintaining this and touch-up is recommended. The House Retiring Room includes a “tree” mural which is considered part of the decorative paint, and cleaning is recommended.

The Senate Chambers has some localized damage in niches and selected walls, on the balcony arches and around mechanical vents – repair and touch-up is proposed. The Senate Retiring room is very good condition and requires only touch-up in select locations.

The Supreme Court Chamber is also in good condition, but requires touch-up in the vestibule and the courtroom. The Court’s Retiring Room was originally and will continue to be creamy white with a small amount of decorative paint at wreaths where touch-up is required.

Public Hallways are in good condition, but wall panels are inconsistent in color, due to multiple painting campaigns. Restoring these to a consistent color is recommended.

- **Third Floor**

In addition to office space, meeting rooms and the balconies for each chamber, the third level provides a view of the decorative ceilings and lunettes above public halls and the column capitals that flank these halls. The decorative ceilings and column capitals exhibit tarnished gold and the lunettes require cleaning. Public hallways on this level were recently investigated and re-painted and shall remain as is, although some water damage must be repaired.

Although ceilings are generally in good condition, if they are affected by the installation of sprinklers, additional repair and restoration will be required. Painted surfaces in the oval stair well are in stable condition, but do not reflect the original colors – repainting this stairwell using original color scheme is recommended. This level offers a view of the top of the rotunda where the cleaning of lunettes and the repair of wide-spread water/plaster damage is recommended. The large mural in the rotunda are classified as Fine Art and not addressed here. Meeting rooms on this level do not show evidence of decorative paint; however these may be areas where new sympathetic decoration is introduced.

--End of Painting--



12.1 STRUCTURAL DESIGN CRITERIA

Building Codes and Standards

The following building codes are currently adopted by the State of Minnesota:

1. 2007 Minnesota State Building Code (2006 International Building Code with Minnesota amendments).
2. 2007 Minnesota State Building Conservation Code (2000 Guidelines for the Rehabilitation of Existing Buildings with Minnesota amendments).

Having been deemed acceptable by the Authority Having Jurisdiction, the criteria for structural analysis and design of modifications to the Capitol will be based on the following codes expected to be adopted by the State of Minnesota:

1. 2012 International Building Code (IBC), with Minnesota amendments.
2. 2012 International Existing Building Code (IEBC), with Minnesota amendments.

Reference standards adopted by the 2012 IBC and IEBC codes include:

1. ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
2. ACI 318-11 Building Code Requirements for Reinforced Concrete.
3. AISC 360-10 Specification for Structural Steel Buildings.
4. MSJC 2011 Building Code Requirements for Masonry Structures (ACI 530-11/ASCE 5-11).

Building Category

The Building Risk Category is III, based on Assembly occupancy.

Refer to Section 3 – Life Safety for additional details of construction type and required fire-resistance ratings for new structural elements.

Design Floor Live Loads

The following live loads are minimum design loads for various usages. The capacity of existing floor framing may exceed these values. All added floor framing will be designed for a live load not less than 100 PSF to accommodate future flexibility of space utilization.

Lobbies, corridors, stairs	100 PSF
Public assembly spaces:	100 PSF
Office:	50 PSF (plus 15 PSF partitions)
Chambers and galleries (fixed seating):	60 PSF
Light storage, file rooms:	125 PSF
Mechanical and electrical rooms:	125 PSF (or actual equipment load where greater)

Snow Loads

Ground Snow Load = 50 PSF
Snow Importance Factor = 1.1
Snow Exposure Factor = 1.0
Snow Thermal Factor = 1.0
Flat Roof Snow Load = 39 PSF

12.2 MATERIALS

Materials for new work within the building will conform to the following:

Cast-in-Place Concrete

F'c=4000 psi at 28 days for footings, walls and slab-on-grade
F'c=3500 psi at 28 days for lightweight concrete on metal deck
F'c=4000 psi at 28 days for all other concrete

Concrete Masonry

Concrete masonry units: ASTM C90 type "N-1"
Masonry grout: F'c=3000 psi at 28 days
Structural masonry: F'm=1500 psi using Type S mortar

Steel Reinforcing

Reinforcing bars: ASTM A615 (grade 60)
Epoxy-Coated reinforcing bars: ASTM A775 or ASTM A934
Reinforcing bars to be welded: ASTM A706 (grade 60)

Structural Steel

W shapes and WT cut from W shapes: ASTM A992 (Fy=50 ksi)
Plates and shapes other than W: ASTM A36 (Fy=36 ksi)
Hollow structural sections (HSS): ASTM A500 Grade B (Fy=46 ksi)
Pipes: ASTM A53, Types E or S, Grade B or ASTM A501
Bolts: ASTM A325 and A490
Anchor Rods: ASTM F1554

12.3 EXISTING STRUCTURAL SYSTEMS

Existing Structural Systems Overview

The structural systems of the Minnesota State Capitol primarily consist of load-bearing brick and stone masonry walls and piers supporting steel-framed floor and roof systems. Floor systems generally consist of brick and terra cotta tile masonry arches and vaults spanning to steel framing. Roof systems are a combination of clay book tile supported by steel framing and steel-framed domes over the chamber spaces. The main dome is a marble and brick structure, reinforced with embedded steel elements. The lantern structure atop the dome is independently supported on a steel frame inside the shell of the outer dome.

Existing Structural Conditions Overview

Overall, the conditions of structural systems within the Minnesota State Capitol are good, considering its age of over 100 years. Most of the structure is original, and where significant deterioration has been discovered, the structural elements have been repaired or replaced.

The majority of previous structural deterioration has been attributed to water infiltration through the building envelope. Some of the most vulnerable areas have been the main dome and exterior terraces at the building perimeter. Restoration and repair of the exterior stone façade is in progress as a separate project.

Refer to the Historic Structures Report and Predesign prepared for this project for additional details of the existing structural systems and conditions.

12.4 STRUCTURAL MODIFICATIONS – GENERAL

Structural modifications within the Capitol will generally be required to support other building systems and functions. Elevators and stairs will be added, modified and extended in a number of locations. Significant foundation underpinning and modification will be required to accommodate routing of underfloor ductwork and other utilities below the Terrace Level floor. Additional vertical and horizontal penetrations through existing floors and walls will be provided for routing of building systems, and modifications within attic spaces may be required to support routing of mechanical and electrical systems. Removal of existing columns and bearing walls is anticipated in some locations to accommodate programming of the spaces and will require modification and re-support of the adjacent floor framing and supporting foundations.

Repair or restoration of deteriorated structural elements is expected to be limited based on the existing conditions observed. One exception is at the northwest corner of the existing Terrace Level, in the area outside of the original building footprint and currently housing Capitol Security. Cracking of the terrace slab was observed from the exterior during the 2012 West plaza and stair repair project, and the interior conditions are not fully known. This area will be investigated further as demolition occurs in this space.

Consistent with the Capitol historic preservation principles, the existing structure of the building will be preserved and maintained to the extent possible. This is particularly important within Preservation Zone 1 spaces, where major interventions into historic finishes could be required to access structural elements. All modifications to the existing structure will be sensitive to the historic integrity of the building and compatible with the existing materials. Testing of existing materials may be necessary to verify strength and determine appropriate methods for connecting new elements to existing. If deterioration is uncovered during the course of work, preference will be given to repairing and strengthening the original elements, as opposed to replacement.

The following sections describe the currently anticipated scope of structural modifications.

12.5 DEMOLITION

Structural demolition will be required in conjunction with many of the building structure modifications. Major demolition scope items and locations are identified on the Architectural demolition plans and described in the following sections.

All structural demolition is to be coordinated with the new work required, such as temporary shoring, underpinning, reconfiguration and re-support of existing framing, and new permanent framing and lintels. As a result, structural demolition will generally need to occur in conjunction with the associated permanent structural modifications.

Temporary shoring of existing walls and columns supporting significant loads will be required. All shoring design is to be provided by a professional engineer licensed in the State of Minnesota.

12.6 FOUNDATION UNDERPINNING AND MODIFICATIONS

Significant ductwork and other building utilities will be routed below the Terrace Level floor slab to maximize the useable space on this level. Due to the size of the utilities and the limited depth of footings and space between them, significant underpinning or soil modification will be required below existing footings to permit the excavations required for the routing of the utilities.

The existing foundations typically consist of tiered limestone and concrete slabs supporting stone foundation walls and piers. Due to the previous lowering of the Terrace Level floor, the top of footings are visible in many locations. The depth from the current floor to the bottom of existing footings is expected to be approximately two feet in much of the building interior based on available information. These shallow, closely spaced foundations limit the utility excavation that can be accomplished without undermining the footings.

A geotechnical investigation is underway to evaluate properties of the existing soils and foundations supporting the Capitol building and to determine appropriate methods for supporting the existing foundations adjacent to utility excavations. Possible methods include chemical grouting or traditional concrete crib underpinning. The suitability of the two methods is dependent on the

existing subgrade soil properties. As geotechnical information becomes available, additional details and recommendations for the foundation modifications will be developed.

Based on the extents of the underground ducts and other utilities anticipated at the Terrace Level, the majority of the existing slab on grade will be removed and replaced. The new slab on grade will be 5" thick, with a 15-mil underfloor vapor barrier directly below the slab and placed on suitable compacted underfloor subgrade material.

Refer to the Structural drawings for representative foundation modification scope and typical details.

12.7 STAIRS AND ELEVATORS

To address accessibility and life safety, a number of modifications are required to current stairs and elevators. One new enclosed stair and a service elevator will be added in the area northwest of the Rotunda. The existing south Rotunda elevators and Governor's private elevator will also be replaced. Additional stairs will be added or extended in a number of locations:

- Far East stairs (North and South) will be extended to the Ground Level
- Far West stair (North) will be extended to the Ground Level
- West Senate gallery stair (South) will be extended to the Ground Level
- Two convenience stairs will be added adjacent to the House chamber between First and Second Levels
- Convenience stairs will be added at the Governor's and Attorney General's suites.

Enclosed Stair and Service Elevator

The new enclosed stair and service elevator will be built within load-bearing CMU wall enclosures on new foundations. Portions of the adjacent existing floors to remain will be re-supported on the CMU walls. Temporary shoring of the existing floor structure will be required during construction of the stair and elevator. The new elevator pit will require modification and underpinning of adjacent existing footings. Depending on the type of elevator selected, modifications to the roof structure above the elevator may also be required to provide an adequate overrun.

Removal of a load bearing masonry vault wall adjacent to the new stair and elevator is planned in conjunction with the work in this area to maximize the available space. Shoring and re-support of the floor framing will be required and will be incorporated into the new construction for the adjacent elevator and stair. Wall removal is expected to occur between the Terrace Level and Second floor. This will require temporary shoring and re-support of floor framing on the Ground, First and Second floors, and re-support of two columns above the Second Level that currently bear on these walls. It is anticipated that new columns below the existing columns will be required to re-support the column loads and floor framing.

Added and Extended Stairs

Stairs to be added or extended will require new floor openings through the existing structure to accommodate the stairs. Reconfiguration and re-support of adjacent floor framing will be required to create the openings. The stairs will generally be supported from existing masonry walls and reconfigured floor framing at the landings. Shoring, modification and re-support of the existing portions of these stairs to remain will also be required. At some locations the stairs will also require new or enlarged openings through existing masonry bearing walls for access.

Replacement of Existing Elevators

The three existing elevator cabs in two hoistways on the south side of the Rotunda will be replaced. Modification will be made to the elevator machine support framing, pits and hoistways as required to accommodate the new elevators.

The Governor's private elevator will also be replaced and extended to the Terrace level. This will require demolition of the existing elevator shaft and pit, and construction of a new pit. To create the new elevator pit, modification and underpinning of adjacent existing footings will be required.

Refer to Section 3 – Life Safety, and Section 22 – Vertical Circulation for additional details of the elevators and stairs. Refer to Architectural demolition drawings for locations of associated floor openings.

12.8 VERTICAL SHAFTS AND PENETRATIONS

To support the replacement of the major building system infrastructure, a number of new or enlarged vertical penetrations will be required through the existing floors. Existing floor structures generally consist of hollow terra cotta tile arch construction supported by steel framing. The majority of floor areas above the ground floor are of flat tile arch construction, while the ground level floor consists of segmental arch construction. Guastavino timber arch construction is present in many of the public corridor spaces, but large penetrations through this system should be avoided.

Small cored penetrations may generally be placed through the typical tile floor construction without requiring modification. Larger circular penetrations will be cored, sleeved with steel pipe sections, and grouted into the tile arches to stabilize arching action around the penetration.

Where rectangular shaft penetrations are required, the existing tile arch construction will be removed full length between supporting beams, as the arching action of the tiles between beams is compromised by large penetrations. Because removing the tile arches between beams may result in openings larger than required, steel-framed openings with concrete slabs on composite steel deck will be used to infill as necessary to create the required final penetration sizes.

Existing construction supporting vertical shafts will require fire-resistance ratings to match that required for the shafts. This may require providing additional fire protection on existing structure. Refer to Section 3 – Life Safety for additional information.

Refer to the Architectural demolition drawings for anticipated locations of major shaft penetrations.

12.9 HORIZONTAL PENETRATIONS AND LINTELS

To support the building programming and replacement of the major building systems, a number of new or enlarged horizontal penetrations will be required through existing walls. The load-bearing structural walls are typically built of solid brick above the ground floor and limestone slabs at the terrace level.

Small circular penetrations may be cored directly through the brick and stone walls without reinforcement. Larger circular openings will be cored, sleeved with steel pipe sections, and grouted into the walls to reinforce around the wall penetrations.

Where duct openings, doors, or similar horizontal penetrations are required, lintels will be provided to support the wall above. Lintels will be constructed from steel shapes, angles and plates. Temporary shoring of walls above openings may be required during lintel installation. Horizontal penetrations should not be located directly below existing beams bearing on the walls.

For many openings of reasonable widths in brick walls, such as single doors, lintels constructed from steel angles sawcut into the walls and bottom closure plates can be economically installed. Larger openings and/or heavily loaded locations will require temporary shoring of the walls and lintels built from one or more steel channel and/or wide flange shapes.

Refer to the Architectural demolition drawings for anticipated locations of major penetrations.

12.10 FLOOR INFILLS

Where existing shafts, stairs or other openings through floors or roofs are abandoned, the openings will be infilled. Infill framing will generally consist of structural steel with composite concrete slabs supported by existing framing and walls. Minimum slab thickness will be determined to provide the require fire-resistance rating for the floor assembly.

12.11 BEARING WALL MODIFICATIONS AT HEARING ROOMS

A number of existing bearing walls will be removed to accommodate the programming of hearing rooms. These bearing walls are generally 2'-4" thick and support significant loads. Temporary shoring and installation of lintels will be required at each location. Lintels will consist of multiple parallel wide flange shapes at each location.

Refer to Appendix 12 for conceptual sketches and details of the structural modifications associated with removal of these walls. Refer to Architectural demolition drawings for locations.

12.12 COLUMN REMOVAL IN NORTH WING

Four existing cast iron columns will be removed between First and Second Levels to accommodate programming of the House caucus rooms below the House Chamber. Temporary shoring and re-support of framing will be required at each column location.

Refer to Appendix 12 for conceptual sketches and details of the structural modifications associated with removal of these columns. Refer to Architectural demolition drawings for locations.

12.13 ATTIC MODIFICATIONS

Modifications to attic spaces adjacent to the existing skylights over the east and west grand stairs have been studied to potentially create mechanical or electrical rooms. Due to the difficulty of providing adequate access to these spaces, creating additional rooms in the attic is not presently in the project scope.

Routing of building systems within the attic spaces above the third floor is planned. Modifications to existing plaster ceiling supports may be required in some locations to accommodate the size and routing of ducts and other systems. Additional horizontal penetrations through walls and lintels within the attic will be provided where required. To provide access to equipment and systems within the attic, catwalks or other walking surfaces will be added or modified where necessary.

Existing Conditions at Northwest Terrace

At the Northwest corner of the existing terrace, cracking of the terrace slab was observed from the exterior during the 2012 West plaza and stair repair project. Significant cracks were noted along the west and north edges of the structural slabs, and the interior support conditions are not fully known. Further investigation was recommended, but was not completed as part of the 2012 repair project. This area is outside of the original occupied building footprint and presently houses Capitol Security. It was likely constructed during the same era as the tunnel connections to the State Office Building (1930s). This area will be investigated further as interior demolition occurs. It is expected that some structural repairs and/or re-support will be required to address the observed slab cracking.

--End of Structural System--



13.1 DESIGN GUIDANCE

The mechanical design will form to the following codes, manuals and guidelines:

- 2012 International Mechanical Code
- International Fire Code, 2006 Edition.
- NFPA 101 – Life Safety Code.
- The Architectural Barriers Act Accessibility Standard (ABAAS).
- State of Minnesota Sustainable Building Guidelines B3-MSBG Version 2.1
- 2012 International Plumbing Code/Minnesota Plumbing
- International Fuel Code
- International Fire Code
- ASHRAE: Standard 15: Safety Code for Mechanical Refrigeration.
- ASHRAE: Standard 52.2: Method of Testing: General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- ASHRAE: Standard 55: Thermal Environmental Conditions for Human Occupancy.
- ASHRAE Standard 62 - 2007
- ASHRAE Standard 90.1 – 2007
- ASHRAE: Standard 100: Energy Conservation in Existing Buildings.
- ASHRAE: Standard 105: Standard Method of Measuring and Expressing Building Energy Performance.
- ASHRAE: Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC Systems.
- ASHRAE: Standard 114: Energy Management Control Systems Instrumentation
- NFPA Standards

13.2 HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS – EXISTING CONDITIONS AND DEMOLITION

13.2.0 General

- Occupied Building Scenario: The Capitol will be partially occupied throughout the entire construction process from start to finish. Refer to Section 2: “Occupied Building Phasing Narrative and Schedule” of the project narrative for more specific phasing criteria. Building systems serving occupied areas must remain on-line and operational until the area is under construction. Building services will be temporarily back fed with new or existing equipment to facilitate phasing.

13.2.1 Existing Heating Systems & Demolition

- St. Paul District Energy has installed an existing pair of 4” heating hot water mains to serve the Capitol heating needs. The building was originally provided with steam heat supplied from the campus central plant. This system was eliminated when the District Energy heating system was extended to the Capitol.
- The mains enter the building at the Northeast corner of the East Wing. This system serves the Capitol heating needs only and is not routed to other buildings on the campus.
- The District Energy service supplies the building with 250 F. hot water on a design day.
- There is a building secondary hot water heating loop water. The District Energy service is pipe to a heat exchanger that transfers the heat energy from the district hot water side to the building secondary hot water system. The secondary system varies hot water temperatures based on outdoor reset schedules from 190 F. to lower temperatures. The system is shut off in the summer months.
- Hot water from these systems supply various unit heaters, perimeter hot water radiation systems, heating coils in air handlers, etc. All of these systems and piping shall be removed in their entirety.
- All heating hot water pumps, heat exchangers and heating hot water piping throughout the building shall be removed. District energy piping at the building perimeter shall remain as existing. A new system will be provided, sized and configured for the new building requirements.
- Phasing: The building remains occupied during construction, except for the areas under construction. Remove hot water systems piping, coils, unit heaters, radiation, etc., in a phased approach. Some of these systems will be utilized for temporary heating throughout the building – coordinate removal with phasing schedules.

13.2.2 Existing Chilled Systems & Demolition

- The Capitol building is served by a pair of 20” chilled water mains that enter the building at the Northeast corner of the East Wing. This service exits the building as a pair of 14” mains at the southeast corner of the east wing and is routed below grade near Aurora Avenue and then south along Dr. Martin Luther King Jr. Boulevard to where it is connected into the State Office Building and the Transportation Building.
- The mains are routed through the lower level of the East Wing. The available capacity from this primary 20” chilled water service is 17,250 gpm. In 2005, the peak flow rate for the Capitol was determined to be approximately 1900 gpm. St. Paul District Energy and the Capitol Plant Management indicate that the existing 20” CHW service has the available chilled water capacity for the Capitol renovation project, and appears to be of adequate capacity for the cooling needs of the State Office Building and the Transportation Building. This will be verified as the project progresses. The Capitol is also connected to the campus power plant, which can provide 100% cooling water backup in the event that the District Energy source were to fail. The chilled water backup consists of (1) 2,500 ton chiller and (3) 1,000 tons chillers at the power plant.
- Existing chilled water is piped throughout the Capitol building to the various air handling systems throughout the building. The piping is in poor condition.

- All chilled water pumps and chilled water piping throughout the building shall be removed in their entirety. District Energy piping at the building exterior and entering the valving room shall remain. Fourteen (14") mains that exit the Capitol and serve the State Office Building and the Transportation Building are to remain.
- Phasing: The building remains occupied during construction, except for the areas under construction. Remove chilled water systems piping, coils, etc., in a phased approach. Some of these systems will be utilized for temporary AC throughout the building – coordinate removal with phasing schedules.

13.2.3 Existing Air Handling/Distribution Systems & Demolition

- Central station air handling units provide the supply and return air to all areas of the building. The air handling units are located in several mechanical rooms in the basement, ground floor, fourth floor and two units are on the roof.
- The air handlers are provided with heating coils, cooling coils, some with variable speed drives, filters, some with return fans.
- The air handlers range in age from very old to newly installed systems. Most of the air handlers respond to space located thermostatic control to provide the heating or cooling requirements of each area served. The units have full outdoor economizer air capabilities.
- There are several units in the basement that are continuously dripping water to the floors in the basement. The water pools in several areas creating a potential for mold growth due to the continuously wet conditions.
- There are two large central station air handlers on the roof with heating and cooling coils, filters, supply and return fans, etc. These units serve the Senate and House Chamber areas. These two large systems are older units, installation date unknown but very old. Both systems are still in operation. There is a constant flow of water from the coils and hose bibs associated with these units, onto the roof. There is evidence of moss around these continuous wet areas.
- There are several building relief air systems. The main Capitol dome areas are relieved through four (4) copper round relief vents (witches hats) on the roof, located at four corners on the observation deck outside the building on the roof. These reliefs appear to be original and will be retained as-is.
- There are several copper relief “dog-house” type louvered vents on the roof areas above the three wings that relieve air from the Supreme Court, Senate and House chamber areas below. Upon inspection of one of them, they appear to be blocked up so that air is no longer continuously relieving from the spaces below. These vents appear to be original to the building, and should not be removed.
- Outdoor air for the various air handling units in the basement is brought in through area wells below grade, with ductwork extended from the areawells to the air handling units. There appears to be enough intake area for the use of economizer air operation.
- There are numerous power roof ventilators on the roof of the three wings. These exhaust ventilators vary in age but none are original to the building. They are typically mushroom type and louvered type, consistent with 1970’s style ventilator fan systems. They all appear to exhaust bathrooms or other rooms with exhaust requirements. Ductwork from the fans is routed down to grilles in the respective spaces that are exhausted.

