



3.1.1 General Description of the Capitol.

The Minnesota State Capitol is a five story building with approximately 380,000 square feet of area. Construction began in 1896, and its upper four floors were completed in 1905. The basement level was subsequently excavated and finished in 1936-37.

The structure of the capitol comprises a steel and cast iron frame on rough limestone foundation walls with concrete footings. The ground floor and first floor are supported by Guastavino tile vaulting. At the center of the Capitol is a free standing unreinforced masonry dome, the second largest in the world. The dome is a triple structure; The inner dome is of Guastavino construction, the center, cone-shaped steel ‘dome’ supports the lantern, and the outer dome, built of white Georgia Marble surrounds the whole. 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 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 exterior cladding consists of Georgia Marble on the dome and upper three floors, with Minnesota Granite cladding the lower story. The roof was originally a tar-impregnated building paper, with tile fireproofing above. It has been subsequently reroofed with an epdm roof, with tile overlay. The legislative and judicial chambers are roofed in copper.

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 Kasota Limestone wainscot over a marble base, varying in color from floor to floor and 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 throughout are limestone. The ground floor is plain, with more ornament on the first floor, the greatest amount on the second, in the corridors surrounding the grand stairs, rotunda and the rotunda gallery itself. The third floor has a relatively simple border on the floors of its public spaces. 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, many of these originally served to locate the cast brass candelabra (also called torchers) that illuminated the space. Ventilation is accomplished through decorative grilles. These grilles are bronze in the public spaces, and are painted cast iron elsewhere. 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 importance. 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. 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.



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The chambers have identical sliding pocket doors ten feet high, with ornate carved floral patterns. Each chamber also has a bronze gate that allows the chamber to be viewed while not in session. Other doors throughout the Capitol are built to the same high standard, but vary in character. Double swinging glazed doors open from the vestibules to the main public spaces. Copper clad glazed doors face south at the main entrance. Monumental wood doors open to each of the secondary entrances. Three paneled oak doors serve office spaces. Doors into the main corridors on the first through third floors are framed with marble, at the ground floors, with plaster. Doors in office areas are framed with often elaborate oak frames.

The structure of the main dome is comprised of three distinct components: the outer marble and masonry dome, the middle dome supporting the lantern, and the inner dome forming the ceiling of the rotunda. The outer dome is marble with hollow brick back-up and embedded steel tension bands. A large trussed tension ring resists thrust at the base of the dome. The middle “dome” is actually a conical steel structure supporting the steel-framed lantern of the dome. It is constructed from steel column ribs that connect to the tension ring at the base of the outer dome. Space between the columns is infilled with shallow brick arches. The inner dome is of Guastavino construction.

The Capitol’s electrical system has changed dramatically over its lifetime. It was the first major building in Minnesota to be lit with electric lights, with Direct Current power from its own powerplant. In 1954, this was changed to Alternating Current from a public utility. Since then, electricity and technology has struggled to integrate with the Capitol’s character, with conduit being run through new concrete floor topping, and in runs hollowed out of the original wooden baseboards.

The Capitol once had the benefit of having its own physical plant, which provided heat as well as electricity. It would eventually give up this plant in favor of a central campus heating source. Cass Gilbert was proud of how modern the Capitol was in 1905, insisting it should have all the modern innovations, including mechanical ventilation. Grilles for that purpose are well integrated into the design of the building, though subsequent renovations have added more and more.

Description of Volume 3

Volume 3 of the Historic Structures Report consists of 16 sections corresponding to the divisions of construction specifications. In each is a description of items within or around the Capitol pertaining to that division. Each section describes the component and provides references to projects and studies pertaining to it. This will allow information for whatever purpose to be easily located by designers or Capitol caretakers.

It is intended that this document be updated whenever new projects are completed, or new information comes to light.

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SECTION 3.2

SITE COMPONENTS



3.2.1 Site Materials Summary: Background.

The State of Minnesota forbade the entrants to the Capitol Design Competition from including any site design with their submission. However, after winning the project, Cass Gilbert created several unsolicited site plans, and lobbied the government, the press and the public to enact them. His specific designs are included in Section 2.1 above.