- There are several split system DX refrigerant fan coil systems that serve various 24/7 areas in the building. The condensing units are on the roof and the evaporator fan coils are in the spaces they serve.
- There is one larger glycol dry cooler system on the roof with a pump package that is piped to a cooling unit in the building for 24/7 space operation.
- All existing air handling unit and distribution systems shall be removed.
- Ductwork supply and return is routed up inside walls, inside shafts, in mechanical spaces throughout the building to floor x floor air distribution. Most of the ductwork running horizontally is located above sheet-rocked ceiling areas, that were part of the original design of the building and have not been replaced. All of this vertical and horizontal ductwork will be removed in it's entirety.
- Phasing: The building remains occupied during construction, except for the areas under construction. Remove air handling systems, piping, ductwork, grilles, etc., in a phased approach. Some of these systems/ductwork will be utilized for temporary AC and ventilation – coordinate removal with phasing schedules.

13.2.5 Building Automation/Control Systems

- The Capitol has an existing Honeywell building automation system and pneumatic systems. The main air handling systems are interfaced with this DDC system for primary functions.
- All existing building automation systems and controls shall be removed.
- Phasing: The building remains occupied during construction, except for the areas under construction. The control systems will be modified/upgraded to accommodate new work but shall be available for control of existing HVAC systems at all times, in order to maintain AC, Ventilation and heating in all occupied areas.

13.3 PROPOSED HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEM

13.3.0 General HVAC Systems Design Criteria and Assumptions

- Design Conditions
 - Outside Air Conditions:
 - Winter: -16F
 - Summer: 91F DB/73F WB
 - Summer Indoor Design Conditions:
 - 75°F DB at 50% to 60% RH for open and private offices, corridors, lobbies, toilets, conference rooms, chambers, kitchen and dining.
 - 78°F DB at 50% to 60% RH for locker rooms, electrical closets, elevator machine rooms.
 - 95°F at 50% to 60% RH mechanical and electrical switchgear rooms.
 - 104°F DB at 50% to 60% for emergency generator rooms and electrical vaults.
 - Winter Humidification: Maintain 20% to 25% relative humidity conditions in winter

- Winter Indoor Design Conditions
 - 72°F DB for general offices, corridors, lobbies, toilets, conference rooms, chambers, kitchen and dining.
 - 65 F. for electrical rooms, emergency generator rooms, outdoor equipment storage rooms.
- HVAC Zones:
 - Rooms, areas, spaces, supplied with conditioned air by the air handling systems shall be provided with variable air volume boxes for zone temperature control. Perimeter zones with exterior exposures, and floor areas with roof/attic exposures above them, shall be provided with parallel type Fan Powered type VAV boxes with hot water reheat coils. Interior areas with roof/attic exposures above them, will be shut-off type variable air volume boxes with hot water reheat coils. Interior rooms, areas, spaces shall be provided with shut-off type VAV boxes without reheat coils (with the exception of conference, meeting, Hearing, large occupancy type rooms), which shall be provided with shut-off type VAV boxes with hot water reheat coils. Following are specific requirements:
 - Conference rooms, committee rooms, reception areas, Chambers or other rooms with larger occupancy will be provided with Series Fan-Powered VAV boxes with hot water reheat coils and a space carbon dioxide level sensor to enable the VAV box to supply up to 100% primary air flow for increased outdoor air capabilities when the room(s) are fully occupied.
 - Return air from spaces shall be through ceiling return air plenum.
 - Thermostatic Zones
 - a) Interior open office spaces with no exterior exposures: One VAV zone for similar occupancies up to 1,200 SF maximum.
 - b) Interior general private offices with no exterior exposures: One VAV zone per three offices maximum.
 - c) Interior private offices with no exterior exposures – Senator, House of Representative, Judges offices, other High Priority Offices (see plans): One VAV zone per office.
 - d) Interior – conference/meeting/hearing/committee rooms: One VAV zone per room. Provide hot water heating coils at these VAV boxes for reheating capabilities based on carbon dioxide levels in the respective rooms served.
 - e) Perimeter exposure private offices (including attic); Senators, House of Representatives, Governor, Judges and similar high priority offices: One Fan-Powered VAV zone per office.
 - f) Perimeter exposure; open office spaces (including attic): One VAV zone with hot water reheat coil for similar occupancies up to 750 SF maximum.

- g) Perimeter exposure; corner private or open office with two or more exposures (including attic) – One VAV box with hot water reheat coil.
 - h) Bathrooms, Storage Rooms interior: Up to 1500 SF of storage rooms, bathrooms supplied with one VAV box, no heating.
 - i) Bathrooms, Storage Rooms exterior exposure (including attic): Up to 800 SF of area supplied with one VAV box with hot water reheat coil.
- Ventilation Rates: Outdoor ventilation rates for occupants are based on ASHRAE Standard 62.1.
 - Pressurization: Outdoor air will be provided to accommodate for occupant ventilation, make-up for exhaust, plus an additional amount required for building pressurization at a recommended rate of between .03” to .05” pressure differential from indoors to outdoors. The control systems shall modulate outdoor dampers and relief air systems to maintain this range throughout the building.
 - Dehumidification: Cooling systems provided are designed to remove moisture in the supply air to the building areas to maintain relative humidity conditions within the ranges described above. Control systems automatically control chilled water valves and/or the outdoor air economizer controls to maintain building comfort and maintain humidity levels in a range between 50% to 60% in summer months.
 - Exhaust Ventilation
 - 2 CFM/ft² for bathrooms, showers/locker rooms
 - 1 CFM/ft² for break rooms with microwaves, coffee stations, etc

13.3.1 General Description of HVAC Systems

- District Energy heating and cooling. Maintain existing 20” CHWS/R and 4” HWS/R service to the Capitol. Maintain the chilled water main piping systems from the Capitol entry point to the State Office Building and the Transportation Buildings.
- Secondary chilled water and hot water heating system pumps and piping systems distributing water to air handling units, unit/cabinet unit heaters, perimeter fin tube radiation and VAV reheat coils. Provide brazed plate and frame heat exchangers at the service entry points of the building for both chilled water and hot water heating systems. The secondary chilled water systems shall be filled with a 25% propylene glycol solution for protection against freeze-failure of the damper or valving systems associated with the air handling systems.
- Variable air volume air handling units with 100% economizer air capabilities. All air handling units shall be located in the basement.
- VAV boxes with and without reheat coils to serve perimeter and interior zones.
- Variable refrigerant flow systems to serve 24/7 spaces such as server/data rooms, telecomm and electrical rooms.

- Building shall be provided with an electric steam generating system for building humidification.
- DDC building control systems. All control systems shall be compatible for interface with the campus Honeywell DDC systems.

13.3.2 General HVAC Systems Materials and Methods

- Construct all ductwork in accordance with ASHRAE and SMACNA standards. Extend ductwork substantially as shown on drawings with bends and curves of easy radius. Install adjustable quadrant dampers in all branch ducts. Seal all ductwork in accordance with SMACNA standards: above two-inch W.O. static pressure - Seal Class "A"; between one-inch and two-inch W.G. - Seal Class "B"; less than one-inch W.G. - Seal Class "C". Duct sizes shown on drawings are inside dimensions. Increase as necessary to accommodate duct lining where specified.
- Engineered Underground Ductwork: Provide “The Blue Duct” underground air ductwork systems for direct burial underground for air systems. The material shall be High Density Polyethylene (HDPE). Ductwork shall be installed to manufacturers recommendations, shall be water tight, shall have structural integrity for the ground and floor loads above and around the materials.
- Flexible ductwork shall be Wiremold WCK or WK, Thermaflex M-KE, Flexmaster 3M or Norflex NT-25M. Maximum flexible duct lengths shall be six feet, except at inlets to terminal air boxes, where maximum length shall be one foot, with minimum length of three diameters of straight rigid duct at connection to box.
- Type I Grease Exhaust Ductwork: The existing grease exhaust ductwork from the hoods in the Terrace level cafeteria shall be rerouted from the current louver on ground level up inside a 2-hour fire/smoke rated shaft up to a grease exhaust fan at the attic/roof level and then discharged up above the roof per code. Provide all welded 16-gauge black steel ductwork. Provide UL approved roof penetrations for all Type I grease exhaust systems. Provide access panels at all changes of directions and at regular intervals along horizontal duct routings for cleanout. Provide grease drains and collectors.
- Commercial Dishwasher Exhaust: The existing commercial dishwasher exhaust will be re-routed up through the roof as part of this project. The Mechanical Contractor shall connect stainless steel exhaust to the discharge connection(s) from the dishwasher and route to an inline fan with aluminum components to discharge outside the building.
- Provide aluminum or stainless steel drip pans (soldered water-tight) below all intake louvers on the roof – offset the drop in the attic to enable a 6” deep drip pan to be provided. Insulate this drip pan. Provide a drain outlet at the low/bottom point of the pan. Provide electric heat trace cabling in

the drip pan, self-regulating to prevent build-up of any ice or snow in winter.

- Hydronic piping systems shall be provided throughout the building. Piping materials shall be type “L” copper or steel Victaulic. Provide 2-position motorized valves at all heating and cooling coils, radiation, units heaters, fan coil units, etc.
- Steam Humidification piping systems shall be schedule 80 steel piping from the humidifier to the discharge manifolds in the air handlers. Discharge condensate to drains.
- Provide UL approved flexible connections at inlet and outlet of each and every fan or fan system.
- Ductwork Insulation: Insulate ductwork with external fiberglass insulation of the following thicknesses:
 - Supply air: one-inch thick.
 - Return air: one-inch thick – insulate all return ductwork in attics, in partially heated or partially cooled spaces, and insulate the first 10’ of return ductwork from a shaft into a ceiling, including the elbows.
 - Outdoor air: two-inch thick.
 - Exhaust Ductwork: one-inch thick from the connections through roof or louver to six feet upstream. Insulate all exhaust ductwork in the attic spaces.
 - Louver plenums: two-inch thick. Provide 3M high temperature rated duct wrap, two layers per code requirements, where ductwork is within 18” of any combustible materials or where duct leaves the kitchen.
 - Insulate return air ductwork and transfer elbows internally with one-inch fiberglass with teflar coating for sound control.
 - Sound Attenuation: Provide attenuators at all inlet and discharge locations from air handlers in the Terrace Levels. Attenuators shall have internal perforated mylar liners.
 - Motorized dampers: high performance, low leak type with actuators at all exterior wall, roof and at air handler locations in ductwork.
 - All break/small kitchen areas on floor-by-floor locations will be exhausted at a rate to maintain a slight negative condition to adjoining areas. Air will be connected to a nearby bathroom, or other general type exhaust system.
 - Ductwork penetrations into/out of vertical shafts serving multiple floors shall be provided with combination smoke/fire dampers at penetrations on to a floor served. Provide UL approved frame assembly at each location.

13.3.3 Heating, Ventilating and Air Conditioning Systems

- All new air handling systems serving the occupied areas shall be factory constructed custom fan-wall type central station air handling units located in existing or new mechanical fan room areas throughout the Terrace Level

of the facility (see plans). Units shall be broken down (factory split) into sections to allow for entry into the building areas then reconstructed in-place with factory witness of re-assembly.

- The air handling units shall be provided with the following components:
 - Economizer damper section to operate dampers for enthalpy economizer control.
 - Separate duct connections with motorized damper for minimum outdoor air and economizer outdoor air. Provide an air flow measuring station at each unit to control volume of minimum outdoor air flow based on occupancy/carbon dioxide levels – demand controlled with minimum position and alarm for below minimum failure position.
 - Return/relief fan section. Provide fan wall section to achieve size configuration requirements. Each fan shall have a VFD and controller integral with the unit.
 - 30% MERV 8 prefilter/85% MERV 13 final filter section.
 - Hot water “morning warm-up” heating coil section.
 - Chilled water cooling coil section.
 - Supply fan: Provide fan wall section to achieve size configuration requirements. Each fan shall have a VFD and controller integral with the unit.
 - Discharge air section (where required).
 - Ultraviolet lights in all air handlers at cooling coil section at the condensate pan.
 - All air handling units to deliver 55°F supply air (summer) with reset of discharge temperatures in winter (up to 60°F), based on space zone temperatures and number of VAV’s in cooling mode.
 - Air from the air handling units shall be distributed to throttling type variable air volume boxes with and without reheat coils throughout the facility for zone control.
 - All air handlers shall be ducted with outdoor air at a capacity required for minimum outdoor air for occupants, plus an additional amount necessary for pressurization of the building and demand controlled ventilation requirements.
 - All air handlers shall be ducted for full outdoor air to new and existing roof level intake hoods with louvers, for full enthalpy controlled economizer. Provide motorized dampers at the roof level to close when the systems are in unoccupied mode.
 - All air handlers shall be ducted for full relief air to existing area wells at the terrace level for full enthalpy controlled economizer. The relief damper shall modulate to maintain space pressures based on average of the floor served.
 - The amount of outdoor air supplied to the air handling units shall be a fixed amount to make-up for the continuous exhaust and pressurization requirements of the building. Additional outdoor air required for occupant load shall be through the economizer damper control sequence, as determined by demand controllers on each floor

- through floor x floor/unit x unit carbon dioxide sensors sampling the air quality in the building and increasing or decreasing outdoor air flow through the respective AHU serving the floor, to maintain required building maximum CO2 levels below the setpoint.
- See the drawings for a summary of AHU sizes and areas served.
 - Humidification System: Provide an electric steam boiler (approximately 1450 lbs/hr, approximately 400 KW) for generation of low pressure steam to humidify the building. Pipe this steam to steam dispersion tubes in each of the Capitol air handling systems. Maintain the building at approximately 20% to 25% relative conditions. Alternate: Provide the cost for a high temperature hot water to steam generating humidification system as manufactured by Dri-steam or equal, 1450 lbs/hour using 250 F. steam from District Energy hot water service as the source.
 - Heating Systems: A new heating piping system will be provided for the entire Capitol building. Provide the following systems
 - Provide a new AHU coil heat exchanger (brazed plate type) of size and capacity required for the building, at the existing service location from District Energy. Discharge hot temperatures shall be 190 F. supply and 160 F. return water temperatures. This hot water shall supply the air handling unit and any makeup air handling system outdoor air heating coil systems.
 - Provide a new brazed plate heat exchanger to supply low temperature (130F. HWS/110 F. HWR) hot water to perimeter radiators, unit heaters, cabinet unit heaters to be provided throughout the facility.
 - Provide replica hot water radiators to match a “turn-of-the-century” steam radiator appearance. The radiators shall be located at all window locations.
 - Provide new hot water fan/coils for heating at entries or exit door areas to replace existing.
 - Provide new hot water unit heaters to replace existing heaters at existing locations in the Capitol building.
 - Route heating mains above ceilings at each floor level, rising up directly to the inlet and outlet of the new radiators in the occupied spaces.
 - All heating devices shall be provided with 2-position or fully modulating automatic control valves.

13.3.4 24/7 Cooling Systems

- Provide a “Variable Refrigerant Volume” direct expansion cooling system for the 24/7 spaces within the Capitol building.
- The VRV systems shall consist of air cooled direct expansion condensing units, located in mechanical rooms on the Terrace Level of the building. Each 24/7 room shall be provided with a VRV fan and coil unit. The units shall be located outside the rooms that they serve and ducted with supply and return to the room. Extend common VRV system refrigerant

suction and liquid piping from the condensing units in the Terrace Level to all of the fan coil units throughout the Capitol building serving 24/7 rooms.

- Extend condensate drains from the VRV fan coil units to nearest indirect drains.

13.3.5 Building Atrium Smoke Evacuation System

- Atrium Smoke Evacuation System: The Capitol building shall be provided with an atrium smoke evacuation system. The capacity of the system shall be approximately 120,000 cfm when in operation.
- Provide four (4) exhaust fans and locate them in attic areas suitable in size to achieve 30,000 cfm each when in operation. The fans shall discharge into the four (4) approximately 32” diameter gravity vents from the four corner of the rotunda which discharge to the rain capped outlets at the observation deck level outdoors. Provide motorized dampers at these connections at the discharge side of the fans before existing the roof.
- Extend exhaust ductwork from each of these fans to exhaust inlets in the ceilings of the upper (3rd) level of the Capitol Rotunda. All air exhausted will be from this uppermost level.
- Air intake shall be achieved by automating the operation of at least 2-exit doors per exposure from the building to outdoors.
- The fans shall be UL rated for use in emergency smoke purge applications, per NFPA and mechanical codes for redundant components.

13.3.6 General Exhaust Systems

- All bathrooms and break-room areas shall be continuously exhausted. Refer to 13.3.0, E. above for exhaust rates from these rooms
- Extend exhaust ductwork from grilles in each of these exhausted spaces up to the attic areas. Provide exhaust fans in the attic near access catwalks. Extend from these exhaust fans to one or more of the Rotunda 32” round exhaust ducts through the roof. Provide motorized dampers at these connections.

13.3.7 Automatic Controls

- Remove existing HVAC systems DDC controls.
- Provide a new complete DDC control system, interface with the Campus Honeywell DDC system for all control and monitoring functions of all HVAC, plumbing systems.
- Provide new programming at the central Campus DDC sysetms to accommodate all of the HVAC, plumbing, electrical/alarm controls requirements for the new building systems.
- All air handlers shall be controlled from the BAS. Provide controls, alarms, air measuring/monitoring, etc. All “house” systems shall be provided with demand controlled outdoor ventilation control for energy conservation.

- Control and monitor smoke management systems.
- Control “demand controlled” ventilation within the building on a floor-by-floor basis. Adjust the amount of make-up air in response to CO₂ levels.
- Monitor emergency generator and lighting controls from the BAS.
- Provide all motorized damper and control valves with actuators.
- Control and monitor all variable speed drives that are to be provided by manufacturers and/or electrical contractors.
- Control and monitor all plumbing pumps, high/low level plumbing controls.

--End of Mechanical System--



14.1 FIRE PROTECTION SYSTEM

14.2 Fire Protection System Narrative

General Project Information

The Minnesota State Capitol is programmed for a complete building renovation with an emphasis on the infrastructure systems that support building function and life safety. The fire sprinkler systems, as part of the life safety systems, will be upgraded to current code requirements in order to provide required fire protection throughout the building. The intent is for the building to be considered “fully sprinklered” at the completion of the project.

Applicable Codes

The sprinkler system installation is expected to follow the 2012 International Building Code and 2012 International Fire Code, with corresponding amendments to each code as adopted by the State of Minnesota. The 2012 editions of these codes have not yet been adopted by the State and the amendments have not yet been finalized. It is expected these codes will reference the following NFPA standards: NFPA 13, "Installation of Sprinkler Systems" (2010 edition); NFPA 14, "Standard for the Installation of Standpipe and Hose Systems" (2003 edition); and NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection" (2010 edition). The Authority Having Jurisdiction is the City of St. Paul. See Section 3, “Life Safety Narrative” for additional information regarding applicable codes.

Fire Service Water Supply

The Minnesota State Capitol building is currently served by two fire services. These services are expected to remain in place and shall continue to serve the building.

The first fire service connects to a 12” combined water service which in turn connects to the 16” watermain under University Avenue. This combined service splits into a 4” domestic water service and an 8” fire service outside of the building. This fire service (and domestic service) currently enters the building on the north wall of the northwest wing and will be re-routed to the new fire pump room location. Upon completion of the proposed new work, this northwest fire service will serve as the primary fire service for the building.

The second fire service is an 8” fire service that enters the north wall of the northeast wing. This service connects to the 16” watermain under University Avenue. This northeast fire service will likely be maintained as a secondary backup fire service and will likely connect directly to the standpipe system similar to the current configuration.

Demolition and Phasing Considerations

The majority of existing fire sprinklers, branch piping, and distribution piping within the building will be removed. This includes removal of sprinklers serving the Terrace Level which is currently completely sprinklered as well as sprinkler removal in select office areas on each level in the building.

During Terrace Level demolition and construction, fire sprinkler protection will be maintained for the Rathskeller. Sprinkler protection will also be maintained for Senate Duplicating and Senate Media while these spaces are occupied. Exit paths for these areas will also continue to be sprinklered. Temporary sprinkler zones and associated piping modifications may be added to maintain protection in these areas.

A new diesel fire pump will be installed in the previous West electrical vault area. Once the new fire pump is installed and operational, the existing fire pump in existing room B19B can be disconnected and removed.

Prior to the new standpipe system being installed, existing standpipe distribution piping within the Terrace Level will be connected to the new fire pump to temporarily serve sprinkler systems in other areas which are to remain active. Where conflicts are encountered with existing piping to remain, the existing piping will be rerouted to eliminate the conflict until the new distribution system is installed.

The existing sprinkler zones serving the Terrace Level will be disconnected and removed maintaining required sprinkler protection for select areas as described above. New Terrace Level sprinkler zones, likely originating in the fire pump room, will be installed coinciding with new construction phasing.

New standpipe distribution piping will be installed horizontally throughout Terrace Level and extended vertically at required standpipe locations to serve the upper floors. This work will coincide with new construction phasing.

New fire sprinkler system zones serving levels above the Terrace Level will connect to the new standpipe systems once the standpipe systems are installed. This work will also coincide with new construction phasing.

Fire Pump

The existing fire pump does not have sufficient capacity to serve the fire protection needs of the new sprinkler and standpipe system and will be removed and replaced with a larger capacity fire pump.

The new fire pump will be provided within a new fire pump room. This will be located in the previous northwest electrical vault space which is being repurposed to house mechanical equipment. The fire pump will be located in a dedicated room with direct access to the building exterior via an exterior stair. The fire rating required for the new fire pump room is 1 hour.

Assuming a fully sprinklered building, the fire pump will have a flow capacity of 1,000 GPM. The pressure and horsepower of the fire pump will be determined based on the final configuration of the fire sprinkler and standpipe systems. Preliminary calculations estimate the fire pump would not exceed 150 horsepower.

The fire pump under consideration at this time is the following:

Diesel: A skid mounted, horizontal split case, diesel engine driven fire pump. This is being considered due to the contemplated loads on the existing generator and a desire to not increase the capacity of the existing generator. If the fire pump is a diesel pump, the fire pump would not be connected to the generator. A diesel fire pump will require combustion air, engine exhaust, and fuel supply systems.

Standpipe Distribution

A Class I automatic wet standpipe system will be provided for the Minnesota State Capitol. The use of Class I automatic standpipes within the building is allowed provided the building is protected throughout with fire sprinklers.

Vertical standpipe risers will be located at each required stairway with the hose outlets installed at the intermediate landings of the stairs (unless the primary landings are desired and deemed acceptable by the Authority Having Jurisdiction). Required stairways include: The Far West Stair (North), West Gallery Stair (South), Grand Stairs (East and West), the New Enclosed Stair at Rotunda, Elliptical Stair, Far East Stair (North) and Far East Stair (South). The East and West Grand Stairs are also required stairs; however, a request will be made to omit standpipes at these stairs due to their proximity to other standpipes. Please refer to Section 3, Life Safety Narrative for additional information regarding required stairs.

A maximum 200 foot travel distance to a hose valve must also be maintained throughout the building and additional standpipe hose connection locations may be required at the discretion of the Authority Having Jurisdiction to maintain compliance with this requirement.

A new, traditional standpipe is planned for the new exit enclosure which will serve all levels of the building. This standpipe will also serve as a new sprinkler riser – as discussed further below. Existing exit stairs that are being maintained as required exits may have space and/or aesthetic restrictions that preclude the installation of standpipes within the stair. For such stairways, an adjacent fire rated chase and/or fire rated closet may be required for standpipe routing. Alternatively, elimination of standpipes in some of these stairs may be possible based on proximity (i.e., 200 feet or less) from hose connections located in other stairs. Such an approach requires additional discussion with and approval by the Authority Having Jurisdiction.

If sprinkler zoning occurs off of a standpipe within a stair, locating the hose valve and sprinkler zones on the primary landings is preferable from a sprinkler installation standpoint.

An isolation valve shall be installed at the base of each vertical standpipe riser.

The standpipe distribution system will be routed through the Terrace Level of the building, connecting each of the vertical standpipe risers to the common standpipe distribution system.

Sprinkler System Zoning and Distribution

A new fire sprinkler system will be provided throughout the Minnesota State Capitol building such that the building will be considered sprinklered throughout.

The majority of the fire sprinkler piping systems will be wet systems. Dry systems may be necessary in select areas where building temperatures cannot be maintained over 40°F, and/or where sprinkler supply piping is required to be routed through unheated spaces.

Zoning of the sprinkler system will primarily be per floor with multiple zones per floor and no single zone exceeding 52,000 square feet. The Terrace Level will require a minimum of 3 sprinkler zones. Ground/Balcony Level and each level above Ground Level will require a minimum of 2 sprinkler zones per level. Gallery spaces above Third Level may be supplied from dedicated sprinkler zones or supplied from the Third Level sprinkler zones. Dry systems, if required, may either be dedicated zones or sub-zones depending on the conditions encountered. Currently, dedicated sprinkler zone(s) for the atrium (central Rotunda) are not proposed to correlate with the atrium smoke control system. Refer to the “Atrium Smoke Control Narrative” included as part of section 13, “Mechanical System Narrative”, for additional discussion. Additional zoning may be provided for the central Rotunda in order to facilitate pipe routing in chase cavities at the rotunda perimeter.

Zone piping will either connect to the standpipe distribution system within stair enclosures or alternate riser locations as deemed appropriate. Additional zoning, especially for the Terrace Level, may also occur in the fire pump room.

The intent is for the primary combination standpipe/riser supplying these zones to be located in the new exit enclosure. A secondary combination standpipe /riser will only be necessary in the event that the new exit enclosure does not have adequate space to contain all the necessary zoning/valving equipment; or, if routing sprinkler mains across the Rotunda area is not feasible. If required, this secondary standpipe riser would be located in the Northeast portion of the building. Additional standpipe/ riser piping may also be located in fire rated closets in the Southeast and Southwest portions of the building to facilitate routing of piping in order to avoid passing through historically sensitive areas.

The project intends to omit sprinklers in select non-combustible, inaccessible (or limited access) spaces – where permitted by NFPA 13 and/or the IBC. These areas include certain attic spaces, the space above the central Rotunda ceiling (i.e., exceeding 55 feet in height), etc. Where attic spaces include enclosed mechanical spaces, accessible rooms, or combustible loading, sprinkler protection shall be provided. In order to avoid sprinkler protection in some attic spaces, removal of existing wood planking serving as access structures may be required.

The project will also pursue discussions with the Authority Having Jurisdiction regarding omission of sprinklers in other areas where sprinkler effectiveness may be negligible due to ceiling height. Examples of these areas may include the central Rotunda area and the open stairways east and west

of the Rotunda. The intent at this time, however, is to omit sprinklers within the Rotunda space for areas exceeding 55 feet in height (in accordance with IBC 404.3, exception 2) and still consider the building “fully sprinklered”.

The ability to omit sprinklers from any areas not specifically described in NFPA 13 must be reviewed with the Authority Having Jurisdiction. While certain building code provisions may allow omission of sprinklers, for example atrium spaces over 55 feet tall, the building may no longer be considered “fully sprinklered” when applying such omissions. In other words, the code may allow for sprinklers to be omitted in certain areas but these omissions may adversely impact other features of the building design which require a fully sprinklered building.

All new stairs which are not enclosed will be provided with draft curtains and closely-spaced sprinklers as described in NFPA 13, 8.15.4. All existing open stairs connecting Terrace Level and Ground Level to the “atrium” (i.e. First Level, Second Level, and Third Level) will be provided with draft curtains and closely-spaced sprinklers, where possible without impacting the historical fabric of the building. Refer to Section 3, “Life Safety Narrative” for additional discussion.

Sprinkler System Installation in Historic Areas

The fire sprinkler and sprinkler piping installation within the building will require removal and reinstallation of existing ceilings. This will include ceilings in historic portions of the building. The sprinkler design will make every attempt to maintain the existing aesthetics and historic fabric of the building; however, the fire sprinkler and sprinkler piping systems will have an impact on these areas that must be carefully coordinated.

Where sidewall sprinklers can be used and piping can be routed through less sensitive areas, this approach will be implemented to the fullest extent possible. This approach appears to be feasible for much, but not all, of the walkway areas surrounding the central Rotunda.

It may be possible to negotiate with the Authority Having Jurisdiction some flexibility with installing sidewall sprinklers slightly outside of their normally approved parameters in order to achieve a balance between sufficient sprinkler protection and maintaining the aesthetic nature of the historic space. Existing examples of where this approach has already been used is in Ratskeller area of the Terrace Level which was remodeled in 1998. For example, extended coverage sidewall sprinklers are installed below a curved ceiling in this area, which is a condition which would not normally be allowed for new construction. The design team intends to pursue similar negotiations with the Authority Having Jurisdiction where deemed appropriate.

Where piping is installed above painted plaster ceilings, concealed sprinklers with custom color cover plates may be used to minimize the visual impact of the sprinklers. Brass sprinklers with brass escutcheons may also be used in the historic areas to match other brass fixtures within the building.

In finished areas of the building, and where exposed piping is required, pipe fittings in these areas will be restricted to be either threaded or welded which will avoid the use of Victaulic style couplings in these areas. Painting of exposed sprinkler piping in finished areas will be required.

The sprinkler installation in the Capitol building will pose unique and numerous challenges. Below is a brief summary describing such installation challenges. Further, please see the figures included in Attachment A that show representative photos of these highly sensitive areas.

Ground Level: The decorative ceilings in the common corridor areas on the Ground Level are often configured in a barrel vault design which may limit the types of sprinklers that can be used. In addition, many of the barrel vault ceilings on Ground Level are structural in nature – i.e., without void spaces above. Unless otherwise exempted by the Authority Having Jurisdiction, sidewall sprinklers may not be available for use in these areas due to installation limitations defined in code and the manufacturer’s installation requirements. Since many of these ceilings do not have void spaces above, exposed piping or piping contained within new soffits may be necessary in some areas where other sprinkler configurations are not appropriate or feasible.

First Level: The public corridor areas on First Level pose similar challenges to that of the Ground Level. The decorative ceilings in these areas are also often configured in a barrel vault design which may limit the types of sprinklers that can be used. In addition, the ceilings in these areas also have historic painted ceilings. In order to conceal piping in these areas, where void spaces above the ceilings exist, removal and reinstallation of ceilings will be necessary to route sprinkler piping above the ceiling. Added soffits may be necessary or preferred to route and conceal piping below existing structure.

Installation of sprinklers in other decorative ceilings areas, such as the Governor’s reception room, will also require careful coordination to maintain the existing appearance.

Second Level: The public corridor areas on Second Level often have ornate coffered ceilings which will require reconstruction if the ceilings are opened to install sprinkler piping above. Additional areas requiring careful coordination are the meeting/retiring rooms north of the house chamber floor and west of the senate chamber floor where ornate ceilings are installed.

Third Level: The public corridor areas on Third Level have similar barrel vault design challenges, as discussed above for First Level. The high domed ceilings in the House, Senate, and Supreme Court will require careful sprinkler placement coordination to match the ornate ceiling patterns if sprinklers are installed using custom color concealed sprinklers. Such sprinklers will be fed from the attic/void spaces above the chambers. Also, it is assumed that such attic/void spaces above the corridors and the legislative chambers may not be heated, in which case dry sprinkler systems would be necessary for sprinkler systems routed in these areas. If full access to the ceiling areas is not available, exposed piping in these areas may be necessary. Installation of dry sprinkler systems for these areas will require pitched piping and drain valves installed at low points. Such drain valves will be coordinated and located outside of historically sensitive areas – to the greatest extent possible. Dry pipe valving will need to be located in heated enclosures – either on Third Level or enclosed attic space above. Plumbing drainage will be required at each dry valve location.

Central Rotunda:

As noted earlier, one area that may be exempt from requiring sprinklers is in the atrium area directly below the central Rotunda. The ceiling height in this area is in excess of 55 feet which may allow

sprinklers to be omitted. See discussion regarding sprinkler omission under the Sprinkler System Zoning and Distribution section above.

Materials

All materials and components shall be UL listed and/or FM Global Approved.

Piping: All sprinkler piping will be Schedule 40 steel. All piping is to be concealed where feasible. Exposed piping shall be painted in all finished areas. All dry piping shall be internally and externally galvanized, including dry pipe runs to the fire department connection and fire pump test header.

Sprinklers: All sprinklers to be installed will be quick response type. As indicated earlier, concealed sprinklers with custom color cover plates will be used where possible in historic areas to match decorative ceiling colors. Brass sprinklers with brass escutcheons may also be a desirable option in historical areas.

Office areas may have either recessed pendent or concealed pendent sprinklers in standard colors. Upright and pendent sprinklers will be used in utility areas with no ceilings. Sidewall sprinklers may be used in any area where deemed appropriate. Sprinkler protection shall be installed in the center of the tile +/- 2" where ceiling tile is used.

Flexible Sprinkler Drops: Flexible sprinkler drops will not be used for this project unless specifically approved on a case-by-case basis. Approval shall be required by the Owner, the Authority Having Jurisdiction, and the Engineer of Record.

Hazard Classifications

The majority of the building will be considered light hazard sprinkler classification. Mechanical and electrical rooms will be considered Ordinary Hazard Group 1. Storage areas will be considered Ordinary Hazard Group 2.

Fire Department Connection and Fire Pump Test Header Location

A new yard-type fire department connection and associated underground piping will be provided. The fire department connection will be located north of the west wing of the building near University Avenue. A new yard-type fire pump test header and associated underground piping will also be provided. The test header will likely be set near the fire department connection. The underground piping serving these devices will enter the building at the new fire pump room.

System Drainage

The sprinkler and standpipe systems shall be provided with complete system drainage as required by NFPA 13 and NFPA 14.

Drain risers shall be provided adjacent to standpipe risers which supply sprinkler system zone piping.

Additional drains shall be provided at all trapped sections and low points as described in NFPA 13.

All dry pipe sprinkler systems shall be pitched and provided with drains as required by NFPA 13.

Additional Fire Protection Systems

The installation of pre-action and/or clean agent systems has not currently been identified as a requirement for this project. This may change as the needs of individual spaces are evaluated further. If kitchen grease hoods are installed, the protection of the hoods and associated ductwork will be provided by the kitchen equipment supplier.

Demolition

All existing fire alarm system equipment including main and auxiliary Fire Alarm Control Panels (FACP's), power supplies, audio amplifiers, etc, shall be replaced with new equipment. The system must remain operational during the entire construction project. Service outages and system cutovers shall be carefully coordinated with the Owner.

Fire Alarm System Architecture

The Fire Alarm System is monitored by Capitol Security staff at a facility located off-site of the Capitol building. System monitoring, management, and is controlled thru Honeywell Enterprise Buildings Integrator (EBI) platform. A new Honeywell XLS 3000 FACP shall be located in a secured main electrical, telecom, or mechanical room on the main level of the Capitol building, location to be determined. A UL listed fire alarm network shall be provided to transmit fire alarms to the Capitol Complex central monitoring location. Fire Alarm NAC panels and audio amplifiers shall be distributed throughout the building and located in secure electrical or mechanical rooms. New initiating and notification devices shall be provided. The notification system shall be speaker based. Wheelock S8 series devices are basis of design speaker. The distance between speakers shall be approximately twice the height of the ceiling to provide intelligible audio coverage.

1. The Capitol building Fire Alarm System shall be expanded and upgraded to provide a complete and functional intelligent fire alarm system, with zone selective one-way voice communications. Campus wide capabilities for full function remote monitoring shall be by dedicated campus facilities fiber network command center. Fire alarm system shall include new signal and initiation devices throughout the building. The system will include manual stations, smoke detectors, duct smoke detectors, heat detectors, connection to fire suppression systems, audio (speaker)/visual (strobe) devices. The system will be designed to meet NFPA, the State, local and applicable Capitol building guidelines. The following items will be included:
 - Manual pull stations at each exit from each floor, double action, keyed reset. Mounting heights shall be no lower than 36" AFF and no higher than 48" AFF and shall be within ADA accessible reach limits at all locations and within 5' of exit doors.
 - Beam Smoke Detectors will be used in areas with vaulted ceilings, and where spot type smoke detectors would be difficult to install, test, and service. Complete beam smoke detector coverage shall be provided for the central rotunda on first level, second level, and third level.
 - Notification Devices: All notification devices located in historical zones shall be factory painted to match the surrounding finish. Note that there are multiple finishes to be matched

and the manufacturer may require a minimum order (typically at least 100 devices) for each color of finish. Cost estimators, please account for many spare devices of multiple colors.

- Audible Notification: Speakers shall be placed throughout the areas building to maintain a prescriptive performance of 70dBA. Municipal prescriptive performance test shall be provided by the Contractor. Mounting heights shall be no lower than 80”AFF and no higher than 96”AFF.
 - Visual notification: Strobes placed within restrooms, all general/common use areas (studios, work areas), hallways, lobbies, and any other areas for common use. Devices shall be UL 1971 listed, 15 candela minimum. Mounting heights shall be no lower than 80”AFF and no higher than 96”AFF.
 - Audio/visual notification appliances in quantities and locations required to notify occupants in accordance with NFPA 72 and the ADA. Strobes shall be minimum 15 cd rating under UL 1971.
 - Door Holders: Provide magnetic door holders for release of designated doors upon alarm signal. Coordinate with architectural for doors to be held open.
 - Elevators: Smoke and heat detectors needed to perform elevator recall function.
 - HVAC Interface:
 - Interface to accomplish control of HVAC units based on duct detector input, monitoring of power used for life-safety functions (shunt trip power, etc.)
 - Interface to accomplish control of HVAC combination fire/smoke dampers. Dampers shall actuate upon detection of smoke by associate duct detector.
 - Sprinkler System Interface: Connection to tamper and flow switches in quantities and locations determined by the fire protection contractor.
 - An LCD remote annunciator will be provided at a location acceptable to the fire department for notification and control of the system. A microphone station will be included at annunciator location and/or remote locations to provide the fire department to give real-time direction over the fire alarm speaker system.
 - Atrium Smoke Control: The rotunda in the central portion of the building is classified as an atrium, and compliance with Section 404 of the Minnesota State Building Code is required. The atrium classification applies to the entirety of first, second, and third levels. The fire alarm system shall interface with the HVAC system for monitoring and control of smoke control equipment, and a fire fighter smoke control panel shall be provided. The fire alarm system shall interface with operable smoke resistant partitions which shall close upon smoke detection or sprinkler flow within the associated zone. Note that the central Rotunda will not be provided with a dedicated sprinkler zone(s) given the practical difficulties of providing sprinkler protection and routing sprinkler piping throughout and around the historic spaces of the central Rotunda.
2. Fire alarm system conduit and fire alarm j-box covers shall be painted red.
 3. The Capitol building shall fully evacuate on general fire alarm.

4. Maintain existing circuit continuity during demolition and construction. Operation of downstream devices shall remain uninterrupted by the removal of an existing fire alarm device. Care shall be taken when working near the existing pair of 1-1/4" fire alarm riser conduits that route throughout the building. Existing fire alarm conduits shall be re-supported from structure if existing support methods are disrupted.
5. Refer to section 14 appendix for existing fire alarm device locations.

--End of Fire System--



15.1 Electrical Systems Overview

General description: Power and signal systems work, associated with construction of the Minnesota State Capitol Interior Renovation.

The Capitol Interior Renovation project consists of extensive upgrades and modifications to the electrical power distribution throughout the building. It is desired that the building electrical service be upgraded. This includes generator power supplying the building. Stand-by emergency power distribution power will be located to provide adequate emergency lighting needs for egressing, and associated fire alarm systems.

In general, the existing electrical distribution will be demolished. New distribution rooms will be located at the Terrace Level and Third Level. This project requires that several existing distribution points located throughout the building are maintained and reconnected to the new power distribution system.

The final installation of electrical distribution system in the Terrace Level is to be routed under the Terrace Level floor. The contractor shall be responsible with coordinating the underground raceway routing and pull boxes with the project engineer and structural engineering requirements. Refer to the structural engineering requirements for footing underpinning and soil solidification requirements for underground duct and raceway routing.

The building has a Fourth Level which is considered an Attic space. The Attic spaces mainly consist of mechanical equipment, electrical raceways and rough service incandescent lighting. Refer to the electrical riser diagrams for power distribution points located in the attic spaces. In general, the existing lighting is to be replaced with LED lighting. Additional emergency lighting is also to be provided.

The Capitol building is equipped with an existing lightning protection system. The project shall maintain and modify the existing lightning protection system as necessary. The contractor shall coordinate the disconnecting and relocation of the system with the re-roof work associated with this project and the exterior stone work project. The contractor for the exterior stone project is responsible for replacing, supporting and connecting all air terminals that are attached to stone work. The exterior stone contractor shall also be responsible for re-connecting air terminal conductors to the perimeter lightning protection conductor along the roof. If the perimeter lightning protection conductor is relocated or modified, it shall be the responsibility of this contract to modify and extend any stone mounted air terminal leads to the perimeter conductor. A Master UL label is **not** required for the project.

It is an Owner's stated goal of this project to meet Minnesota's Sustainable Building Guidelines commonly referred to as B3 (Buildings, Benchmarks, and Beyond). Refer to Section 19 – B3 of the Schematic Design Report for additional details. Note that the following Optional B3 guidelines will **not** be included as scope of work for this project.

15.2 Codes and Standards

1. All work shall be done in accordance with all applicable local, State and Federal codes.
2. Comply with all applicable OSHA regulations.
3. All material shall be new and shall bear a U.L. label where a U.L. standard and/or test exists or other nationally recognized testing standard recognized.
4. Prepare and submit to all authorities having jurisdiction, for their approval, all applications and working drawings required by them. Secure and pay for all permits and licenses required.
5. The following codes, standards, and guidelines will be used for the design as applicable or as directed by the authorities having jurisdiction:
 - 2010 Mechanical Code
 - 2010 Plumbing Code
 - 2011 Electrical Code
 - 2007 Minnesota Fire Code
 - 2009 Version 2.1 State of Minnesota Sustainable Building Guidelines (MSBG)
 - 2010 NFPA 13
 - 2010 NFPA 72, 90, 101,
 - 2010 ASRHRAE 90.1 Energy Code Requirements
 - TIA/EIA Telecommunications Building Wiring Standards: 526-7, 526-14-B, 568-C.0, 568-C.1, 568-C.2, 568-C.3, 568-C.4, 569-C, 606-B, 607-B, and 758-B.
 - IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - ICEA publication S-80-576-2002
 - 1996 ANSI A117.1/ADAAG
 - Requirements of Insurance Carrier

15.3 Service and Distribution Scope

Currently, the Capitol building is fed from a 13.8kV campus loop distribution system, which enters the building in two existing medium voltage (MV) switch rooms. These rooms are located underground on the north side of the building under the east and west parking lots.

The West MV Switch Room is to be converted into mechanical space and the existing 208V/120V double ended substation is to be removed as well as associated normal power distribution. The West MV Switch Room also contains existing generator power distribution, which is to be removed. The East MV Switch Room also contains an existing 208V/120V double ended substation, which is to be removed.

The East MV Switch Room shall contain a new 480Y/277V double ended substation, which is to serve the entire building and downstream distribution points. The new double ended substation shall be fed from the existing G&W switches within the East MV Switch Room. The new substation shall include provisions for a new, fully rated, free-standing switchgear with bus minimally rated at 4000A- 480Y/277V, 3-phase, 4-wire with main draw-out breakers within the dedicated main electrical room. Provide TVSS protection equipment mounted externally to the switchboard.

Refer to Schematic Drawings and riser diagrams for additional information.

A new one-hour rated generator power distribution room is to be constructed within the East MV Switch Room. This room is to serve as the new generator power service point to the Capitol building. The room shall contain the new ATs and generator power distribution equipment.