The original records of construction note that the site grading was completed by 1905, with planting that spring. The Commissioner's report notes that the 'gravel and sand of the site has been deeply covered with black earth, seeded and planted with turf on the slopes.'¹ This earth was provided without cost to the State by the City of St Paul and the Saint Paul and Sault Ste Marie Railway Company. The natural soil of the area was noted to be very sandy.

Site paving was commenced the same year, and by 1907, it was complete.² Mention is made of a yet to be completed 'wide approach' to the Capitol, which can be seen on early models and aerial photographs. It remains to this day.

The Campus was little changed from its beginning until 1957, when the present Mall was added. The many public buildings surrounding the Capitol were added later. See section 2.1 Site Development for more information.

The Capitol Campus as it stands today contains a variety of plantings, landscape features, art, informational displays and structures. These have been added over time, but there are a number of commonalities between them, especially in their selection of materials.

Material Catalogue:

Paving: There are three main materials used for paving on the Capitol Mall: Concrete, Granite, and Asphalt.

Concrete is the most common, with standard sidewalks predominating. The paths leading directly south from the Capitol have a decorative diamond pattern in a darker concrete.



Granite paving exists in three varieties: standard white, the most common, matches the granite base of the Capitol.

Red Granite is frequently used as an accent color, both around the Capitol and at the memorials. Black granite is used as a field color around some of the memorials. All three types are found in different sorts of finish; the standard peened finish, polished, and rough. Asphalt is used in the parking lots at the far south of the Mall, and on the streets that cross it.



Planting:

Between the memorial gardens and the extensive planting beds surrounding the Capitol, there are two many different types of planting to list individually. Certain plants deserve special mention, however.

The State Tree of Minnesota is the Red or Norway Pine (*Pinus resinosa*). This is planted on the terraces immediately surrounding the Capitol, but is not common throughout the site.

Princeton Elm. An experimental planting of a Dutch Elm disease resistant variety surrounds the World War II memorial.

Birch. White Birches are found in the south west corner of the site, surrounding the Vietnam Memorial.

Maple: Probably Freeman's Maple, these are common as large specimen trees on Capitol Site.

Yew:

Hostas:

Juniper:

Perennial Beds

Annual Beds:

¹ Board of State Capitol Commissioners. "Sixth Biennial Report." 1905. St Paul Pioneer Press.

² Board of State Capitol Commissioners. "Seventh Biennial Report." 1907. No printer's mark.



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Site Amenities:

Benches:

These attractive benches are standard on the Capitol site. A plastic frame with hardwood slats. From the Forms and Surfaces Company.



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Waste Receptacles:

These square concrete receptacles are common throughout the site area.



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Site Lighting:

This is the standard light fixture on the Capitol Site. Intended for lighting the sidewalks and footpaths, they exist in addition to the street lights. In form they resemble some of the free standing candelabra inside the Capitol.



Closer to the Capitol, next to Aurora Avenue, the standard light post becomes more elaborate, gaining four extra globes and, often, a security camera.



These atypical fixtures have the same base but a different globe than the typical fixture, and exist only around the Vietnam Memorial.



Light poles with spotlights such as these surround the Capitol, to illuminate it at night.





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These exterior posts are either the original exterior light fixtures alluded to in the final report from the Board of Capitol Commissioners, or replaced them long ago. They are in very poor condition, with visibly rusting iron parts and dirty globes.

There are two of them for each entrance.



To the north of the Capitol, new light posts have been installed by the Light Rail line. These match the pylons that carry the wires for the trains. They do not match the standard light fixtures for the site.





Memorials and Site Art:

There are twenty different monuments, sculptures and fountains located on the mall. The older, more traditional sculptures commemorating early governors and civic leaders, such as Governor Knute Nelson, John Johnson, and Floyd Olsen, are bronze statues located on granite pedestals, nearby the Capitol. Newer memorial gardens and installations are located south of Rev. Dr. Martin Luther King Jr. Drive, with the Minnesota Vietnam War Memorial, Minnesota Peace Officer's Memorial, Monument to the Living, and Promise of Youth Fountain clustered around the Veteran's Building at the South end of the Mall. See illustration for locations, and Inventory of Mall Memorials, Statuary, Paintings, and Governor's Portraits for more information. See Site Development History Section 2.1 for photographs and dates.