The building's generator power is supplied from an existing 600kW diesel Caterpillar generator located at the State Power House Plant at the corner of University Avenue West and Cedar Street. This existing generator currently supplies emergency, legally required stand-by, and optional stand-by to both the Capitol building and the Power House Plant. Feeders are routed to the Capitol building via the campus duct bank/manhole system. The existing campus duct bank/manhole system will require modifications to separate feeders and bring conditions up to code. All campus site duct banks shall be concrete encased. Refer to electrical site plan for additional requirements for duct banks.

The Electrical distribution shall be physically segregated into major load types, such as mechanical equipment, lighting, and plug loads. This distribution arrangement shall allow for an energy measurement and verification strategy that shall be easier to understand and operate for future on-going operations and maintenance.

Building electrical energy and power quality monitoring for each respective secondary 480Y/277V service shall be provided. This will provide whole building electrical monitoring. Additional electrical energy monitors shall be provided to monitor energy consumption of major system loads (mechanical, lighting, and plug loads). These secondary power monitors shall consist of a combination of metering feeders or monitoring points within packaged mechanical equipment. All power monitoring points shall be brought into central power monitoring software platform. Dedicated electrical rooms shall be planned for at locations shown on the Schematic Drawings. In general, the main distribution rooms are located on the Terrace Level and the Third Level with ancillary distribution points on other levels throughout the building.

New 480Y/277V and 208Y/120V branch panelboards will be located in four quadrants of the building within dedicated electrical rooms. Distribution dry-type transformer(s) will be required within dedicated electrical room(s) to step voltage down from 480V/3-phase to 208Y/120V.

Panelboards

1. Panelboards: NEMA PB 1, UL 50, 61, with overcurrent protective devices, enclosure suitable for use, copper bus, compression type main and neutral lugs.
2. Panelboard Types: Lighting and appliance branch circuit panelboards; distribution panelboards.
3. Circuit breakers: Fully Rated

4. The contractor should allow for 5% of the panelboards to be electronic grade panelboards.
5. All new 120/208V panelboards shall be 84 circuit panelboards unless noted otherwise.

Distribution Transformers

General distribution transformers shall be dry-type, energy efficient, copper windings with kVA ratings required. Primary shall be 480 volt, 3-phase, 3-wire, delta and secondary shall be 120/208 volt, 3-phase, 4-wire wye. Transformer shall include four primary voltage adjustment taps, class H insulation for 150 degree C rise above 40 degrees C ambient, and a ventilated enclosure.

1. Isolation Transformer shall be dry-type, NEMA ST 20, copper windings, 2 winding type; NEMA 1 enclosure type, 220 degrees C insulation class, 80 degrees C temperature rise; electrostatic shielded, isolated transformers with K-Factor rated, high-performance vibration isolators.
2. All transformer rated 500kVA or less shall be constructed to CSL-3, 10 CFR PART 430 COMPLIANCE, with a minimum K-FACTOR of 9.

Grounding

1. Grounding Equipment: UL 467; copper conductors; connectors.
2. Grounding Electrodes: Copper-clad steel ground rods; copper plate electrodes.
3. Substation room ground bus (see Medium Voltage Distribution section above) shall be tied to water piping, structural steel, and other required items to form a building ground system.
4. Each electrical room, telecommunication room, and audio/video room shall be equipped with predrilled copper bus-bar. Bus-bar connections shall be compression type.

Execution

1. Identification: All switchgear, unit substations, panelboards, transformers, transfer switches, junction and pull boxes and other equipment must be labeled with equipment name and operating voltage.
2. Raceway identification
 - Emergency system conduit shall be orange.
 - Legally required (elevators) conduit shall be in yellow.
 - Optional stand-by distribution conduits shall be gray.

The new campus buildings, other than the Central Plant, shall include new 480Y/277V and 208Y/120V main and branch circuit panelboards. Electrical distribution equipment will be located in dedicated, centrally located electrical rooms on each floor, and stacked vertically within respective buildings. Dry-type high efficiency distribution transformer(s) will be required within each branch electrical room to step voltage down from 480V/3-phase to 208Y/120V. The branch electrical rooms shall be designed with one-hour fire/smoke rated criteria.

Specialty power distribution equipment such as power conditioning, central static or rotary UPS power, etc. are not anticipated at this time.

Dedicated 480Y/277V feeders to supply shielded, K-rated, isolation transformers and 208Y/120V branch circuit panelboards with isolated ground bussing shall supply A/V system technical power as applicable.

15.4 Generator Distribution Scope

Emergency Power – Existing Generator Option #1

1. The buildings generator power is supplied from an existing 600kW diesel Caterpillar generator located at the State Central Maintenance (Power House Plant) Building at the corner of University Avenue West and Cedar Street. This existing generator currently supplies emergency, legally required stand-by, and optional stand-by to both the Capitol building and the Power House Plant. Feeders are routed to the Capitol building via the campus duct bank/manhole system. The existing campus duct bank/manhole system will require modifications to separate feeders and bring conditions up to code. The optional-standby branch would include IT systems and HVAC environmental systems to support IT services and additional mechanical equipment serving the House and Senate Chambers in the event of normal power failure.
2. Loads:
 - Life safety branch: Provide single 4P – 480Y/277V wall mounted, program transition automatic transfer switch to serve code required emergency egress lighting and exit signage, fire alarm and fire protection branch circuits.
 - Fire Pump branch: Provide feeder to new 4P – 480Y/277V fire pump ATS and WYE-DELTA starter.
 - Legally Required branch: Provide single 4P - 480Y/277V wall mounted, program transition automatic transfer switch to serve legally required elevators and associate elevator equipment and controllers.
 - Optional Stand-by branch: Provide single 4P-480Y/277V wall mount, program transition automatic transfer switch to served House and Senate mechanical equipment, IT equipment elective building loads, to be determined.
3. Provided cost estimate to eliminate the fire pump feeder and duct bank cell from the scope of work. The Mechanical and Fire Protection narratives indicate an alternative price option to install a diesel fire pump package.

Emergency Power – New Generator Options #2

1. Provide estimated cost to provide a 750 KW outdoor pad mount clean diesel fueled emergency generator at grade adjacent to the Capitol building to serve “emergency” loads, “legally required” loads, and in addition “optional stand-by” loads. Anticipate the new generator to be located near the northeast parking area for estimating the cost of feeders. The optional-standby branch would include IT systems and HVAC environmental systems to support IT services and additional mechanical equipment serving the House and Senate Chambers in the event of normal power failure.
2. A new generator solution will be located outdoors and the main emergency distribution panel and automatic transfer switches shall be located within a one-hour rated room separate from the normal power main distribution equipment.
3. Loads:
 - Life safety branch: Provide single 4P – 480Y/277V wall mounted, program transition automatic transfer switch to serve code required emergency egress lighting and exit signage, fire alarm and fire protection branch circuits.
 - Legally Required branch: Provide single 4P - 480Y/277V wall mounted, program transition automatic transfer switch to serve legally required elevators and associate elevator equipment and controllers.

- Optional Stand-by branch: Provide single 4P-480Y/277V wall mount, program transition automatic transfer switch to served House and Senate mechanical equipment, IT equipment elective building loads, to be determined.

Packaged Engine Generator System Characteristics

1. Type: Standby-rated, automatically started engine with an AC generator unit.
2. Ratings: kW (To Be Determined subject to detailed design), 480Y/277V, 60Hz.
3. Maximum Transfer Time to Assume Full Load: 10 seconds.

Packaged Engine Generator System Components

1. Engine: NFPA 37, Diesel.
2. Fuel Tank: Base tank, 24-hour capacity.
3. Cooling System: Closed-loop, liquid-cooled, radiator mounted on generator set base.
4. Engine Exhaust System: Critical silencing muffler.
5. Combustion Air-Intake System: Filter type air intake silencer, intake duct and connections.
6. Starting System: Electric with negative ground.

15.5 Branch Circuit Wiring and Devices

Raceways

1. Electrical conduit, tubing, surface raceways, wireways, cable trays, boxes, and cabinets for electrical power and signal distribution.
2. Empty Raceway System: Provide an empty 5" x 5" x 2.875" deep recessed outlet box with single-gang trim ring and 1-1/4" conduit routed to accessible ceiling space or cable tray at each outlet location necessary to accommodate the low voltage systems described in this narrative. Include a nylon pull string in each empty conduit.
 - Metal Conduit and Tubing: GRC, IMC, EMT, flexible metal conduit, Liquidtight flexible metal conduit
 - Nonmetallic Conduit and Ducts: RNC Schedule 80 (Schedule 20 concrete encased for under slab Terrace Level)
 - Conduit Fittings: Compression and set-screw fittings
 - Surface Raceways, Metallic: Galvanized steel, with hinged covers
 - Outlet, Device, Junction, and Pull Boxes: Steel, UL50
3. Connection to Vibrating Equipment: Flexible Metal conduit, liquidtight at exterior.
 - Acoustic Seals: Seal around all conduit (single and grouped) to preserve the acoustic rating of all walls, floors, and other partitions penetrated.

Conductors

1. All conductors shall be copper only.
2. Wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less. Comply with NEC.
3. All feeders, branch circuits, and other wiring shall include an insulated green equipment ground conductor, properly terminated to the panelboard ground bus and load served.

Scope

1. New Construction: Devices as required to provide convenience power, power to specific equipment such as computers, lab equipment, and other equipment and appliances.

Products

1. Receptacles: Industrial Specification grade.
2. Ground-Fault Interrupter (GFI) Receptacles: Feed-through type ground-fault circuit interrupter with integral duplex receptacles.
3. Light Switches: 120/277V, silent type AC switches.
4. Wallbox Dimmers: Solid state, linear slide.
5. Wall Plates: Single and combination types, smooth stainless steel and steel plate with baked-on finish.

The following voltages are typical

1. Motors ½ HP or greater: 208V for user equipment and HVAC equipment not available at 480V, 3-phase otherwise all new major HVAC equipment will be supplied by 480V, 3 phase.
2. Lighting: 120V and 277V.
3. Receptacles and motors 1/3 HP or less: 120V.

General convenience duplex receptacle locations and quantities

1. Interior spaces are described below, with the following quantities of outlets and estimated locations.
 - Committee Rooms: Provide a double duplex receptacle per computer workstation location. These receptacles shall be equally spaced on the walls and floor for flexibility. Provide a ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen, where applicable.
 - Faculty Offices: Provide at least one convenience duplex receptacle per wall and one double duplex receptacle at each one of two work station locations per office. Should powered furniture partitions be installed, partition feed will be provided instead of double duplex outlet. Convenience receptacle locations shall be coordinated with around large shelving units.
 - Meeting Rooms: Provide convenience duplex receptacle on each wall and in the floor. Provide ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen, where applicable.
 - Break Room/Kitchenette: Provide dedicated duplex receptacles for full height refrigerator, two microwave ovens and dishwasher. Provide convenience two duplex receptacles. Microwave oven receptacles shall be mounted at counter height for ADA accessibility. Receptacles shall be GFI type were required by code.
 - Entrance Lobby: Provide at least one convenience duplex receptacle per wall.
 - Commons: Provide at least one convenience duplex receptacle per wall. Provide a dedicated GFI receptacle for each vending machine and electric water cooler.
 - Conference and Meeting Rooms 220 to 1,500 SF: Provide a ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen. Provide convenience duplex receptacles on each wall and in the floor. Receptacles shall be evenly spaced on the walls and floors to provide flexibility.

- Copy/work room: Provide dedicated duplex receptacles for every copier. Provide at least one convenience duplex receptacle per wall.
 - Toilet Rooms: Provide one above counter GFIC convenience duplex receptacle at the sink 48" AFF.
 - Janitor Closets, Storage and Support Spaces: Provide one above counter GFIC convenience duplex receptacle adjacent to wall switch 48" AFF.
 - Lounge: Provide a convenience duplex receptacle on each wall in addition to duplex receptacles required for vending machines or televisions.
 - Presentation room: Provide convenience duplex receptacle on each wall and in the floor. Provide ceiling mounted receptacle to power overhead projector. Provide power and switch for motorized screen.
 - Corridors: Receptacles every 40 feet throughout for housekeeping purposes. Provide power for interior signage touch screen pads.
 - Storage, utility spaces: One receptacle at entrance door, 48" AFF.
 - Mechanical spaces: Receptacles spread throughout for maintenance purposes.
 - Outdoor: One receptacle at each entrance/exit from the building, with additional perimeter outlets to reduce the spacing to 100'-0" maximum.
 - Main Telecom/IT Rooms on Terrace level: (4) 20 Amp/120 Volt individual branch circuits with a 4-plex receptacle on each branch circuit. (4) 30 Amp/208 Volt individual branch circuits with single L6-30R twist-lock receptacle on each branch circuit.
 - Telecom/IT Rooms: (2) 20 Amp/120 Volt individual branch circuits with a 4-plex receptacle on each branch circuit.
 - MPOP Room: (2) 20 Amp/120 Volt individual branch circuits with a 4-plex receptacle on each branch circuit.
2. Automatic receptacle control shall be provided to 50% of all receptacles in offices and open offices. Receptacles control shall be shut off equipment such as computer monitors, copiers, water coolers, charging stations, etc.

Motor Controls

1. Stand-alone Motor Starters: Provide solid state magnetic starter for all motors without integral controls. Provide a combination starter when starters are mounted within sight of the motor.

15.6 Basic Materials and Methods

General

1. Shop drawings, Operation and Maintenance Manuals and Operating instructions for the Owner are required for this project.
2. All materials shall be new, UL Listed and approved for the purpose and installed per code.
3. Work shall be installed per the NEC (NFPA 70) and applicable state and local codes and shall meet the requirements of nationally recognized standards. The contractor shall secure and pay for all permits, licenses, utility and inspection fees and coordinate all work with local inspection authorities.
4. All systems shall be completely functional and wiring systems shall test free of defects using megger, continuity, ground, voltage, current, and phase rotation tests. Balance system phase currents to within five percent of each other.

5. Provide all cutting and patching necessary for installation of electrical work and restore finished surfaces disturbed by this Contractor. Do not cut or drill structural members.
6. Provide general cleanup of waste and rubbish in the work area and clean all removed and reinstalled equipment and luminaires. Clean all equipment that has become dirty during construction.
7. All materials and methods shall be subject to DSF general guidelines and standard specifications.

Equipment Support

1. Provide support of all electrical work through the use of hanger rods, clamps, structural framing, fastening devices and backboards. Provide vibration isolation in all supporting hardware for vibrating electrical equipment installed by this Contractor. Provide four-inch high concrete pads for floor mounted equipment.

Identification

1. Provide engraved nameplates, wire and cable markers, embossed tape, and device plate cover engraving on electrical distribution and control equipment and the loads they serve, main power and special system cabinets, motor control centers, motor starters and variable frequency drives and disconnects.

Temporary Electric Services

1. Provide complete, adequately sized and temporary electric power and lighting services for all trades. Since power originates from the Campus system, no additional charges will be paid. Provide temporary service equipment, transformers, feeders, panel boards, panel board receptacles and lighting as required for the trades to perform quality work in a safe environment. Energize hoists, cranes, elevators, field offices, and other large significant loads. Work shall include ground fault protection where required and comply with OSHA and the NEC. Remove facilities prior to occupancy or as otherwise directed by the owner.
2. Major portions of the building must remain operational and with power during demolition and construction. Temporary power must be provided during this period of time when permanent power is not established at secondary distribution points within the system.

Underground Installations

1. Provide all excavation, backfilling, fill and compacting of trenches for installation of electrical work. Provide all necessary pumping and drains. Restore site surfaces such as streets, sidewalks, curbs, paved areas and lawns, to original condition. Install marking tapes and pitch conduits away from the building for draining.

Raceway Systems

1. Conduits: Rigid steel, IMC, EMT, Flexible steel and Liquidtight, and PVC conduits will be used with approved fittings. Provide complete raceway systems including outlet boxes, pull boxes and fittings. Conceal conduits in finished spaces. Group conduits on racks leaving 25% conduit space and suspend from the structure. Size conduits, boxes, and bends per the NEC. Provide expansion fittings, conduit seals, drain tees, conduit hubs and fire/smoke barriers where required. Metal conduits shall have continuous grounding integrity.
 - Rigid Conduit will be used for the service entrance conduits.

- PVC conduit encased in concrete shall be used for feeders under the slab of the Terrace Level.
- IMC will be used for feeders running below the slab (except as noted above) and exposed outdoors.
- EMT will be used for interior feeders and branch circuits.
- Flexible steel or Liquidtight will be used for connection to motors and transformers.

Wire and Cable

1. Branch circuit conductors shall be THWN/THHN-2 solid copper through #12 and stranded copper #8 and larger. Minimum wire size is #12. Conduit fill shall conform to NEC table 3. All conductors shall be in raceways with color coded insulation and each voltage system shall be separately identified. A green ground conductor will be installed in each feeder and branch circuit conduit.
2. Provide a separate neutral conductor for all feeder and branch circuits. Shared neutrals shall not be permitted.

Boxes and Cabinets

1. Pull and Junction Boxes: Indoor boxes shall be NEMA 1, constructed of a single piece code gauge steel, with folded and welded corners, complete with flat removable screw down cover. Outdoor boxes utilizing rigid metal conduit shall be cast iron with cast iron gasketed cover held down with stainless steel screws. Outdoor boxes utilizing PVC conduit shall be plastic with screw down gasketed cover. Size all boxes per NEC article 370. Provide boxes to comply with code and to provide ease of conductor installation.
2. Outlet Boxes and Fittings: Interior outlet boxes shall be galvanized steel, non gangable with knockouts and covers or extension rings as required. Exterior surface outlet boxes shall be cast iron alloy with threaded hubs and screw down gasketed WP covers.
3. Cabinets: Cabinets shall be constructed of code gauge steel without factory knockouts, surface or flush mounted and shall appear as a panel board with a hinged and latched door. Provide barriers to separate low voltage and power wiring as required.

Devices and Cover Plates

1. AC toggle switches shall be heavy-duty specification grade, 20 amp, 120/277 volt, quiet toggle, momentary contact, pilot type or illuminated toggle. Provide single pole, double pole, 3-way, 4-way, or SPDT as required similar to Hubbell 1221 series.
2. Receptacles shall be heavy-duty grade, duplex or single outlet, voltage, and NEMA configuration as required. Provide GFI receptacles as required. GFI receptacles shall have test and reset buttons and indicator lights.
3. Interior device plate covers shall be:
 - Unfinished areas (storage, mechanical, etc.): Galvanized steel.
 - Finished, public spaces: stainless steel.
 - Exterior device plates shall be suitable WP while in use with hinged lid.

Grounding and Bonding

1. Provide grounding and bonding of the service entrance complete with grounding bushing on each conduit entering the service equipment. Connect service entrance gear to ground as listed below.

2. Provide a service entrance ground by making a connection from the service entrance panel ground bus to the incoming water service and ground rods.
3. Provide a 4" x 1/4" x 24" copper ground bar in the main electrical room. Ground bar shall be used as the central grounding point for telecommunications and other systems in the building.
4. Equipment Grounding
 - Motor circuits shall have a ground conductor pulled with the phase conductors.
 - Scrape light fixture finish to assure a good ground.
5. Provide a green grounding conductor in all branch circuit and feeder conduits sized per NEC. Provide grounding conductors in all conduit systems, flexible conduit lengths, and surface raceways.
6. Provide grounding of all equipment comprising a permanent bonding together of all metallic, non-current carrying parts of the electrical system like raceways, boxes, panels, cabinets, equipment enclosures, housings, motor frames, ducts, and luminaires.

15.7 Electrical Distribution Equipment

Medium-voltage Electrical Distribution 13.8kV Nominal Switching

1. Acceptable Manufactures: Eaton, General Electric, Square D, or Siemens.
2. Switchgear Rating: 95KV BIL and 600 amp.
3. Buses and Connections: Three-phase, three wire, with copper bussing.
4. Infrared (IR) Windows: Provide a minimum of two IR windows for each switchboard section. IR windows shall be suitable for long wave and medium wave thermography.
 - Short wave: minimum of 90% at 4 μm
 - Long wave: minimum of 75% at 9 μm

Medium-Voltage Transformer Section

1. Style: Indoor, ventilated, dry type cast coil.
2. Cooling: Air cooled with provisions for future forced-air rating. Include mounting provisions for fans.
3. Insulation Temperature Rise: 150 deg. C.
4. BIL: 95 KV BIL.

Switchboards 600V and Below

1. Acceptable Manufactures: Eaton, General Electric, Square D, or Siemens.
2. Buses and Connections: Three-phase, four-wire type, copper bussing, uniform capacity entire length of switchboard.
3. Overcurrent Protective Devices: Ratings, characteristics and settings suitable for use. Main and branch devices shall be electronic trip types with integral metering for customer's use.
4. Ratings: Nominal system voltage, continuous main bus amperage, short-circuit-current rating suitable for use.
5. Infrared (IR) Windows: Provide a minimum of two IR windows for each switchboard section. IR windows shall be suitable for long wave and medium wave thermography.
 - Short wave: minimum of 90% at 4 μm
 - Long wave: minimum of 75% at 9 μm

Transformers

Transformers shall be dry-type, energy efficient with kVA ratings as shown on the drawings. Primary shall be 480 volt, 3 phase, 3 wire, delta and secondary shall be 120/208 volt, 3 phase, 4 wire wye. Transformer shall include four primary voltage adjustment taps, class H insulation for 150 degree C rise above 40 degrees C ambient, and a ventilated enclosure.

Panelboards

1. Panelboard enclosures shall be made of code gauge steel with finished cabinet front with concealed trim clamps, concealed door hinges, and lockable trim door with flush locks all keyed alike. 120/208 volt circuit breakers shall be bolt on, minimum 10,000 AIC rating, 277/480 volt circuit breakers shall be bolt-on, minimum 14,000 AIC rating. Provide removable typewritten circuit breaker identification inside door.
2. Disconnect switches shall be heavy duty, horsepower rated, 250 volt or 600 volt, 2-pole, solid neutral, or 3-pole fused or non-fused and as required. Switch shall be quick make quick break with interlock and lockable enclosure door for opening. Provide NEMA 1 enclosure indoors, NEMA 3R outdoors, and NEMA 4X in interior wet locations. Enclosed safety switches shall be non-fused molded case switch or enclosed circuit breaker type disconnect switches with motor rated HARC type circuit breakers.

Motor Controls

1. Magnetic / Combination Starters: NEMA 1 enclosure with pilot light, HOA switch, control transformer with matching closing coil, 1 NO & 1 NC auxiliary contact and thermal overload protection sized to the motor. Fusible switches shall be quick make, quick break with interlock to door. Starters
2. shall be full voltage across the line sized as necessary.

--End of Electrical Systems--



16.1 Lighting Systems

This section provides general guidelines on lighting system that apply to the overall lighting system performance. See Section 16.2 for the specific lighting design approaches and requirement for the historical lighting zone (Zone 1). The proposed lighting layout drawings are also provided to indicate fixture locations and estimated quantities. See drawing sheets (E201.1, E202.1, E203.1, E204.1, and E501) for lighting layout in Zone 1. See drawing sheets (E-*) for lighting layout and luminaire schedule in Zone 2, Zone 3 and Zone 4.

The Interior Lighting: Lighting systems appropriate for the task and design of the space will be selected. Lighting levels will meet or exceed IES recommended lighting levels.

Lighting energy system shall meet or exceed MSBG (B3) energy provisions and prescriptive requirements.

Design will utilize energy efficient fluorescent lamps, LED light sources and electronic ballasts. Lamp color temperature shall be consistent with the Capitol campus standard degree Kelvin color temperature with a color rendering index (CRI) of 85 or better for general lighting applications, with exceptions in specialty areas where 2700 degree Kelvin color temperatures will be applied to match historical lighting appearance. Incandescent and halogen light sources may be used for the historical lighting application and where the incandescent and halogen dimming function is required.

Where fluorescent dimming is specified, ballasts shall provide dimming to one to five percent of total light output for all lamp sources.

Fluorescent lighting fixtures shall be provided with ballasting to accommodate step-dimming or inboard/outboard switching as indicated.

Indoor Lighting Specifics

1. Interior spaces are described below, with maintained illumination levels and luminaire types.
 - Open Office: Provide 30fc using historical style luminaires. The general illumination will be provided by pendants or surface mounted luminaires. Task lighting will be provided at each work station and be incorporated into the furniture design as much as possible
 - Private Office: Provide 30fc using historical style luminaires. The general illumination will be provided by pendants or surface mounted luminaires. Task lighting will be provided at each work station and be incorporated into the furniture design as much as possible
 - Conference Rooms: Provide 30fc using historical style luminaires. Luminaires shall be dimmable to accommodate the different function of the space

- Hearing Room: Provide 30fc using historical style luminaires. Luminaires shall be dimmable to accommodate the different function of the space. Provide additional lighting of 100fc for TV production. TV production lighting shall be provided by 3200K LED luminaires.
 - TV production control rooms: Provide 30fc using dimmable luminaires with good glare control
 - Editing studio: Provide 30fc using dimmable luminaires with good glare control
 - Public Restrooms: Restore/replicate historical lighting in public restrooms for Ground Level through 4th Level. See historical drawings for partition mounted historical lights and mirror lights. At Terrace Level, provide historical style wall sconces at the mirror wall and surface mounted historical style ceiling fixtures in circulation path and in each stall. For single-stall toilet room, provide one historical wall sconce at the mirror and one ceiling mounted historical light fixture for general illumination
 - Janitor Closets: Provide 20fc using fluorescent luminaires
 - Storage Rooms: Provide 20fc using fluorescent luminaires
2. LED edge-lit exit signs will be used throughout other than in the Zone 1 spaces. Specially designed exit signs will be used in the Zone I spaces to meet life-safety code requirement.

Exterior Lighting Specifics

1. Building / Egress Lighting: Each exit door shall have minimum of one building mounted LED luminaires.
2. Temporary construction parking lot lighting: Provide 25', shoe-box style pole lights with metal halide light source. See landscape drawing for layout and quantity. Provide 1fc minimum and 10:1 uniformity ratio for parking surface.
3. Bus route lighting: Provide historical light poles to match the existing capital campus roadway lighting. See landscape drawing for layout and quantity.

Emergency Egress Lighting

1. Exterior: Building-mounted exterior lighting at entrances/exits from the building will be circuited and controlled to serve as egress lights and be connected to the life safety circuit.
2. Interior: Egress lighting will be provided by fixtures connected to the life safety circuit where necessary to meet code requirements.

Lighting Controls

1. Single-occupant offices, single-occupant toilet rooms, corridors, storage rooms, and other enclosed rooms less than 1000 square feet will be provided with occupancy sensors to automatically control lighting. See list below for occupancy sensor application.
 - Janitor's closets, small storage rooms, single-occupant toilet rooms: Wallbox infrared
 - Multi-occupant toilet rooms: Ceiling-mounted dual technology
 - Large storage rooms: Ceiling-mounted dual technology
 - Open office, conference rooms: Ceiling-mounted dual technology
 - Private offices: Wall mounted dual technology
 - Corridors: Ceiling-mounted dual technology
2. Waiting areas, lobbies, and other large unenclosed public spaces, other than corridors will be controlled by a microprocessor-based, low-voltage lighting control system consisting of line-

voltage relays controlled throughout. The microprocessor based system shall accept input signals from remote low-voltage switch stations, astronomic time clock, day lighting sensors, occupancy sensors and campus Honeywell EBI Building Automation System.

3. Local dual-level switching will be provided in work and office areas to allow occupant selection of lighting level.
4. Wall box dimmers will be provided where incandescent is located. Large areas of incandescent will have multiple dimming zones, controlled separately.
5. Exterior lighting will be controlled by a microprocessor-based lighting control panel consisting of line-voltage relays controlled through the microprocessor based control input.
6. Senate media room, associated TV production control room and editing studio will be controlled by modular dimming and preset system.
7. Community Rooms will be controlled by modular dimming and preset system.
8. See Section 16.2 for the Zone 1 lighting control requirements.

Lighting Systems Commissioning

1. A third party commissioning agent must test and verify lighting controls are calibrated and operate as intended, and performed to manufacturer's installation instructions.
2. The contractor shall be required to make any necessary modifications to the systems programming or installation to address any of the system deficiencies identified by commissioning agents.

Basic Materials and Methods

1. Shop drawings, Operation and Maintenance Manuals, and Operating instructions for the Owner are required for this project.
2. All materials shall be new, UL Listed and Approved for the purpose, and installed per code.
3. Work shall be installed per the NEC (NFPA 70) and applicable state and local codes and shall meet the requirements of nationally recognized standards. The Contractor shall secure and pay for all permits, licenses, utility and inspection fees, and coordinate all work with local inspection authorities.
4. All systems shall be completely functional and wiring systems shall test free of defects using megger, continuity, ground, voltage, current, and phase rotation tests. Balance system phase currents to within 5% of each other.
5. Provide all cutting and patching necessary for installation of electrical work and restore finished surfaces disturbed by this Contractor. Do not cut or drill structural members.
6. Provide general cleanup of waste and rubbish in the work area, and clean all removed and reinstalled equipment and luminaires. Clean all equipment that has become dirty during construction.
7. All materials and methods shall be subject to DSF general guidelines and standard specifications.

Lighting Equipment

1. Luminaires: Luminaires will be provided complete with lamps, ballasts, and all necessary accessories and mounting hardware. Luminaires will be compatible with ceiling or wall systems.
 - See luminaire schedule issued for luminaire specifications.

2. Ballasts
 - Fluorescent: Program Rapid-start electronic, low harmonic (10% THD or less at 120V, 15% THD or less at 277V)
 - Compact Fluorescent: Program Start, Normal Ballast Factor (0.85 or higher), <10% THD
3. Lighting Control Panels: Microprocessor-based control system with electrically-held relays for control of lighting loads. Multiple panels shall be networked together with signal cabling. Low-voltage momentary switches located as necessary for control intent.
4. Occupancy Sensors:
 - Wallbox passive infrared: similar to SensorSwitch
 - Wallbox dual-technology: similar to SensorSwitch
 - Ceiling-mounted passive infrared: similar to SensorSwitch
 - Ceiling-mounted dual-technology: similar SensorSwitch
5. Wall box dimmers: Complete with calibrated linear vertical slide control, separate push on push off switch, square law dimming, concealed fins, and preset feature with high adjust trim. Group dimmers shall be finished so that the installation appears ganged without breaking off any cooling fins. Dimmers shall be Lutron Nova Vareo or equivalent.

16.2 Zone 1 Lighting Design

Existing Historic Lighting Fixtures and Locations

1. There are many existing historic lighting fixtures located throughout the Zone 1, high priority public areas of the Capitol. The existing fixtures from 1906 were early in the development of electric light and the use of lighting in buildings. The light levels exhibited under the original design are minimal when compared to today's standards for light levels, safety, and efficiency.
2. The original light fixture design generally "featured" the exposed Thomas Edison carbon filament lamp, with either a clear or frosted lamp envelope. At some of the fixtures, the lamps were located within translucent round glass globes.
3. Fortunately, many of the fixtures are in good condition, but several have been modified over the years for aesthetic reasons, light output, or maintenance and efficiency improvements.
4. Several of the floor lamp torchiere fixtures have been relocated within the facility and four of them were relocated to another state building. The torchieres were generally relocated to make room for the Governor portraits or moved to areas with great deficiency in lighting levels.
5. Related to the torchiere locations, it is interesting to note that the fixtures typically flanked entrances or were directly at the end of hallways to give the visitor a sense of orientation and to utilize the fixtures as a way-finding means within the Capitol.

Existing Historic Lighting Fixture Approach

1. The historic lighting fixtures will all be cleaned, rewired, sockets and lamps replaced, and brought up to UL wiring safety standards.
2. The modified fixtures will be restored to their original design. Generally speaking, this involves restoring the multiple lamp approach that was integral to the luminaires and can be viewed in the project documents.
3. The torchieres that have been previously moved will be reinstalled at their original locations.

Existing Non-Historic Lighting

1. There have been several changes to the Capitol lighting design since the building opened. These changes were implemented based on the technology available at the time and the design direction that was desired related to architectural changes in function, finishes, lighting levels, and maintenance and energy efficiency.
2. The modifications consist of the following primary changes:
 - The addition of recessed down lights in some public corridors.
 - The addition of recessed down lights at the House of Representatives Chamber, the Senate Chamber, the Senate Hearing Room, and the Supreme Court Chamber. Many of these fixtures were added due to the need for additional light for both function and video needs.
 - The addition of surface mounted up and down lights at the Rotunda.
 - Modifications to historic fixtures with light sources and optical reflectors that increased the lighting levels at specific areas.
 - Modifications of historic fixtures with contemporary lamps to change the light source for increased lighting levels, and energy and maintenance improvements.
 - The addition of high output quartz uplights to illuminate the corridor ceilings and provide increased ambient light levels.
 - The addition of theatrical type fixtures to illuminate specific areas within the House of Representatives for daily operations and for video needs.

Existing Non-historic Lighting Approach

1. The existing recessed downlights in the public corridors will be removed and a replicated light fixture will be utilized to provide illumination in those areas.
2. The existing quartz uplight will be removed and a new low profile LED light strip will be utilized at the existing cornice to uplight the ceiling and provide ambient illumination. The extent to which the LED strip will be implemented and the exact locations will be refined through out the design process.
3. In areas where additional illumination is required and it is not feasible to add the strip uplight or change the lamping of existing fixtures, an approach to add concealed sources within existing fixtures or within architectural details will be considered.
4. The proposed restoration of the ceilings to their original darker finishes will also decrease the light levels and the perception of the brightness in the space. This will require a specific lighting approach to illuminate these areas. Replicated fixtures, including freestanding torchieres to provide uplight and surface mounted fixtures to provide ambient lighting are being explored.
5. The design team will determine the exit lighting sign requirements. If exit signs are required in historic areas, the signs could be minimal and contemporary in appearance or they could be furnished in an historic looking format.
6. Additional electric illumination will be provided by concealed luminaires behind skylights, lay lights, and the elevator shaft windows.
7. Illumination of art work and displays will require further study and coordination with the Minnesota Historical Society. An allowance for some of this work is included in the documents.

Lighting Control

1. The lighting control systems in the House, Senate, and Supreme Court Chambers, and the Hearing Room have served their function well but they are far beyond their anticipated life. The systems will be replaced with modern technology to control the new light sources. The user interface to these systems will be very simple and provide easy to use operation for the designated preset lighting needs in the various spaces. The system may also be tied to emergency and building operation systems if desired.
2. The lighting control for the primary public circulation areas will be controlled by a lighting dimming system to reduce maintenance, save energy, and provide the ability to represent different lighting level presets. The presets could include the original historic lighting levels, the daily light levels supplemented by the natural illumination from skylights, lay lights, and windows, and night time levels for both occupied and reduced illumination needs.
3. Circuits within the lighting systems can be intercepted and used for emergency needs as required. Additional emergency lighting can be provided by carefully integrating concealed fixtures into the architecture that are only used for emergency operation.

Lighting Documents

1. This report includes a light fixture schedule for historic series fixtures (types SH-*), replicated fixtures (types SR-*), and architectural fixtures (types S-*). See Appendix 16 for reference. The proposed lighting layout drawings are also provided to indicate fixture locations and estimated quantities. See Architectural Lighting Sheets included in the drawing set (E201.1, E202.1, E203.1, E204.1, and E501) for reference.

--End of Lighting System--



17.1 COMMUNICATIONS SYSTEMS

General description: Communications systems work, associated with construction of the Minnesota State Capitol Interior Renovation.

The Capitol Interior Renovation project consists of extensive upgrades and modifications to the telecom infrastructure throughout the building. It is also desired that the building MPOP and the Main Telecom rooms be relocated and upgraded.

In general the existing telecom cabling infrastructure will be demolished. All abandoned cabling shall be removed per NEC requirements. The demolition of all communications cabling and termination hardware must be performed by trained telecom cabling professionals. This project will require that several existing telecom rooms and existing cabling infrastructure located throughout the building be temporarily maintained during the multiple phases of construction.

New telecom rooms will be located on the Terrace Level, First Level, Second Level, and Third Level. The final installation of the telecom infrastructure on the Terrace Level is to be routed under the Terrace Level floor. The contractor shall be responsible with coordinating the underground raceway routing and pull boxes with the project engineer and structural engineering requirements. Refer to the structural engineering requirements for footing underpinning and soil solidification requirements for underground duct and raceway routing.

It is an Owner's stated goal of this project to meet Minnesota's Sustainable Building Guidelines commonly referred to a B3 (Buildings, Benchmarks, and Beyond).

Items currently not included in the scope of work:

- Telephone System: Telephone hardware and electronics such as handsets. It is presumed that the Owner will provide this equipment. Telephone cabling, pathways (conduit and cable tray), outlets, faceplates, terminal blocks, backboards, cable termination and cable testing are included as part of this project.
- Data System: Data network electronics such as Ethernet switches, servers, wireless LAN access points, uninterruptible power supplies, and other electronic equipment are not included. It is presumed that the Owner will provide this equipment. Data cabling (fiber optic and copper), pathways (conduit and cable tray), outlets, faceplates, patch panels, network equipment racks, cable terminations and cable testing are included as part of this project.
- DAS (Distributed Antenna System): DAS electronics, copper and fiber optic cabling, and Antennas. It is presumed the Owner will provide this equipment and cabling. Pathways (conduit and cable tray) are included as part of this project.

- Cable TV (CATV) System: DVD player/recorders, video signal processors, and other electronics are not included. It is presumed that the Owner will provide this equipment. CATV cabling, pathways (conduit and cable tray), outlets, faceplates, amplifiers, splitters, backboards, terminations and testing are included as part of this project.

The codes, standards and guidelines listed indicate recommended or minimum requirements. Based on input from Owner representatives and recommendations from HGA, minimum requirements or standards may be exceeded.

1. All work shall be done in accordance with all applicable local, State and Federal codes.
2. Comply with all applicable OSHA regulations.
3. All material shall be new and shall bear a U.L. label where a U.L. standard and/or test exists or other nationally recognized testing standard recognized.
4. Prepare and submit to all authorities having jurisdiction, for their approval, all applications and working drawings required by them. Secure and pay for all permits and licenses required.
5. The following codes, standards, and guidelines will be used for the design as applicable or as directed by the authorities having jurisdiction:
 - 2010 Mechanical Code
 - 2010 Plumbing Code
 - 2011 Electrical Code
 - 2007 Minnesota Fire Code
 - 2009 Version 2.1 State of Minnesota Sustainable Building Guidelines (MSBG)
 - 2010 NFPA 13
 - 2010 NFPA 72, 90, 101,
 - 2010 ASRHRAE 90.1 Energy Code Requirements
 - TIA/EIA Telecommunications Building Wiring Standards: 526-7, 526-14-B, 568-C.0, 568-C.1, 568-C.2, 568-C.3, 568-C.4, 569-C, 606-B, 607-B, and 758-B.
 - IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - ICEA publication S-80-576-2002
 - 1996 ANSI A117.1/ADAAG
 - Requirements of Insurance Carrier

Pathways and Spaces

Entrance Facility (MPOP) Room:

1. A new MPOP room will be located in the Southwest portion of the Terrace Level to accommodate the incoming telephone service and the Fiber Hut service from Century link.
2. Four 4" conduits will be provided from the new MPOP room to the Century Link manhole located Southwest of the building in the sidewalk at the intersection of Rev Dr. Martin Luther King Jr. Boulevard and Aurora Avenue
3. 3/4" AC grade fire retardant plywood from 4" AFF to 8'-4" AFF will be provided along all four walls of the room and painted with two coats of paint.
4. Coordination with Century Link will be required for the installation of new conduits and new cabling from the manhole to the new MPOP room and for the relocation of the existing Fiber Hut in existing room B6 on the Terrace Level to the new MPOP room. Contact Tom Frankfurth at 651-714-7520 thomas.frankfurth@centurylink.com.

Main Telecom Rooms

1. Two Main Telecom rooms will be provided on the Terrace Level. One room on the West end and one room on the East end. Refer to Schematic Design drawings for specific locations.
2. Telecommunications services to the building from the Capitol campus network system provided by MN.IT via fiber optic cabling in the West and East utility tunnels will be brought into each of the two Main Telecom rooms.
3. Six 4" conduits will be provided from the MPOP room under the Terrace Level floor slab to the West Main Telecom room. Two Maxcell 4" 3-cell Fabric Innerducts will be provided in four of the 4" conduits.
4. Four 4" conduits will be provided from the MPOP room under the Terrace Level floor slab to the East Main Telecom room. Two Maxcell 4" 3-cell Fabric Innerducts will be provided in each 4" conduit.
5. Six 4" conduits will be provided from the East Main Telecom room under the Terrace Level floor slab into the East utility tunnel. Two Maxcell 4" 3-cell Fabric Innerducts will be provided in four of the 4" conduits.
6. Twelve 4" conduits will be provided from the West Main Telecom room under the Terrace Level floor slab to the East Main Telecom room. Two Maxcell 4" 3-cell Fabric Innerducts will be provided in eight of the 4" conduits.
7. The layout for each Main Telecom room will be:
 - 3/4" AC grade fire retardant plywood from 4" AFF to 8'-4" AFF along all four walls of the room and painted with two coats of paint.
 - Five 4-Post Equipment racks located along the center of the room with front and rear vertical cable management between each rack and on each end of the row of racks.
 - 24" wide cable tray will be installed over the racks and to the end walls.

Floor Telecom Rooms

1. Floor telecom rooms will be provided to limit the voice/data horizontal cable length to 295 feet or less from the telecom room out to the farthest voice/data outlet.
2. Six 2" conduits will be installed from one of the two Main Telecom Rooms on the Terrace Level to each Floor Telecom Room. One Maxcell 2" 3-Cell Fabric Innerduct will be provided in four of the 2" conduits.
3. Quantities/locations are as follows (refer to Schematic Design drawings for specific locations):
 - Two Telecom rooms on the Terrace Level.
 - One Telecom room on the Ground Level.
 - Five Telecom rooms on the First Level.
 - Four Telecom rooms on the Second Level.
 - Seven Telecom rooms on the Third Level.
4. The typical layout for each Telecom Room will be:
 - 3/4" AC grade fire retardant plywood from 4" AFF to 8'-4" AFF along all four walls of the room and painted with two coats of paint.
 - Two 2-Post Equipment racks located along the center of each room with front and rear vertical cable management between each rack and on each end of the row of racks.
 - 12" wide cable tray will be installed over the racks and to the end wall.

Telecommunications Grounding

1. Provide 4" x 1/4" x 24" copper grounding busbar with pre-drilled holes to TIA/EIA-607-B hole pattern in each of the Main Telecom Rooms. Provide 3/0 AWG copper conductor from grounding busbar in each Main telecom room to the grounding busbar in the main electrical room.
2. Provide 2" x 1/4" x 12" copper grounding busbar with pre-drilled holes to TIA/EIA-607-B hole pattern in each of the Floor Telecom Rooms and the MPOP room. Provide 3/0 AWG copper conductor from grounding busbar in each Floor telecom room and the MPOP room to the grounding busbar in the main electrical room.
3. Bond equipment racks and cable trays to Telecom grounding busbar in Telecom rooms.

Cable Tray and Conduit

1. 12" width, 4" inside loading depth, wire basket-type, galvanized steel, NEMA 8C supported minimum 8' on center. Refer to Schematic Design drawings for locations.
2. The cable tray will installed along the major corridors through-out the building.
3. A typical voice/data outlet will have a 5" x 5" x 2.875" box with a single gang trim ring and a 1-1/4" empty conduit with pull string routed up to an accessible ceiling space or cable tray located in the corridor.