Signage and Informational Displays:

References:

Comprehensive Plan for the Minnesota State Capitol Area. 1998 with 2009 Amendment. MN CAAPB

Inventory of Mall Memorials, Statuary, Paintings, and Governor's Portraits
April 2008. MN CAAPB.

Previous Projects:

See Section 2.1 Site Development for information on the installation of site features, monuments and buildings in the Capitol Campus.

See Appendix "A History of the Minnesota State Capitol Area," by Gary Phelps, published by the Capitol Area Architectural and Planning Board, 1985, for more information on development of the Capitol Area.

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CONCRETE



3.3.1 Concrete Summary: Background

Concrete is originally specified for the Capitol's footings and 'sub-basement slab.' The 'sub-basement' (which was more or less where the current basement is) slab was subsequently removed when the basement was finished in 1936-8. The existing slab dates from that time. The second floor loggias are also specified to be a special sort of concrete, called "granolithic." Exposed concrete floors were also used in utilitarian spaces, such as janitor's closets, vaults, and walkways within the dome. Concrete filling was used above the timber arches in the Oval Staircase, and above other arches and vaulting.

The largest use of Concrete is in the Terraces. Originally built of stone and brick timber arches, like the rest of the foundations, the terraces were rebuilt in stages from 1932 to 2012. Current construction of the terraces is entirely poured concrete, with a concrete wearing slab.

Concrete has been added in subsequent renovations, most notably, the basement finishing, which added a new floor slab which still exists today, and the office renovations which have gradually replaced the original wood flooring with concrete topping in all but a few places. Other uses of Concrete in the building include the four tunnels that connect the Capitol Basement with other buildings on the Capitol Complex.

Applications

Footings

The original footings were built off Cass Gilbert's specs which called for imported Cement, mixed with sand and stone aggregate in proportions of 1/3/5¹. The amount of concrete used in the footings is 77,555 cubic feet²

A previous investigation in 1988 indicated the footings are supported on moderately dense sands and silty sands with an estimated allowable bearing capacity of 6000 pounds per square foot.³

In general, the main building foundations appear to be performing well and are in good condition. No significant building settlement issues are apparent within the building, although some settlement has previously been noted between main building walls and various entry stair foundations. This can likely be attributed to the much higher loads on main building foundation walls relative to lightly loaded stair foundations.

¹ Gilbert, "Specifications for Excavation and Concrete Work of the Minnesota State Capitol," 1902.

² Capitol Commission, "Fourth Biennial Report," 1900.

³ Miller-Dunwiddie and Associates "Comprehensive Preservation Plan," 1988

An evaluation of first floor elevations in 1988⁴ showed the floor to be remarkably level, with a maximum differential floor elevation of 7/8" in 150 feet.

Granolithic slab at Loggias

The specification calls for this material to substitute gravel for broken stone aggregate in the mix specified above. It was to have an incised pattern.

Concrete Filling

This differs from other mixes in having a 1/3/6 mixture, with broken brick and terra cotta allowed to be substituted for stone aggregate.⁵

Concrete Columns

Concrete columns are the norm in the rebuilt areas of the terraces. Typical columns are 12" x 12".

Basement Slab and Floor Toppings

No specifications for these materials exist. The original concrete mud slab of the basement was removed, and a new slab poured during the WPA projects of the thirties.

Terrace Structure and Paving

The Terraces were all originally paved with concrete, and remain so today, though all the terraces have been removed and replaced over time. Historically, the terraces suffered greatly from water infiltration, and did not prove as robust as the masonry of the building foundations themselves. The typical terrace has a three inch wearing slab over two to three inches of insulation and waterproofing, with additional drainage board, all over a six inch concrete structural slab.