Backbone Cabling

New Intra-Building (Campus) Backbone Cabling:

1. 96 strands of plenum rated indoor/outdoor rated armored singlemode (OS2) fiber optic cabling will be installed from the DOT Building room B41A to the State Office Building (SOB) room B46, from the State Office Building (SOB) room B46 to the Capitol Building Main Telecom Room on the West end of the Terrace Level, from the Capitol Building Main Telecom Room on the West end of the Terrace Level to the Capitol Building Main Telecom Room on the East end of the Terrace Level, from the Capitol Building Main Telecom Room on the East end of the Terrace Level to the Judicial Building Room A311 MPOP, from the Judicial Building Room A311 MPOP to the Centennial Office Building (COB) Fifth Floor Network Central Site Room utilizing the existing utility tunnels and Steam tunnels in the Capitol complex as pathways between buildings. Close coordination will be required with MN.IT. Contact Marty Willenbring at 651-201-1063 marty.willenbring@state.mn.us or Joe Koch at 651-201-1018 joe.koch@state.mn.us. The fiber strands will be terminated on connectors or fusion spliced for pass-thru in each building as follows:
 - DOT Room 41A – Terminate all 96 strands on duplex-SC connectors.
 - SOB Room B46 – From DOT terminate 24 strands on duplex-SC connectors, from COB Fifth Floor Network Central site terminate 24 strands on duplex-SC connectors, and the remaining 72 strands are to be fusion spliced as a direct pass-through for direct DOT to Capitol West Main Telecom room, DOT to Capitol East Main Telecom room, DOT to Judicial, and DOT to COB fiber paths/connections.
 - Capitol West Main Telecom Room – From COB Fifth Floor Network Central site terminate 12 strands on duplex-SC connectors, from DOT Room 41A terminate 12 strands on duplex-SC connectors, and the remaining 84 strands are to be fusion spliced as a direct pass-through for direct DOT to Capitol East Main Telecom Room, DOT to Judicial, DOT to COB, and COB to SOB fiber paths/connections.

- Capitol East Main Telecom Room - From COB Fifth Floor Network Central site terminate 12 strands on duplex-SC connectors, from DOT Room 41A terminate 12 strands on duplex-SC connectors, and the remaining 84 strands are to be fusion spliced as a direct pass-through for direct COB to Capitol West Main Telecom Room, DOT to Judicial, DOT to COB, and COB to SOB fiber paths/connections.
 - Judicial Room A311 MPOP – From COB Network Central site terminate 24 strands on duplex-SC connectors, from DOT room 41A terminate 24 strands on duplex-SC connectors, and fusion splice remaining 48 strands as a direct pass-through for direct COB to DOT, COB to Capitol West Main Telecom Room, COB to Capitol East Main Telecom Room and COB to SOB fiber path/connections.
 - COB Fifth Floor Network Central Site - Terminate all 96 strands on duplex-SC connectors.
2. 24 strands of plenum rated indoor/outdoor rated armored singlemode (OS2) fiber optic cabling will be installed from the Main Telecom Room on the East end of the Terrace Level to the Judicial Building Room A311 MPOP utilizing the existing utility tunnels in the Capitol complex as pathways.
 3. 48 strands of plenum rated indoor/outdoor rated armored 50/125 laser optimized (OM4) multimode fiber optic cabling and 96 strands of plenum rated indoor/outdoor rated armored singlemode (OS2) fiber optic cabling will be installed from the Main Telecom Room on the West end of the Terrace Level to the House/Senate computer room in the Basement of the State Office Building utilizing the existing utility tunnels in the Capitol complex as pathways.

Relocations of Existing Intra-Building (Campus) Backbone Cabling

1. Existing Campus backbone fiber optic cables are terminated in Rooms B18 and B31 on the Terrace Level. These fiber optic cables will need to be relocated or spliced/extended to the new Main Telecom Rooms, re-terminated on to new fiber optic connectors and tested. Close coordination will be required with MN.IT. Contact Marty Willenbring at 651-201-1063 marty.willenbring@state.mn.us or Joe Koch at 651-201-1018 joe.koch@state.mn.us.
2. The following existing Campus backbone fiber optic cables will need to be relocated or spliced/extended from Rooms B18 and B31 to the new East Main Telecom Room, re-terminated on to new fiber optic connectors, and tested:
 - One 12 strand singlemode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Administration Building.
 - One 12 strand singlemode (indoor armored) fiber optic cable with SC connectors to the Admin Building.
 - Two 12 strand multimode (conventional fiber in innerduct) fiber optic cables with ST connectors to the Admin Building.
 - One 36 strand singlemode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Centennial Office Building (COB).
 - One 12 strand singlemode (conventional fiber in innerduct) fiber optic cable with SC APC connectors to the Centennial Office Building (COB).
 - One 24 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Centennial Office Building (COB).
 - One 24 strand singlemode (indoor armored) fiber optic cable with SC connectors to the Department of Revenue (DOR) Building.
 - One 24 strand singlemode (indoor armored) fiber optic cable with SC connectors to the Judicial Building.

- Two 12 strand multimode (conventional fiber in innerduct) fiber optic cables with ST connectors to the Judicial Building.
 - One 6 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Power Plant Building.
3. The following existing Campus backbone fiber optic cables will need to be relocated or spliced/extended from rooms B18 and B31 to the new West Main Telecom room, re-terminated on to new connectors, and tested:
- One 48 strand singlemode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Department of Transportation (DOT) Building.
 - Two 24 strand multimode (conventional fiber in innerduct) fiber optic cables with ST connectors to the Department of Transportation (DOT) Building.
 - One 12 strand singlemode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Ford Building.
 - One 12 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Ford Building.
 - One 24 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Ford Building.
 - One 24 strand singlemode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Minnesota State Retirement System (MSRS) Building.
 - One 96 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the Minnesota State Retirement System (MSRS) Building.
 - One 24 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the State Office Building (SOB).
 - One 24 strand multimode (conventional fiber in innerduct) fiber optic cable with ST connectors to the 525 Park Street Building.
 - One 24 strand multimode fiber optic cable with ST Connectors to the History Center Building.

New Inter-Building Backbone Cabling

50 pairs of Category 3 plenum rated copper backbone cabling will be installed from one of the two Main Telecom Rooms on the Terrace Level to each Floor (TR) Telecom Room.

1. 200 pairs of Category 3 plenum rated copper backbone cabling will be installed from the MPOP room to each of the two Main Telecom rooms on the Terrace Level.
2. 200 pairs of Category 3 plenum rated copper backbone cabling will be installed from the West Main Telecom Room to East Main Telecom Room on the Terrace Level.
3. The new fiber optic backbone cabling system will consist of an Air Blown Fiber Optic cabling system:
 - One plenum rated tube cable with a quantity of 7 tubes will be installed from one of the two Main Telecom Rooms on the Terrace Level to each Floor Telecom Room.
 - One fiber bundle of 24 strands of plenum rated 50/125 laser optimized (OM4) multimode fiber and one fiber bundle of 24 strands of plenum rated singlemode (OS2) fiber will be blown into the tube cables from one of the Main Telecom Rooms to each Floor Telecom Room.
 - Two plenum rated tube cables with a quantity of 19 tubes will be installed between the two Main Telecom Rooms on the Terrace Level.

- Four fiber bundles of 24 strands (total of 96 strands) of plenum rated 50/125 laser optimized (OM4) multimode fiber and (4) fiber bundles of 24 strands (96 strands total) of plenum rated singlemode (OS2) fiber will be blown into the tube cables between the two Main Telecom Rooms on the Terrace Level.

Horizontal Cabling System

Horizontal Cables:

1. The horizontal cabling to the typical voice/data outlet faceplate will consist of (2) plenum rated Augmented Category 6 twisted pair cables for voice and data.
2. The typical voice/data outlet will consist of two 8-position modular jacks on a single-gang faceplate.
3. The horizontal voice and data cables will be terminated on rack mounted Augmented Category 6 patch panels in the floor telecom rooms.

Voice/Data Outlet Scope:

1. Existing spaces defined on the plans as “Minimal remodeling”: Remove jacks and cabling from existing device locations to remain and provide new voice/data cabling and jacks at existing device location. Provide additional voice/data outlet faceplates with jacks and cabling as needed for Owner-provided equipment and other new devices.
2. Existing spaces defined on the plans as “Extensive remodeling”: Remove jacks and cabling from existing device locations to remain and provide new voice/data outlet faceplates with jacks and cabling at existing device locations. Provide additional voice/data outlet faceplates with jacks and cabling on existing walls and new walls to adequately address the new use for the remodeled space.
3. New construction: Provide voice/data outlet faceplates with jacks and cabling as required to provide connections to specific equipment such as computers, ceiling mounted projectors and telephones.

Typical Voice/Data Outlet Quantities and Locations:

1. Private Offices: Provide two voice/data outlet faceplates, one each on opposite walls, with two jacks on each faceplate.
2. Cubicles: Provide 1 voice/data outlet faceplate with two jacks.
3. Desks on Senate Chamber Floor: 1 voice/data outlet faceplate with two jacks.
4. Desks on House Chamber Floor: 1 voice/data outlet faceplate with two jacks.
5. Conference and Meeting rooms: Provide 4 voice/data outlet faceplates, one on each wall, with two jacks on each faceplate. Provide one voice/data outlet faceplate at the presentation location with two jacks.
6. Copy/work room: Provide three voice/data outlet faceplates with two jacks on each faceplate.
7. Lounge: Provide two voice/data outlet faceplates on opposite walls with two jacks on each faceplate.
8. Vending Machines: Provide outlet faceplate with 1 jack at each vending machine location.
9. Hearing Rooms: Provide one voice/data outlet faceplate at presentation location with two jacks. Provide one voice/data outlet faceplate with two jacks at each seat in the Dies area. Provide two data outlet faceplates with one jack on each faceplate for two wall mounted monitors.
10. Wireless LAN Access Points: Provide outlet locations for each 1,500 SF of floor space consisting of two data jacks at each location for ceiling mounted Access Points. Final Access

Point locations to be determined by IT facility study and shown per their direction during final design.

11. Elevator Cab Phones: Provide jacks and cabling to elevator control panels to provide a telephone connection in each elevator cab.
12. Main Fire Alarm Panel: Provide two jacks for telephone connections to auto-dialer.
13. Building Management System (BMS) Control Panels: Provide data jacks to each control panel.
14. Security Cameras: Provide one data jack at each camera location.
15. Card Access System Control Panels: Provide one data jack at each card reader control panel.
16. Mechanical Rooms: Provide one jack for wall mounted telephone.
17. Telecom Rooms: Provide one jack for wall mounted telephone.
18. Electric Rooms: Provide one jack for wall mounted telephone.

Television Distribution System

The existing Cable TV service is provided by Comcast to the Capitol Building and the other buildings in the Capitol complex. The TV signal enters the Capitol Building via the West utility tunnel utilizing (3) 1/2" hardline coaxial cables and leaves the building via the East utility tunnel utilizing (3) 1/2" hardline coaxial cables to distribute the TV signal to the other buildings in the Capitol complex. The existing TV signal source for the Capitol Building is terminated in room B31 on the Terrace Level along with the head-end distribution equipment. Comcast also has two fiber optic cables enclosed in a 1" PVC conduit that passes through the ceiling of the Terrace Level of the Capitol building, from the West utility tunnel to the East utility tunnel, to provide services to the City of St. Paul and Ramsey County. The existing 1/2" hardline coaxial cables and the fiber optic cables will need to be relocated inside of the under floor conduits from the West Main Telecom Room to the East Main Telecom Room by Comcast. The existing TV signal source in Room B31 will need to be relocated to the West main telecom room by Comcast. Contact John Bednorz at 651-493-5359 John_Bednorz@cable.comcast.com.

A wired television distribution system connected to Campus TV System will be provided. Cabling will consist of plenum rated RG-11 or 1/2" Hardline coaxial trunk distribution cabling from the Head-end equipment located in the West Main Telecom Room on the Terrace Level to each floor Telecom Room. Horizontal drop cabling will consist of plenum rated RG-6 coaxial cabling from the nearest floor telecom room to each TV jack. Taps, Splitters and line amplifiers shall be located in Telecom Rooms (they shall not be located above ceiling tiles) and shall support 5 MHz to 750 MHz minimum video bandwidth.

TV Outlet Quantities and Locations

1. Private Offices: Provide two TV outlets, one each on opposite walls.
2. Cubicles: Provide one TV outlet.
3. Conference and Meeting rooms: Provide one TV outlet.
4. Copy/work room: Provide one TV outlet.
5. Lounge: Provide one TV outlet.
6. Hearing Rooms: Provide one TV outlet.
7. Rathskeller Dining Room: Provide two TV outlets.
8. Reception Area: Provide one TV outlet in each reception area.

--End of Communications Systems--



18.1 DESIGN GUIDANCE

The plumbing design will conform to the following codes, manuals, and guidelines.

1. 2012 Minnesota Plumbing Code.
2. State of Minnesota Sustainable Building Guidelines B3-MSBG Version 2.1.
3. National Fire Protection Association Standards
4. American Water Works Association Standards

18.2 PLUMBING SYSTEMS – EXISTING CONDITIONS AND DEMOLITON

18.2.0 General

- Occupied Building Scenario: The Minnesota State Capitol will be partially occupied throughout the entire construction process from start to finish. Refer to Section 2: “Occupied Building Phasing narrative and Schedule” of the project narrative for more specific phasing criteria.
- The existing plumbing within the kitchen/cafeteria, Rathskeller, and associated restrooms will not be demolished and renovated during this rehabilitation except as noted. Refer to drawings P100B and P100C for boundaries.
- Demolition will include removal of all fixtures from toilet rooms, showers, and all floor drains except in excluded areas of kitchen/cafeteria, Rathskeller, and restrooms associated with the Rathskeller.

18.2.1 Existing Domestic Cold Water System and Demolition

Existing

- The Domestic Cold Water System is currently served from two 4-inch domestic water service lines coming from the 16-inch main under University Avenue. Both services enter the building from the north. One service is located on the West Wing and one is located on the East Wing.
- Each domestic water service line is metered and provided with backflow protection. Both are interconnected inside the building.
- There is a 2-inch, valved domestic supply line that serves as an emergency domestic cold water supply to an adjacent building. This must remain in service during demolition and construction.
- There are currently two domestic water chillers serving the public drinking fountains.

Demo

- The existing domestic cold water system will be demolished in all except the kitchen/ cafeteria, Rathskeller, and associated restrooms. Refer to drawings P100B and P100C and phasing narrative.
- Domestic water must be delivered to all operational plumbing fixtures during demolition and construction whether by permanent or temporary means.
- The existing water line entering the building and corresponding backflow preventer on the east side will be removed to enable replacement with new copper piping.
- The existing backflow preventer on the water line entering the building on the west side will be removed to enable replacement with a new backflow prevention assembly.
- Remove the existing 4-inch water service header to enable replacement with new copper pipe.
- Remove the 2-inch water piping and valves connected to the adjacent building.
- The two domestic water chillers and corresponding piping and circulating pumps will be removed to enable new replacement installation.

18.2.2 Existing Domestic Hot Water System and Demolition

Existing

- Domestic hot water is currently generated from three plate-and-frame heat exchangers connected to the district heating water. District Energy supplies 250°F heating water during heating season and 160°F heating water during the rest of the year. The district heating water exchanges energy with a heat exchanger and an intermediate water loop. The intermediate water loop exchanges heat with domestic cold water to provide 120°F domestic hot water for restroom lavs and janitor's sinks and 140°F domestic hot water for the kitchen.
- The 120°F domestic hot water is stored in a 1000-gallon hot water storage tank. The tank is a former steam heated tank that has been retrofitted to its current storage only state.
- The 140°F domestic hot water is stored in a 100-gallon hot water storage tank.

Demo

- The existing hot water distribution system will be demolished in all except the kitchen/ cafeteria, Rathskeller, and associated restrooms. Refer to drawings P100B and P100C and phasing narrative.
- Demolition includes heat exchangers, pumps, storage tanks, piping, valves, expansion tanks, and other ancillary devices. Refer to drawings and phasing narrative.
- Domestic hot water must be delivered to all operational sinks, showers, and lavs during demolition and construction whether by permanent or temporary means. Refer to Phasing Narrative.

18.2.3 Existing Domestic Hot Water Recirculating System and Demolition

Existing

- The primary distribution for the recirculating hot water is from the domestic hot water storage tank to a trench under the floor of the Terrace Level.
- The recirculating lines connect to three headers on the Terrace Level.
- The recirculating hot water lines run under the floor from the headers to distribution above floor directly up into the toilet rooms.

Demo

- The existing hot water recirculating system will be demolished except if located in the kitchen/ cafeteria, Rathskeller, and associated restrooms. Refer to drawings P100B and P100C and phasing narrative.
- Hot water recirculation system demolition includes circulators, piping, and existing headers.
- The hot water recirculating system must be available to all operational sinks and lavs during demolition and construction whether by permanent or temporary means.

18.2.4 Existing Sanitary Waste and Vent System and Demolition

Existing

- Sanitary waste connects to all plumbing fixtures through several risers located throughout the building. These risers connect to sanitary mains under the Terrace Level floor.
- The existing sanitary waste leaves the building at three locations. The largest sanitary waste is a 12-inch line leaving the building on the south side of the West Wing.
- The second sanitary line is an 8-inch line exiting on the south side at the middle of the building. This main serves the east end of the building and the kitchen/cafeteria, Rathskeller, and associated restrooms. There may be some storm leaders connected to this sanitary main.
- The third sanitary waste is a 5-inch line leaving the building from the west side of the West Wing. This main serves the Security restrooms and showers.
- There are currently 5 sanitary or clear water sump/ ejectors in the Terrace Level.
- The sanitary vents through the roof connect multiple restrooms and janitor's closets and rise vertically through the building.

Demo

- The existing sanitary waste and vent system will be demolished in all areas except inside the kitchen/ cafeteria, Rathskeller, and associated restrooms. Refer to drawings and phasing narrative.

- Demolition of the Sanitary Waste System includes all sanitary piping, vent piping, roof vents, sumps, and ejectors.
- The venting for the kitchen/ cafeteria, Rathskeller, and associated restrooms located outside (above) the Terrace Level will be demolished and replaced with new sanitary vents.
- Restrooms, sinks, and lavs will remain operational during the Terrace Level demolition and construction. During demolition and construction, all waste must be delivered to the sanitary sewer leaving the building and all operational plumbing fixtures must be vented whether by temporary or permanent methodology.

18.2.5 Existing Storm Sewer System and Demolition

Existing

- There are 22 identified storm drains that collect rain and snow melt from the roof and deliver to mains under the floor of the Terrace Level. There are approximately 4 roof drains that do not have identification, but are shown on the existing roof plans.
- There are 4 existing drains on the Quadriga promenade.
- There are existing roof drains located high on the dome with new insulated rain leaders. These rain leaders will remain in service. The roof drains will be replaced.
- Area drains currently serve the exterior plaza level surrounding the Capitol building.
- Plaza drain replacement is not part of this project. All connections to the existing plaza drains will be demolished and replaced with new.
- Five storm lines currently exit the building. Two 8-inch storm lines exit on the north side one from the West Wing and one from the East Wing. One 8-inch line exits from the south side of the East Wing. Two storm sewers exit from the south side of the West Wing. One is a 12-inch storm line.

Demo

- The building storm piping will be demolished to the point that the service leaves the building.
- The existing storm leaders will be completely removed and disposed of. The exceptions are those leaders which are located in inaccessible historic locations and the newly replaced storm drain leaders high in the dome. The storm system must be operational during demolition and construction.
- The storm piping and plaza drain piping above and below grade will be completely removed and disposed of. The roof and plaza must be drained of water during rain and snow events and the water must go to the storm system.

18.3 PROPOSED PLUMBING SYSTEMS

18.2.0 Design Criteria and Assumptions

- Sanitary waste piping design is based on the 2012 Minnesota Plumbing Code drainage fixture unit count. Sanitary waste line sizing is based upon plumbing fixture counts from space planning, existing kitchen, and coordination with under floor duct routings.
- Storm water piping design is based on the 2012 Minnesota Plumbing Code. New roof drain sizes and locations are based on existing roof drainage areas.
- Domestic cold and hot water system are based on the 2012 Minnesota Plumbing Code and fixture unit count from space planning and existing kitchen.
- A cast-iron sleeve with water stop and mechanical sleeve seal will be used at each service pipe penetration through foundation walls.

18.2.1 Domestic Water System General

- Piping material for domestic hot and cold water: Soft copper tube, ASTM B88 Types K and L, water tube annealed temper.
 - Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match existing piping.
 - Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- All new above ground water piping will be copper. Copper with lead-free solder will be used for piping up to 1-1/2". Dielectric unions will not be used between dissimilar metals. A copper male adapter and a female of the dissimilar metal will be used.
- Install shutoff valve at each floor level close to water main riser and at each fixture group. Install adjustable hand wheel type supply stops at each fixture. Use full port ball valves for valves sized 4-inches or less. Use butterfly or gate valves for piping NPS larger than 4 inches.
- Each hot-water circulation return branch and the discharge side of each pump and circulator will have a balancing valve.
- Valves
 - Union Ball Valves: MSS SP-122, with full-port ball, socket or threaded detachable end connectors, and pressure rating not less than 150 psig at 73°F.
 - Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than 150 psig at 73°F.
- All piping will be insulated and routed through wall chases or ceiling plenums.
- All water distribution piping will be flushed and sanitized (chlorinated) prior to use.
- All pumps will be Bell & Gossett.
- All piping insulation will be Knauf Permawick or Techlite.
- Install all new plumbing fixtures:
 - Floor type composite janitor's sink with Chicago faucet chrome with vacuum breaker, pail hook, wall support, and integral stops. Chicago faucet model 305VB:

- short spout with vacuum breaker; 3/4-inch hose thread outlet; pail hook; H supply arms; adjustable from 4 inches to 8-3/8 inches centers; 369 handles.
- Install mixing valves for all safety showers and eye wash stations.
 - Install 6 new frost-proof post hydrants at the perimeter of the Terrace Level and 6 roof hydrants with vacuum breakers. There are several possible alternates for post hydrants.
 - a. Alternate 1 is ground hydrants located immediately outside the Terrace Level exterior wall.
 - b. Alternate 2 is quick-couplings connected to the existing irrigation system.
 - c. Alternate 3 is ground hydrants on the terrace/plaza deck.
 - d. Alternate 4 is wall hydrants at the Terrace Level exterior wall.
 - Lavatories will be drop-in, 1-1/2-inch minimum tailpieces with grid strainer.
 - Water closets will be American Standard Afwall wall-mounted, elongated bowl, vitreous china, manual flush valve (Sloan Royal), top spud.
 - Urinal will be American Standard Washbrook, vitreous china, manual flush valve (Sloan Royal), top spud.
 - Carriers will be Josam self-supporting, independent of the wall with rough-in plates.
 - Caulk all fixtures to the floor or wall with latex caulk.
 - Identify all pipes and valves.
 - Valves must be labeled and scheduled.
 - Fixture manufacturer to be consistent throughout the project.
 - Use Neoprene gaskets on the wall-set water closets and urinals.

18.2.2 Domestic Cold Water System

- Two domestic water lines serving the building will remain serving the building. The 4-inch water service entering the east side of the building will be replaced with new copper pipe and a new backflow prevention assembly. The west side service backflow prevention assembly will be replaced with a new assembly.
- The domestic water header will be replaced with new 3-inch copper piping.
- Domestic cold water will be distributed via a cold water loop high in the Terrace Level. New piping will be brought back to main Mechanical Room on the vault level.
- The domestic cold water loop will connect to cold water risers to serve restrooms and fixtures from Ground Level to 2nd Floor of the building and to a portion of the hydrants on the roof. The Terrace Level restrooms and other plumbing fixtures will be served from the cold water loop. Horizontal runs will be minimized in all levels except the Terrace Level. A new 3-inch line will connect to the existing kitchen domestic cold water line. The domestic water loop will reduce to 2 1/2 inches after the kitchen connection.
- A duplex variable drive domestic water booster pump system will increase the domestic cold water pressure for fixtures on the 3rd level, 4th level, and a portion of the roof hydrants.

- Plumbing fixtures with reduced flow rates will be provided to meet the Minnesota B3 requirements.
 - Lavatory faucets will have aerators supplying 0.5 GPM,
 - Wall-mounted, flush-valve water closets will have 1.28 GPF,
 - Kitchenette/Break Room sink faucets will have 2.2 GPM,
 - Showers will have 2.5 GPM,
 - Urinals will have 0.5 GPF.
 - Wall-mounted toilets and urinals will use carriers for support. Manual faucets and manual flush valves will be provided for the plumbing fixtures. Provide ADA fixtures where required by codes.
- Thermostatic mixing valves shall be provided for showers and for eye wash stations. Water fountains shall remain.
- There will be one emergency eye wash station located in the Mechanical Room on the Terrace Level.
- Two new remote water-chilling machines with domestic chilled water recirculation will serve the building's drinking fountains with cool domestic drinking water.
- There will be ground hydrants.

18.2.3 Domestic Hot Water System

- Two new brazed plate-and-frame heat exchangers will convert district heating water energy to domestic hot water with an intermediate loop between the heat exchangers for water safety.
 - The first stage brazed plate-and-frame heat exchanger will have 160°F District Heating Water into the high temp side and 150°F water out the high side. The low temp side water will be heated from 130°F to 150°F.
 - An in-line pump will circulate water between the first stage plate-and-frame heat exchanger and the second stage brazed plate-and-frame heat exchanger.
 - The second stage brazed plate-and-frame heat exchanger will have 150°F water flowing into the high temp side and 130°F water out the high side. The low temp side water will be heated from 120°F to 140°F.
- Two sets of pumps will circulate the intermediate loop and the domestic hot water loop. This assembly shall serve all domestic hot water needs.
- 140° F water will be supplied to the cafeteria kitchen through a 1-inch insulated hot water pipe. 140°F recirculating pipe will return through a ¾-inch insulated pipe.
- Thermostatic mixing stations shall provide 120° F water which will be delivered to restrooms, kitchenette sinks, janitor's closets, showers, and hand washing areas. The 120°F water will be stored in a 1000-gallon, glass-lined horizontal storage tank before being distributed through a domestic hot water loop in the Terrace Level.
- The domestic hot water loop will run parallel to the cold water loop on the Terrace Level. Hot water will be distributed from the Terrace Level loop up into chases and shafts to supply hot water to the fixtures on the upper floors. Horizontal distribution will be limited on all but the Terrace Level.
- Replace existing electric booster heater with new to provide hot water for the cafeteria kitchen dishwasher and pot scrubbing sinks. This booster is located in the

kitchen area and is the only item to be remodeled within the Kitchen/Rathskeller area.

- The 120°F hot water will be stored in a 1000-gallon tank with circulating hot water to maintain temperature. The 140°F hot water will be stored in a 100-gallon tank with circulating hot water to maintain temperature.

18.2.4 Domestic Hot Water Recirculating System

- There will be a hot water recirculating loop routed parallel to the hot and cold water loops located in the Terrace Level. Branch risers will connect at the highest point of each hot water riser.
- Building hot water recirculation shall maintain the desired water temperature at the furthest fixtures.

18.2.5 Sanitary Waste and Vent System

- All new aboveground waste and vent piping shall be cast iron, service weight, no-hub piping with extra-heavy couplings.
- All new underground sanitary and vent shall be cast iron, service weight, no-hub piping with extra-heavy couplings.
- New sanitary waste piping will be connected to the existing services where they transition through the exterior foundation wall.
- The 5-inch sanitary waste line at the west end of the West Wing will not be disturbed during excavation or new construction.
- The 12-inch sanitary waste line at the south end of the West Wing will be replaced with new piping and sleeve.
- The 8-inch waste leaving the south side center of the building will be replaced with new sanitary piping and sleeve.
- The main restroom waste riser, select East Wing sanitary waste risers, and East Wing Terrace Level sanitary waste will be routed to a collection sump located in the Mechanical Room and pumped up and into the 8-inch sanitary waste line at the center of the building. The sump will be provided with duplex (two) pumps.
- Provide all new plumbing fixtures in the restrooms and connect to new sanitary waste and vent.
- Provide cleanouts in sanitary drainage system at ends of runs, at changes in direction, near the base of stacks, every 100 feet in horizontal runs, and elsewhere as indicated on drawings.
- Cleanouts shall be the full size of the pipe for pipe sizes 6 inches and smaller. For pipe sizes larger than 6 inches, the cleanouts will be 6 inches.
- The sanitary waste system must be operational during demolition and construction.

18.2.6 Storm Water System

- All existing building storm services will be replaced with new cast iron, service weight, no-hub piping with extra-heavy couplings. There are two options for new building storm service.
 - Option 1: The storm water service leaving the building will be increased from an 8-inch to 12-inch storm on the north side of the East and West Wings and the south side of the West Wing. The 12-inch storm water service on the south side of the West Wing will be replaced with new 12-inch piping and be routed out the building in the same location.
 - Option 2: All building storm piping will be replaced with new piping of the same size as existing. Area drains will be combined to leave the building as a separate storm water service in parallel to the existing storm service.
- Provide new patio drains to the Second Level Balconies including but not limited to East Loggia, South Loggia, and West Loggia. All patio drains will be connected to the new storm water system.
- All roof drains will be replaced with new roof drains. The existing patio drains located at the Quadriga deck/promenade will be replaced with new patio drains. The existing drains on the dome will be replaced with new drains and connected to existing storm leaders.
 - The roof drains and overflow drains will be coated cast iron with large cast iron dome, non-puncturing clamp ring with integral gravel stop, and large sump with wide roof flange and no-hub bottom outlet.
 - The Quadriga promenade and balcony drains will be medium sump, square cast iron with promenade top.
 - The drains located high on the dome will be coated cast iron and match existing service type.
- The storm drain leaders will follow a similar path as the existing storm leaders through the upper levels of the building, as access allows. The storm drains will collect underground and exit the building through one of the four building storm service lines.
- New overflow drains will be installed at all roof drain locations except high on the dome and at the Quadriga deck.
- The overflow drains will be connected to new overflow rain leaders. The overflow rain leaders will be combined in the attic and run parallel to the storm leaders where practical. There are several options for new overflow rain drainage.
 - Option 1: Provide overflow drains connected to a new separate overflow rain water leader system with leaders combing in the attic and other levels where practical. Overflow leaders will parallel rain water leaders and discharge at the Ground Level through a downspout nozzle or other similar device.
 - Option 2: Provide overflow drains connected to a new separate overflow rain water leader system. The overflow system will be routed to the west side and the south side of the West Wing. They will route underground by directional boring from the exterior wall of the Terrace Level and discharge on the lawn at the Capitol.

- Option 3: Provide overflow drains connected to a new separate overflow rain water leader system. The overflow system will be routed to the west side and the south side of the West Wing. They will route through the underside of the monumental stairs and discharge at an outlet near the drive lane or street.
- Option 4: Provide overflow drains connected to a new separate overflow rain water leader system, with flow switches located in spaces that are easy to access for servicing by facilities. The flow monitoring system will connect to the Building Automation System for alarm and monitoring. This system will be connected to the storm system in lieu of discharging at Ground Level since discharging at Ground Level creates potential slip hazards.
- Provide cleanouts in storm drainage system at ends of runs, at changes in direction, near the base of stacks, every 100 feet in horizontal runs, and elsewhere as indicated on drawings.
- Cleanouts shall be the full size of the pipe for pipe sizes 6 inches and smaller. For pipe sizes larger than 6 inches, the cleanouts will be 6 inches.
- All new storm risers above ground and storm sewers underground will be replaced with new cast iron, service weight, no-hub piping with extra-heavy couplings.
- Insulate first 10 feet of vertical storm pipes and all above ground horizontal storm piping.
- The storm system must be operational during demolition and construction.

--End of Plumbing System Narrative--



19.1 Sustainability Study

A major consideration when preparing the State Capitol building for the next hundred years will be sustainability. The State Capitol building should carefully consider the resources used in the restoration project and future maintenance, not only due to long-term cost concerns but also as an opportunity to set an example for other projects within the State of Minnesota and beyond.

There are a number of Sustainability benchmarking and tracking tools that have been developed in recent decades. In order to receive funds from State bond proceeds, the State of Minnesota Sustainable Building Guidelines must be followed. It has been determined that this is the only tracking / benchmarking tool that the renovation project will utilize.

From The State of Minnesota Sustainable Building Guidelines:

In 2000, The Minnesota Legislature required the Departments of Administration and Commerce, with the assistance of other agencies, to develop sustainable building design guidelines mandatory for all new buildings receiving funding from the bond proceeds fund after January 1, 2004. In 2008 this legislation was expanded to include development of sustainable building guidelines mandatory for all major renovations receiving funding from the bond proceeds fund after January 1, 2009. The legislation defined major renovations as at least 10,000 square feet and including the replacement of the mechanical, ventilation, or cooling system of the building or a section of the building. According to the legislation, the guidelines for both new buildings and major renovations must:

1. Meet the Energy Use Intensity (EUI) set by the SB 2030 Energy Standards Tool.
2. Focus on achieving the lowest possible lifetime costs.
3. Encourage continual energy conservation improvements.
4. Include air quality and lighting standards.
5. Create and maintain a healthy environment.
6. Facilitate productivity improvements.
7. Specify ways to reduce material costs.
8. Consider the long-term operating costs of the building including the use of renewable energy sources and distributed electric energy generation that uses a renewable source or natural gas or a fuel that is as clean or cleaner than natural gas.

It will be the goal of the Design Team to meet all of the mandatory Guidelines for Major Renovation projects as well as most of the recommended Guidelines. Almost all of the Guidelines have cost and schedule impact on the project, and will need to be evaluated at every phase of project development.

The Guidelines that potentially have the most significant cost impact are E1 and E2. Strategy options to accomplish these two guidelines were discussed at length in the Grounds Design Scoping Workshop on February 13, 2013. A summary of the strategies discussed follows.

Guideline E.1C – Meet SB 2030 Energy Standards

Rick Carter, the project manager for B3, helped the design team determine that the B3 baseline for this project will be the 1989 version of ASHRAE 90.1, without factoring in district energy. The goal for the project will be to reduce energy consumption by 30% as compared to this baseline.

The building currently utilizes Saint Paul District Energy, which provides hot and chilled water service. St. Paul District Energy uses various renewable sources and energy efficient systems, which may contribute to the energy goals of the State Capitol.

If District Energy is not considered as part of the sustainability strategy for this project, the only other strategy that might be able to achieve the 30% goal would be geothermal. Geothermal uses the nearly constant temperature of the ground to offset the heating and cooling loads for the building. Heat Exchange wells are drilled into the earth, which are approximately 200 – 300 feet deep, depending on site conditions. The Geothermal well field could be located anywhere within the Capitol Complex, but efficiency decreases and cost increases the further the well field is located away from the building it is serving. The well field can be located under parks, parking lots, and driveways, but not under buildings. Therefore it is best located in areas that are not intended to be developed with buildings in the near future. Geothermal could be considered at a variety of implementation levels for the Capitol building.

- 100% Geothermal

In this scheme, 100% of the heating and cooling load for the building would be provided by Geothermal energy. To accomplish this, approximately 400 heat exchange wells would need to be drilled. This well field would cover an area the size of the entire upper mall area. This scheme would also need approximately 2,230 SF for the chiller and pumps room. This could be located within the existing building footprint or in a separate structure.

- 24/7 Geothermal

In this scheme, the heating and cooling loads for the 24/7 operational loads would be provided by the Geothermal system. To accomplish this, approximately 57 heat exchange wells would need to be drilled. This scheme only requires 315 SF for a pump room.

The Scope of Work for the current project has been limited to within the footprint of the existing building. Any geothermal work would be outside the footprint of the building and would require funding beyond what is allocated in the Restoration Project budget. Due to these scope limitations, it was determined that implementing Geothermal would have to be treated as a separate project.

Guideline E.2A – Provide 2% of overall energy demand with onsite solar or wind power.

- Solar PV- Based on the building's existing energy consumption and anticipated load increase, providing two percent renewable energy with solar photovoltaic (PV) system could be achieved if a 200kW system were installed. We anticipate an increased electrical load due to the fact that we are bringing many areas of the building up to date with new technology and increasing the mechanical load to meet current ASHRAE standards.

B3 states the system would need to produce two percent of the **"overall"** energy needs, not just two percent of the electrical loads. Taking into account heating and cooling energy (from District Energy) along with the electrical energy consumed, we anticipate a 200 kilowatt photovoltaic system would be required to meet this two percent.

The available roof space of the Capitol building would not be adequate for the number of solar panels to produce 200kW. A system producing 200kW would require approximately 640 panels, which would take approximately 12,000 square feet. The Capitol roof area available for solar panels is affected by the domes, skylights, and other features. To achieve the physical area of PV required to meet two percent of the building's energy load, we would need to identify a location other than the Capitol building to locate PV panels. The intention of this project is to stay within the footprint of the building, which eliminates installing PV in a remote location. Also, remote locations for consideration on the Capitol Complex would likely be closer to other buildings, and it would be most efficient for a PV system to serve the building it is closest to. The group concluded that a separate project and/or funding path should be used for instances where the technology is located remotely from the Capitol building.

Alternatively, PV could be installed to power the exterior dome lighting. This lighting consumes approximately 35kW, which would require 128 panels. This system would cover the south portion of both the East and West Wings. Care would need to be taken in locating the panels so they do not block skylights. Note this option would not be enough to meet two percent of the building's energy loads.

It should be noted that if a PV system is installed, the State would need to submit an interconnection agreement with the utility. If the system is larger than 60kW an additional Standby Agreement must be approved with the utility as well.

Due to the spatial limitations of the Capitol roof, the potential impact on the historic appearance of the building, the unfavorable payback period, and the budget constraints on the project, PV will not be included in the restoration project.

- Solar Hot Water - An Evacuated Tube Solar Collector panel system on the roof to provide 60 percent of the domestic hot water needs would meet the two percent on-site renewable energy goal. Evacuated tube solar collectors on the roof would be tied into the domestic hot water system in the building. Water storage tanks located in the basement would store the solar heated domestic water. District energy would supplement the building demand when the solar system could not meet the load. Approximately 2,000 SF of space would be required on the roof to accommodate a solar thermal system that meets 60% of the building's peak load. Shading from the domes would need to be taken into consideration when locating the panels.

Due to the spatial limitations of the Capitol roof, the potential impact on the historic appearance of the building, the unfavorable payback period, and the budget constraints on the project, Solar Hot Water will not be included in the restoration project.

- Wind Energy - According to the National Renewable Energy Laboratory and the U.S. DOE, average wind speeds of 6.5 meters per second (21.3 feet) at heights greater than 80 meters (262 feet) are considered suitable for wind energy development. According to NREL's Minnesota Wind Resource map, the St. Paul area averages six meter per second or less in wind speed. Land based turbines are typically installed between 262-328 feet high. According to the Capitol Area Architectural and Planning Board, the maximum allowable height of a structure is 694.1 feet above the St. Paul datum. The St. Paul datum is 694.1 feet above sea level. According to 2400.2300 Subp. 2. 944 feet above sea level is the maximum height for District 1 (or areas immediately surrounding the Capitol building) and is exclusive to the Capitol dome. Installing a wind turbine at the recommended height for wind generation would mean the turbine would have a minimum elevation of 956.1, exceeding the Capitol Planning Board zoning rules. The lower mall elevation is 845.

The Great River Energy building in Maple Grove, Minnesota has a 160 foot tall, 200kW wind turbine on site. Great River initially estimated the turbine to produce 11% of the facility's energy needs. Based on 2012 data, the electrical production was approximately 3.5%, or 118 MWh's.

In summary, constructing a wind turbine that would produce an effective amount of energy would not be allowed on the site due to zoning requirements. The wind turbine would also have to be constructed outside the confines of the Capitol building, which is outside the Scope of Work for the current renovation project.

Guideline E.2B – Provide ten percent of energy needs with renewable and cleaner distributed generation systems

The group discussed the possibility that District Energy may allow the project to achieve this guideline since District Energy claims to be producing their energy from 100% renewable resources. Fuel cell technology was another topic that was discussed. HGA's electrical engineer had studied solid oxide fuel cells in the California market and had discovered favorable payback period ranging from four to seven years depending on the fuel type and utility rebates. Some of the struggles surrounding implementation of this technology in the Midwest include:

1. Lower electric utility rates in the Midwest.
2. Trained local support and representation of the manufacturers in the Midwest.
3. Manufacturing and production capacity.
4. Some manufacturer will simply not do business in the Midwest for the above reasons.

In addition, to meet the requirement of renewable energy, the State would have to consider using a bio-fuel rather than natural gas. Natural gas is often the fuel of choice. Bio-fuels would need to be refined on site or transported and stored on site.

Due to site constraints immediately adjacent the Capitol, it does not seem to be a good candidate for utilizing Fuel Cells. However, Fuel Cells may be something that could be considered as part of a campus wide sustainability study.

The Design Team and the State have identified a few of the recommended B3 Guidelines that will not be pursued. Following are the reasons these items are not being pursued.

S11B – Use High-Reflectance Roofing OR a Green Roof

Maintenance concerns with the available high-reflectance roof materials available conflict with the goal of preparing the building for the next 100 years. Also, the high-reflectance roof material would make a significant change to the historic appearance of the roof.

Implementing a Green Roof would require extensive structural modifications to support the weight of these systems. These structural modifications would have a significant impact on the historic appearance of many of the interior spaces. Also, Green Roof systems are much thicker than the existing building configuration would allow. Modifications would have an impact on the historical exterior appearance of the building.

S12C – Provide securing bicycle storage and changing/shower facilities

Bicycle racks will be provided. Shower facilities are provided for employees in ? Building, which is attached to the Capitol building via tunnel. Because these are available and space in the Capitol footprint is at a premium, additional shower facilities will not be added.

S12D – Install alternative-fuel refueling station(s)

A solar powered vehicle charging station is being installed in Lot C. Since this is in close proximity to the Capitol building and no permanent modifications to the parking are planned for this project, we will not pursue this item.

S12F – Provide preferred parking for hybrid vehicles, carpools, or van pools

Parking near the Capitol building is already very limited. Any preferred parking is assigned by position.

I10A, I10B, & I11E – Windows

All of these credits relate to windows. To maintain the historic appearance of the building, no additional exterior openings will be created. The original configuration of the building layout and façade openings may make it difficult to achieve these goals. However, existing openings in the Terrace that are currently used for Mechanical purposes will be re-purposed into windows. Also, clerestory and borrowed light strategies will be used wherever possible to improve daylighting. The exterior restoration project will address the operability of the windows themselves.

It should be noted that adding insulation to the building's exterior envelope is not being considered as part of this project. The exterior walls are generally stone in excess of two feet thick, providing a more than adequate thermal mass. Adding insulation to the existing thermal mass would not be cost effective. Energy efficiency will be better improved through other systems as described above.

At the time of publishing this document, the Design Team intends to pursue all other B3 Guidelines, both required and recommended by B3. The Design Team will meet with the Owner throughout the course of the project to re-evaluate sustainability goals.

--End of B3 Narrative--



20.1 WAYFINDING AND SIGNAGE NARRATIVE

1. Understanding

As a building that is open to the public, the Minnesota State Capitol is frequently visited by many diverse users. The users include legislative staff, legislators, lobbyists, political interest groups, visitors, student groups, tour groups and many others. Many of these visitors and groups are not familiar with the building and its surrounds. Even those familiar with the Capitol building report problems in finding their way to various destinations. It is critical that finding one's way around (wayfinding) is made as clear and straightforward as possible.

Visiting the Capitol or attending political functions can be a daunting experience due to the building's presence and lack of clear directional way finding. In addition to its lack of directional clarity, the Capitol does not accommodate those who do not speak English as their first language, those who have difficulty remembering verbal directions, or those who simply have trouble with wayfinding. The Minnesota State Capitol has become prohibitively complex and inaccessible.

2. Existing Signage and Directories

The Minnesota State Capitol signage is a system of differing methods of directional assistance that include wall and floor mounted signs with arrows and wall mounted bronze directories that are often too small to read and out of date. The site signage is lacking in timely and easily identifiable cues, making it very difficult for a visitor to make decisions about site access by automobile, parking locations, building access by a pedestrian and now with the new loading dock – deliveries by service providers. The location of signage is often in poorly lit areas that contribute to the wayfinding problems.

The newly constructed loading dock provides an opportunity to reduce/eliminate service deliveries to the building, but signage to the loading dock needs updating.

Concerns about security have resulted in entries being locked at times and open at other times – furthering confusion as to entry location. There are many entries that do not provide any directional advice upon entering the building. The symmetrical nature of the building and lack of outside orienting views also contribute to a sense of being lost and confused.

Once inside the building, the room numbering system is also quite confusing and hard to locate until one is at the specific door. Many are numbered as suites of rooms in semi-private corridors that seem foreboding. There is no easily understandable system of room numbering that can allow the visitor to quickly locate a specific room.