Construction Issues

The fact that all terraces had to be replaced, more than once in some cases, indicates that water damage is a continuing problem.

⁴ Ibid.

⁵ Gilbert, "Specifications for Excavation and Concrete Work of the Minnesota State Capitol," 1902.



References

Gilbert, Cass, Original specification sections, as found in the Appendix: “Excavation and Concrete Work,” “Masonry,” “Terraces and Steps” and “Concrete and Drainage.” 1902

Capitol Commission, “Fourth Biennial Report,” 1900. (Minnesota Historical Society)

Previous Projects

South East Terrace Reconstruction. 1932. C.H. Johnston. No drawings available.

North East Terrace. 1957. A. J. Nelson, (State Architect) Only one drawing remains, see Plant Management archives.

Capitol Remodelling: Phase I, II, III. 1968-1970. Toltz, King, Duvall, Anderson and Associates. (TKDA). Drawings in appendix. (interior concrete floor topping, misc)

North West Terrace Replacement. 1990. Miller Dunwiddie and Associates. See State Architect’s Office for drawings.

Exterior Plaza. 1995. Miller Dunwiddie and Associates. See Appendix for drawings. (South Plaza)

Exterior Renovations. 1997. Miller Dunwiddie and Associates. See Appendix for drawings. (includes reconstruction of North East terrace.

Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction. 1998. Miller Dunwiddie and Associates. See Appendix for drawings.

South Terrace Reconstruction and Masonry Repointing. 2000. Miller Dunwiddie and Associates. See Appendix for drawings.

University Avenue Tunnel at Capitol Complex. 2012. CNA Consulting Engineers. See Appendix for drawings.

State Capitol West Plaza and Stair Repair. 2012. HGA Architects Engineers and Planners. See Appendix for drawings.

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MASONRY



Background

The exterior of the Minnesota State Capitol is a combination of Georgia white marble and St Cloud Granite. The body of the building is made of Georgia white marble while the ground floor is made of gray St Cloud granite.

Until recently, white Georgia marble matching both the physical and visual qualities of the historic stone has been difficult to procure. Stone used to construct the Minnesota State Capitol originated from the Amicalola quarry¹ in Pickens County, Georgia which is no longer in operation

The Amicalola quarry was located about 1 mile southeast of the Southern Marble Company quarries. Stone was first mined on the property (formerly known as the Herndon property) in 1892. Amicalola Marble Co. bought the property in 1897 and opened the first quarry. The Amicalola was a relatively small outcrop which was used extensively for monumental buildings. It was said to be purer, whiter, and with fewer fissures than material obtained from neighboring quarries.

Several large dimension quarries operated by the Georgia Marble Company were located within a few miles of the Amicalola quarry. The stone is white or light gray with a medium to coarse texture. Sometimes the marble has veins or dark material.²

The Minnesota State Capitol Interior is richly decorated in stones from around the world. The Minnesota Historical Society has compiled a list of all these materials. This list is included with their location.

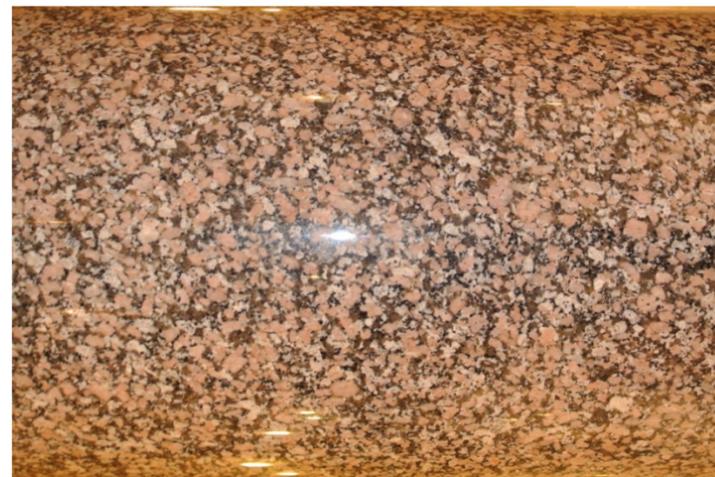
Material Catalogue:

Interior:

GRANITE:

Rockville (Speckled)- Rockville

Minnesota: Four of the eight columns in the second floor rotunda, east and west sides. Each column is a single piece of granite, eighteen feet tall.