3. Proposed Signage and Directories

The implementation of the comprehensive wayfinding system will be developed through a series of Visitor audit and focus group sessions with the purpose of ascertaining the visitor experiences in locating entries, restrooms, meeting and hearing rooms, food service and staff/legislator's offices.

There will be focus group session to develop appropriate signage and wayfinding for various types of disabilities.

The following are components of the proposed wayfinding and signage for the restored State Capitol:

- Identification of all entries and exits.
- Establish information signage at all key places to assist directional decision making.
- Provide wayfinding for mobility, sensory and cognitive impaired visitors and users.
- Provide multi-language informational signage.
- Coordinate lighting levels and location with directional signage.
- Provide signage at key landmarks to aid in wayfinding.
- Provide maps and directories that are suited to ease of use and have historic sensitivity.

Building perimeter signage and wayfinding will be of a "Capitol quality" and spaced at key site entry locations (pedestrian, automotive and public transit) and appropriate to that mode of use. They will be of a standard design.

Building entries will direct pedestrians to the proper locations for entering the building (which can vary during Session and off-Session times.)

Once in the building, there will be signage and directories that will aid the visitor in making decisions about how to locate their destination and how to navigate the building.

The signage and directory systems will be of a high quality and be historically sensitive.

There will be consideration for electronic wayfinding terminals that can provide ease of updating and multi-faceted communication methods.

--End of Wayfinding and Signage--



21.1 AUDIO VISUAL NARRATIVE

1. Audio/Video System Demolition: Existing audio/video system equipment is based on 4:3 aspect ratio, standard definition analog video and analog audio formats. As spaces are renovated, the existing equipment will be replaced with digital equipment. All abandoned cabling shall be removed per NEC requirements. Senate Media Services shall be relocated from their existing spaces in the Capitol building to the New Legislative Office building located in Lot "B". Broadcast A/V equipment used by Senate Media Services shall be provided by the Owner/user, but the electrical, data, technology, and HVAC infrastructure shall be provided under this project. A list of Broadcast A/V equipment and spaces is included below for reference.
2. General.
 - The standard video format for the building shall be high-definition widescreen (16:9) digital video.
 - ADA Accommodations: Interactive building directories or control system touchpanels can be difficult for the partially sighted to see and operate. As an alternative to the colorful, graphical interfaces on directories and touchpanels, a large, easy to see button shall be located on the "start screen" that gives an option to replace the graphics with a high contrast, large font interface.
 - The audio and video headend equipment will be sized to accommodate future expansion for additional equipment that may be added after the project is complete. Each component of main headend equipment shall be sized to connect at least 125% of the equipment specified under this project to accommodate for future system growth.
 - There are two distinct portions to the Audio/Video system design scope of work. Within the Capitol building, the Audio/Video system can be categorized into Presentation systems and Broadcast systems. Presentation A/V Systems will be provided under the project. Broadcast A/V systems will be provided by the Owner. The interconnections between the Presentation and Broadcast A/V systems for sharing audio, video, and control functions shall be provided under the project.
 - Audio/Video Broadcast System Infrastructure:
 - Provide 4-cell tube cable with one fiber bundle of 12 strands of plenum rated singlemode (OS2) routed from the House Chamber, House Caucus Rooms, and other audio/video-equipped rooms designated for House audio or video broadcast use to the West Main Telecom room and terminate all fibers on fiber optic patch panels. Terminate all fibers with LC connectors on both ends.
 - Provide 4-cell tube cable with one fiber bundle of 12 strands of plenum rated singlemode (OS2) routed from the Senate Chamber, Senate Hearing rooms, and other audio/video-equipped rooms designated for Senate audio or video broadcast use to the

Senate Media Services equipment room and terminate all fibers on fiber optic patch panels. Terminate all fibers with LC connectors on both ends.

- Provide 4-cell tube cable with one fiber bundle of 12 strands of plenum rated singlemode (OS2) routed from the Supreme Court chamber to the west main telecom room and terminate all fibers on fiber optic patch panels. Terminate all fibers with LC connectors on both ends.
- Provide 2-cell tube cable with one fiber bundle of 6 strands of plenum rated singlemode (OS2) routed from areas designated for press conferences to both the west main telecom and the Senate Media Services equipment room and terminate a pair of fibers on fiber optic patch panels. Terminate all fibers with LC on both ends.
- All Terrace Level cabling shall be routed below the slab.

3. Presentation Audio/Video Systems.

- The Presentation A/V systems will support the following room types:
 - Committee Rooms
 - Caucus Rooms
 - Hearing Rooms
 - Large Conference Rooms (10 assumed)
 - Conference Rooms (15 assumed)
 - Senate Chambers and Deliberation Room
 - House Chambers and Deliberation Room
 - Supreme Court Chambers and Deliberation Room
 - Press Conference Spaces
 - Public Displays and Dynamic Signage
- Provide Presentation A/V system equipment including, but not limited to, video projectors and screens, LCD flatscreen displays, interactive LCD displays or digital whiteboards, mounting hardware, video distribution amplifiers, switchers, scalers, audio Digital Signal Processing and amplifiers, speakers, wired and wireless microphone systems, assistive listening systems, control processors and touchscreens, wallplates and input/output outlets, equipment racks, and cabling infrastructure. Presentation A/V equipment shall be located within or adjacent to the space it serves. Provide electronics grade power to all A/V equipment.
- Provide audio, video, and control infrastructure between media-equipped spaces and broadcast production spaces. Provide conduit, cabling, outlets, and switching equipment. Broadcasting system endpoints, such as processing and control equipment, will be provided by the Owner.
- Provide “mult” box for press feeds along with cabling, wallplates and outlets for media connections. Assume a quantity of 1.5 mult boxes per room for each of the rooms identified above. Route cabling for outlets in House Rooms to West Terrace Telecom Room. Route cabling for outlets in Senate rooms to Senate Media Services equipment room and make connections. Route cabling for outlets in common and MN.IT-managed spaces to West Terrace Telecom Room.
- Electrical and Mechanical systems serving Presentation A/V spaces will be designed by HGA as part of the Interior Renovations project. HGA will coordinate with the

Presentation A/V system designer to determine Electrical and Mechanical system requirements.

- Provide heating and cooling for Audio/Video System Equipment Rooms.
4. Broadcast Audio/Video Systems will be located in the New Legislative Office building. Information in this section provided for coordination purposes.
- The Broadcast A/V system shall be designed by the Owner/user and shall support Broadcast functions for Senate Media Services in the following spaces:
 - Master Control Room
 - Studio
 - Studio Production Control Room
 - Sound Booth
 - Edit Suite
 - Editor/TV Director's Office
 - Graphics/Audio Production Suite
 - Digital Photography/Portrait Studio
 - Server and Switching Equipment Room
 - Video Streaming Equipment Room
 - Video cameras and robotics in the Presentation A/V spaces
 - Additional rooms will be required to support Media Services functions, such as an Engineering Work Area, Equipment and Archival Material Storage, Meeting Rooms, Offices, Reception, and Administrative/Coffee/Mail/Print/Copy spaces. (All in the New Legislative Office building)
 - Broadcast A/V system equipment will include, but is not limited to, audio and video switchers and signal processors, audio and video monitors, production and editing suites, server and storage equipment, control systems, console equipment, etc. (All in the New Legislative Office building)
 - House Media Services will be located in the State Office Building. Senate Media Services is currently located in the State Capitol building and will relocate. Existing Senate Media Services Offices and Production/Editing/Equipment and Storage spaces will be relocated to the New Legislative Office building. The relocation of existing equipment, along with the design and installation of new equipment shall be by Owner. Electrical, data, technology, and HVAC infrastructure to support Senate Media Services shall be provided under this project
 - Broadcast source equipment located within Presentation A/V spaces, such as video cameras and robotics, will provided by the Owner/user.
 - Existing Broadcast A/V video equipment is based on standard definition, analog format and audio is mainly analog format. As the Presentation A/V systems are upgraded to high-definition and digital formats as part of the Interior Renovation project, the Broadcast A/V system equipment shall be upgraded to support the new signal formats. A study must be conducted to determine how uninterrupted operations will be maintained for the duration of the Interior Renovation project. Phased system cutovers will be coordinated with the Owner and Engineer.
 - A control interface for control of Presentation A/V systems may be provided for the broadcast production staff.

5. Dynamic Signage

- Dynamic signage system shall provide the capability of displaying real-time dynamic content on large format flatscreen displays (50” minimum LED backlight LCD). Dynamic signage displays shall be capable of displaying current weather and forecasts, headline news, and content that is generated by the institution such as events calendars, community news, and faculty/staff recognition. Coordinate exact content requirements with the owner. The display shall be capable of displaying one page with dynamically updating content or as well as an option to periodically scroll through multiple pages of content.
- Dynamic signage screens will be located in public areas throughout the Capitol building. Dynamic signage will be zoned similarly to paging system zones and can be used for providing visual paging.
- The dynamic signage system components will be networked together and will be connected to the Internet. Content can be dynamically updated in real-time from online sources such as live news feeds (typically in the form of RSS feeds). Many organizations create a custom news feed that represents the highlights and accolades of the organization to be included as a component of digital signage.
- The interactive building directory shall be a minimum 60” LED backlight LDC display with single touch or multi-touch capability.

--End of Audio Visual--



22.1 VERTICAL CIRCULATION: ELEVATORS/STAIRS

Refer to Table 1 in Appendix 22 for a summary of stair information, as well as stair key plans for each level of the building.

1. Stair Design

All new stairs and new stair runs will be based upon the historic existing building standard, as illustrated in the original shop drawings; refer to Image 1 in Appendix 22. These stairs will utilize stone treads, and decorative cast components including risers, balusters, and newel posts. The stringer structure will be steel and will be clad in decorative cast iron pieces. Wood rails will cap the guardrails, and new wood handrails will be provided.

The new stairs will closely match the properties of the historic stairs and will be marked as contemporary re-creations as recommended by the U.S. Department of the Interior guidelines for the treatment of historic architecture. Elements differentiating themselves from the originals will include guardrails 42” above walking surfaces with separate handrails and contemporary handrail extensions.

All stairs will consist of straight flights and landings except for the governor’s private stair. This stair will conform to the historic stair standards but will utilize a spiral type configuration.

Where stair work is required, the stairs connecting more than two levels shall utilize draft curtains for preventing the passage of smoke between levels. Draft curtains will not be utilized in historically sensitive areas. The construction of these draft curtains will be similar to a bulkhead finished in plaster, but will require a more decorative plaster profile at the head opening. Stained wood casings similar to those used at other openings may be utilized to create a decorated opening in lieu of using plaster profiles.

2. Stairs Providing an Additional Means of Egress

In addition to the stairs currently providing a means of egress from the building, the number of egress paths from the building will be increased providing additional safety for building occupants. This will be achieved by building one new stair and by reconfiguring four existing stairs.

- Rotunda Stair – Northwest: A new stair connecting all levels and providing a rated enclosure will be added in a central location adjacent to the rotunda.
- Far East Stair – North; Far East Stair – South; Far West Stair – North: The existing stairs connecting the second and third floors will be extended down to also serve the first floor and the ground floor.

- Existing and non-original stairs on the east side of the building connecting the first and ground floors will be removed to allow this work. These stairs currently have no connection to the floors above.
- Senate Gallery Stair – South: The existing stair connecting the second and third floors to the senate gallery on the south side of the chamber will be extended down to the first floor.

The stairs referenced above will be configured to work with the historic fabric and building configuration to discharge as near to the exterior as possible.

3. Convenience Stairs

Stairs not providing a means of egress that provide movement between levels within office suites or between critical functions are considered convenience stairs. One existing stair will be reconfigured and three new stairs will be built to allow convenient movement between levels.

- Governor’s Suite Convenience Stair: The existing stair will be removed and replaced with a new stair in a location allowing efficient arrangements of the governor’s office suite. The new stair will connect the first, ground, and terrace floors within the governor’s suite.
- Attorney General’s Suite Convenience Stair: A new stair will be built in the Attorney General’s office suite connecting the first and ground floors within the suite.
- House Convenience Stair – East; House Convenience Stair – West: New stairs will be provided adjacent to the house chamber on the east and west sides of the chamber. The stairs will connect the first and ground floors, allowing movement between the house business functions on the first floor and the chamber above.

4. Security Stairs

- Governor’s Private Stair: A new stair will be built adjacent to the Governor’s office, providing a secure route to defensible areas for the governor and the governor’s security team. This stair will connect the first, ground, and terrace floors. A spiral design will be utilized allowing a compact footprint and no impact to historic spaces. An original spiral stair in the governor’s suite connecting the first and ground floors was removed, and the new stair will be located in the same area as the original.

5. Rotunda Basement Stairs

The existing two stairs connecting the ground and terrace floors are not consistent with the design intent of the terrace level public spaces. The existing stairs will be removed and replaced with new stairs. The new stairs will conform to the historic building standards and will utilize improved guardrails and handrails, greater width, and a more gradual slope. The stair will be designed to create a perception that the terrace floor is equally as important and integral to the building experience as the more ornate floors above.

6. Miscellaneous Stairs

- Second Level Mezzanine Stair:
The existing stair connecting the second level with the mezzanine above will be removed. A new stair will be built to optimize the space configuration while providing occupant access to the dining area above.

- Others:
Additional stairs and stair modifications may be required within mechanical occupancies accessed only by maintenance staff. These stairs will be added or modified as required to provide adequate access to all equipment and mechanical areas.

ELEVATOR INFORMATION:

1. South Rotunda Elevators

The rotunda elevators are part of the Zone 1 historic fabric. Their presence and appearance are critical historic components routinely used by all building occupants. The design intent for these two elevator banks is to restore the hoistways to their historic appearance, as illustrated in Images 2 and 3 included in Appendix 22.

This will involve removing the existing non-original hoistway walls at floors three, two, one, and ground. The new openings into the hoistways will utilize decorative cast iron frames, cast iron and decorative leaded glass panels. In addition to restoring the original hoistway wall appearance, this will also allow the light from the windows in the elevator hoistways to shine into the rotunda space as originally designed. The west hoistway will require new masonry walls finished in plaster, and new stone openings. The east hoistway existing stone openings will remain and be reused.

The existing three elevators, their controllers, and their machines will be removed. A single new passenger elevator will be installed in each hoistway. The cabs will be customized sizes to fully utilize the area of each existing hoistway. The finishes in these cabs will be custom decorative finishes, and will incorporate large glass lites on the rear wall. The elevator doors will be custom two-speed doors with four sliding panels made of cast iron and leaded glass. New elevator machines will be installed in the existing machine rooms, and will be gearless traction type machines.

The elevator cab will utilize glazed panels at the rear walls and at the doors, allowing natural light to pass through the cab and into the rotunda when parked. Stone flooring and decorative plaster ceilings will be required.

The existing overhead heights are likely sufficient for installing the new and faster elevators. The existing pit depths will likely require deepening, allowing the terrace level landings to be at the same elevation as the rest of the terrace.

2. Northwest Rotunda Elevator

A new five-thousand pound service shape elevator will be built in an adjacent area northwest of the rotunda. The machine configuration will likely be a machine-room-less configuration, given the limited overhead height in the attic for a traditional machine room. The elevator hoistway will be rated and will require all new construction. Demolition and structural reinforcing of the existing floor slab will be required.

The ideal control closet location for this elevator is on the third floor, south of the elevator doors.

This elevator will be available for use by all occupants, but will function as the primary elevator for building services.

The elevator cab and elevator doors will utilize custom etched bronze finishes compatible with those existing in the Capitol. Stone flooring and decorative plaster ceilings will be required.

3. Governor's Private Elevator

The existing elevator in the Governor's suite must be reconfigured to access the terrace floor in addition to the first and ground floors. The existing elevator, machine, controls, and hoistway will be removed. A new hoistway will be constructed that will extend to the terrace floor. The hoistway will accommodate a new elevator and will also provide sufficient space to the west for a handicap accessible restroom in the Governor's suite. A new two thousand pound machine-room-less elevator will be installed in the hoistway.

The elevator will be for private use by the Governor and by the Governor's security staff.

The elevator cab will utilize finishes compatible with those existing in the Capitol.

--End of Vertical Circulation--



23.1 Specifications

Refer to attached Table of Contents for anticipated sections to be included within Project Manual at Design Development and upcoming work packages for construction.

--End of Specifications--



24.1 Cost Estimate

1. Estimate

Schematic Design estimating will be accomplished with the help of documents and systems narratives (Uni Format) of required materials and information established by the design team. The intent of the schematic estimate will be to update and help track progress of the documents as compared to the contractor's (JE Dunn) program estimate. This Schematic Design estimate is a snap shot in time which will inform the design team how the team is tracking to the budget as more information is made available.

2. Value Engineering

If the Schematic Design estimate reflects costs higher than owner's established program budget, the estimating teams along with the design team will work in collaboration to identify materials, detail etc. that can be changed or eliminated without affecting the design intent. All suggested changes to bring the schematic design estimate back in line with the program budget will be reviewed with the owner for approval and buy in to keep the project on budget and on schedule.

Schematic Design drawings and narrative specifications will be delivered to the estimating teams on May 20, 2013 and will be completed June 7, 2013. CPMI will review all estimates submitted.

Note: The Schematic Design estimating and value engineering sessions have been held and the results of these meetings have resulted in the project being reconciled to the restoration budget.

Project is on budget based upon the discussed scope.

--End of Cost Estimate--



25.1 COMMISSIONING INTRODUCTION

1. Minnesota Department of Administration is committed to commissioning new systems required for the reliable, safe and secure operation of the Minnesota State Capitol. This process will verify that systems are complete and functioning properly upon occupancy, that new systems integrate appropriately with existing building systems and infrastructure, and that facility staff have adequate system documentation and training. The Commissioning Agent (CxA) shall develop a Commissioning Plan, document the State's performance criteria, systematically document that specified components and systems have been installed and started up properly and then functionally test the systems to verify and document proper operation through all modes and conditions. In addition, training of the Owner's operations personnel will be coordinated and verified and final project O&M documents will be reviewed for completeness. Commissioning activities will begin during the predesign phase of the project and continue through design, construction and post construction in a collaborative Integrated Project Delivery mode.
2. Commissioning consists of systematically documenting that specified components and systems have been installed and started up properly and then functionally tested to verify that systems are complete and functioning properly upon project completion and that the Owner's staff has appropriate system documentation and training. In addition, Owner-personnel training will be verified and final project Operation & Maintenance (O&M) documents will be reviewed for completeness.
3. Commissioning Goals
The Commissioning Agent has developed specific Commissioning Goals to emphasize the role commissioning will play in the design and construction processes:
 - Satisfy Minnesota State Capitol Project and Sustainable 2030 Requirements.
 - Optimize Systems Operations.
 - Verification and Documentation for Minnesota State Capitol Staff.
 - Performance Test results
 - System Readiness checklists
 - Operating instructions
 - Integrate Functional Performance Testing Schedules into Construction Schedule.
 - Coordination of trades
 - Coordination BAS vendor tasks
 - Coordination TAB vendor tasks
 - Early identification and resolution of issues.
 - Clear and open communications.
4. The commissioning activities have been developed to support Minnesota Buildings Benchmarks and Beyond (3B) Sustainable Building Guidelines and Zoning and Design Rules for the Minnesota State Capitol Area to support delivery of project performance in accordance with the OPR developed with the approval of the Owner.

25.2 SCHEDULE

Project phasing: Construction phasing will be an important aspect of this project so the Commissioning Authority must work with the Construction Manager and Owner's Project Representative to conduct critical path analysis in order to determine the most effective and efficient sequencing of the construction work in order to minimize cost and disruption to the legislators, staff, public and ongoing State operations in the Capitol Building.

25.3 SYSTEMS TO BE COMMISSIONED

System	Testing Sample
HVAC Systems	
Air Handling Units	100%
Chilled Beam Terminal Unit	100%
VAV Terminal Units	25%
Fin Tube Radiation Zone	50%
Energy Recovery Units	100%
Pumps and Hydronic Distribution	100%
Return and Exhaust Fan Systems	100%
Variable Frequency Drives	100%
Building Automation Systems	
Temperature/Humidity/Sensors	20%
CO and CO2 Gas Sensors	100%
Pressure Sensors and Controllers	20%
Sequence of Operation	100%
Airflow Stations	100%
Damper/Valve Actuators	100%
Plumbing and Fire Protection Systems	
Water Heaters	100%
Domestic Hot Water and Recirculation Pumps	100%
Fire Protection Sprinkler System	100%
Electrical Systems	
Normal Power Electrical	50%
Emergency Lighting & Power Systems	50%
Fire Alarm & Life Safety Systems	50%
Occupancy Sensor	50%
Lighting control zone	100%
Day-lighting control zone	100%

25.4 Submittal and Shop Drawing Review

CxA to review selected submittals and shop drawings to support the commissioning process. Review will be for the purpose of developing appropriate System Readiness Checklists and Functional Test Plans. Reviews will focus on the ability to commission the systems, maintainability and general conformance to owner's requirements. Commissioning review of submittals and shop drawings does not replace the Design Team responsibility for approval.

25.5 FUNCTIONAL PERFORMANCE TESTING

1. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Successful Completion of Functional Testing is a Prerequisite to Substantial Completion. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load, fire alarm and emergency power) where there is a specified system response. The Contractor shall verify each sequence in the sequences of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.
2. Development of Test Procedures: The CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. The Contractor shall assist the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the Contractor who shall review the tests for feasibility, safety, equipment and warranty protection.

25.6 OPERATION AND MAINTENANCE TRAINING

CxA to review contractor and manufacturer training plans and agendas for general conformance with specifications and owner's requirements. Observe selected training for quality of training and for general conformance with the training plan and agenda.

25.7 PREPARE SYSTEMS MANUALS FOR COMMISSIONED SYSTEMS

CxA to prepare systems manuals for commissioned systems. The manuals will provide operating staff the information needed to understand and optimally operate the commissioned systems. The manuals will describe system design, components, capacity and sequences of operations. Manuals will include descriptions of interactions with other systems and common systems failure modes and responses.

25.8 CX POST-OCCUPANCY WARRANTY CHECKUP

CxA to return to the project approximately 10 months into the 12 month warranty period to review the building operation with the facility.

--End of Commissioning--