¹ *A Preliminary Report on the Marbles of Georgia*, Bulletin No. 1, by S. W. McCallie, Assistant State Geologist, Geological Survey of Georgia, 2nd ed., 1907

² *United States Geological Survey, "Mineral Industries Surveys - Directory of Principal Dimension Stone Producers in the United States in 1995," prepared in January 1997.*

Ortonville (Rainbow) -Ortonville

Minnesota: Four of the eight columns in the second floor rotunda, east and west sides. Each column is a single piece of granite, eighteen feet tall.



LIMESTONE:

Winona Blue Limestone – Winona

Minnesota: Used for the foundation of the building. Foundation walls and piers supporting the dome and primary exterior walls are constructed of limestone blocks supported on the tiered stone footings below. These stone walls and piers extend up to the level of the ground floor framing. Original perimeter areaway walls at the exterior terraces and foundation walls below exterior stairs are limestone as well.



Kasota Limestone—Kasota/Mankato

Minnesota: The predominant stone in the interior of the Capitol Building, its color variations served as the base colors for the interior decorative scheme. The tan/buff colored limestone is found on the walls in the corridors and rotunda.





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Joliet Limestone – Joliet Illinois: Light gray limestone found on the floors of all public corridors of the building. It is also used as staircase treads in the cantilevered stair and stairs leading from the first to ground floor.



PIPESTONE

Pipestone Jasper—Pipestone

Minnesota: also called Catlinite, this soft rose-red stone is found as an inlaid band wrapping around the rotunda above the eight granite columns. Pipestone has been used for hundreds of years by tribes of northern Great Plains Indians for carving ceremonial pipes and other decorative elements. The quarry in Pipestone is now a national monument.



MARBLE

Tennessee Pink—Tennessee: Found as an accent in some of the floor patterns—most notably as the points of the North Star laid into the rotunda floor. Also used as the handrail in the



cantilevered stair, and as wall covering in the many restrooms around the Capitol.

Vermont White—Vermont: Large columns located in the House of Representatives and Supreme Court Chambers.

Also used as an accent stripe in the floors on the first floor surrounding the rotunda.



Numidian—Nile River, Egypt: Used as a decorative floor highlight, this dark red/brown marble is found as inlay in the points of the North Star in the rotunda floor. Also found in the mantle of the fireplace in the House Retiring Room and in the fireplace surrounds in the Senate Retiring Room.



Hauteville—France: The stair treads and railings of the Grand Staircases leading from the first to second floors are of this stone. It is also used in the railing of the rotunda of the second floor, and on the baseboards of first, second and third floors.





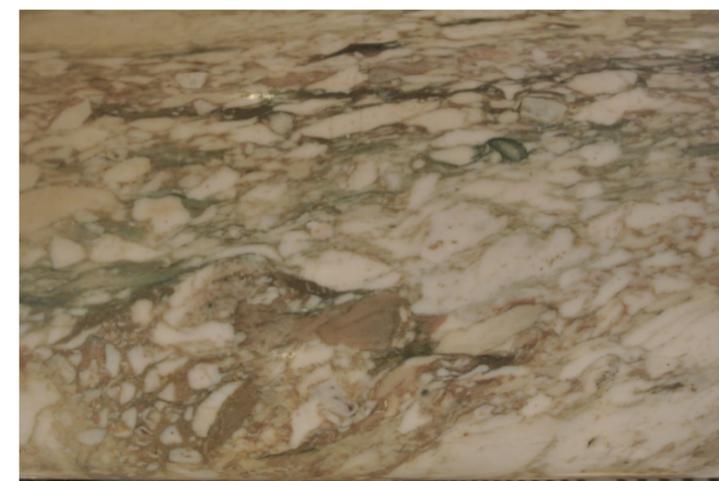
Fleur de Peche (Peach Blossom) – France: Dominant marble in the Senate Chamber, also found in the Supreme Court Lobby.



French Echaillon—France: Door casings in the public corridors throughout the building and in the entrance to the Supreme Court.



Breche Violette—Italy: Thirty-six columns which surround the Grand Staircases.



Old Convent Sienna—Italy: decorative panels above the statue niches in the second floor rotunda and decorative medallions between the arches flanking the Grand Staircases.



Levanto—Italy: Red and dark brown marble used as the baseboard in the Governor’s Ante and Reception Rooms and in the base of the Reception Room fireplace.





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Moss—Sicily: This is used as a tan accent in the floor patterns of the rotunda.



Skytos—Greece: Balusters in both the Grand Staircases and the second floor rotunda are made of this stone. Also found in the four benches below the statues in the second floor rotunda. This stone was furnished and cut by the Evans Marble Company of Baltimore, MD.



Verde Antique—Vermont: Dark green marble with light green or white veining. It is found in Rotunda around the central North Star symbol. Also used for the baseboards in the ground floor corridors and as an accent color on second and third floors. This was provided by Frederick P. Bagley and Company of Chicago.



SANDSTONE

Kettle River Sandstone—Minnesota: This stone is called out for the foundations of the Dome, and does not seem to be visible even at basement level. The column shown supports the rotunda. It is difficult to tell what sort of stone is beneath this paint. Capitol Commissioner’s report does indicate it was delivered and installed on site.³ Kettle river sandstone has a high degree of compressive strength, at 12,295-12799 psi, which makes it well suited for foundations.⁴



Exterior:

White Georgia Marble-Amicalola, Georgia: on the upper floors and dome. Much controversy took place when this stone was chosen for the Capitol. See Section 1.2.3 History of the Capitol Construction. The original stone is badly deteriorated from weathering, and is undergoing a comprehensive restoration project.



St. Cloud Granite—Minnesota: on the Ground floor.

By contrast, the original Granite is in excellent condition. The occasional tuckpointing project has taken place, otherwise most exterior granite is just as it was when installed.



³ Minnesota Board of State Capitol Commissioners. Third Biennial reports, 1899 Pioneer Press company, state printers.

⁴ Bowles, Oliver. “Structural and Ornamental Stones of Minnesota.” United States Geological Survey, 1918



Of note – records of prior work previous to 1975 are incomplete and undocumented.

Exterior Envelope: Condition

The masonry walls of the Capitol were constructed as a marble clad masonry structure. The back up wall is brick, which varies from nearly 2 feet thick at the base to a narrow hollow brick shell that supports the exterior marble of the dome, the whole construction being as little as 18” thick. Georgia marble pieces are anywhere from 4” in a plain panel to 30’ or more feet tall for large carved pieces. The exterior marble is currently undergoing a comprehensive restoration project. The marble had suffered from water infiltration and freeze thaw cycles, that had weakened the original mortar holding the stones in place. Movement in the structure also contributed to mortar failure and water infiltration, that further damaged the stone. See State Capitol Exterior Stone repair and Comprehensive Stone Assessment for more information.

Construction Issues:

- Original construction sequencing: loadbearing conditions, stacked elements, overlapping features, inside corners, and/or overlapping stone units
- Original unit size: lengths over 10 feet are not uncommon (capitals are nearly 30 feet tall).
- Standard quarried block size (8 feet x 5 feet x 4 feet): limits length of replacement pieces (window hoods are over 11 feet wide)
- Weight of material: impacts scaffolding design and hoisting/crane requirements. Georgia marble weighs 180 pounds per cubic foot. To date, the largest installed replacement pieces weigh approximately 300 - 500 pounds. Shoring, moving, lifting, and/or placement of units weighing over 600 pounds require specialized equipment.
- Single supply source: pricing and fabrication are non-negotiable. Material accounts for ~40% of the cost.
- Stone quantity: not an issue at this time
- Procurement time: long lead times (3-6 months depending on level of detail)
- Site logistics: Access, staging, scaffolding and hoisting requirements, winter conditions, shoring, field carving, color matching
- Imported interior stone may be hard to match. Some might not be available any longer. Fortunately, interior decorative stone is in good condition.
- Schedule

Investigations, Prior Projects

The exterior stone has gone through numerous studies, remediation campaigns and is currently undergoing a major restoration effort that involves removal of loose material, grinding of sugared material, crack repair work, Dutchman patching and some replacement.

Notable campaigns include (based upon available records);

1975. Project: Exterior Masonry Conservation. Brooks Cavin
See Appendix for drawings.

Masonry is cleaned and areas that were cracking reinforced. Broken angel sculpture is replaced, other sculptures removed, restored and replaced.

1986. Project: Restoration of the Dome and Lantern. Miller Dunwiddie and Associates
See Appendix for drawings.

Restoration of the Lantern, including flooring, doors, waterproofing, deteriorated masonry, plaster, drainage, stairs and structure.

1989 Marble Consolidation Report

1995 Lantern Stone Evaluation

1997. Project: Exterior Renovations. Miller Dunwiddie and Associates
See Appendix for drawings.

This project consisted of three parts: First the reconstruction of the North-east Terrace. Second, tuckpointing and stone repair at all of the exterior stairs. Third, replacement of stone at the dome lantern. This project includes incidental lighting and mechanical work in areas affected by the terrace reconstruction.

2010. Project: State Capitol Dome Repair Work. HGA Architects Engineers and Planners
See Appendix for drawings

To stop water infiltration through the lantern walkway and middle dome that was damaging the plaster below, new waterproofing was installed above and within the dome, a new rain leader was installed, plaster was repaired, structural reinforcement was installed, and masonry restored. The chandelier in the Rotunda was also restored at this time.

2010 Cornice Condition Assessment

2011. Comprehensive Stone Assessment. HGA Architects Engineers and Planners
See Appendix

This report was prepared for the current Exterior Stone Repair Project

2013. Project: State Capitol Exterior Stone Repair
HGA Architects Engineers and Planners
See Appendix for drawings

This is a comprehensive repair and replacement of Georgia Marble exterior stones that have become damaged or worn over the years.



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References:

Gilbert, Cass. "Specifications for the New Minnesota State Capitol Building, St Paul Minnesota."
Minnesota Historical Society, Capitol Site. 1897-1903. "Masonry," and "Timbrel Arch Construction." See Appendix.



3.4.2 Unit Masonry Summary Background

While stone masonry is the most visible form of masonry in the Capitol, there is a substantial amount of unit masonry to be found. The most prominent use of clay unit masonry is in the many Guastavino tile vaults visible in the Ground floor and Basement, and invisible in the Rotunda Dome, Senate Chamber, First floor Dome Corridors, Supreme Court Lobby, Grand Stair supports and the timbrel arches of the Oval Staircase. This is the only sort of unit masonry that was intended to be exposed to view in the Capitol.

Brick was originally used for the non-bearing partitions and tunnel liners in the basement and at back-up walls for marble or stone on the exterior, and as infill above stone columns, supporting the decorative plaster capitals. Exposed brick is also used in the fireplaces found in the Justice's office, House and Senate Retiring Rooms, Governor's Office, and Supreme Court Conference Room, and for the chimneys. Brick is also used as a back up material for original interior partitions of 8" thickness or more.

Additions throughout the life of the building, especially in the Basement level as redone in the WPA projects of the 1930s, has added a variety of other brick and larger hollow tile type masonry units.

Material Catalogue

Brick

Most floor areas are constructed of shallow brick and tile arches spanning to rolled steel beams. Concrete fill is used over the arches to provide a level floor surface. Original project documents indicate a total load capacity (dead plus live) of 165 pounds per square foot at steel-framed floors, and an evaluation in 1988¹ indicated calculated live load capacities ranging from 100 to 200 pounds per square foot.



¹ Miller-Dunwiddie and Associates "Comprehensive Preservation Plan" 1988

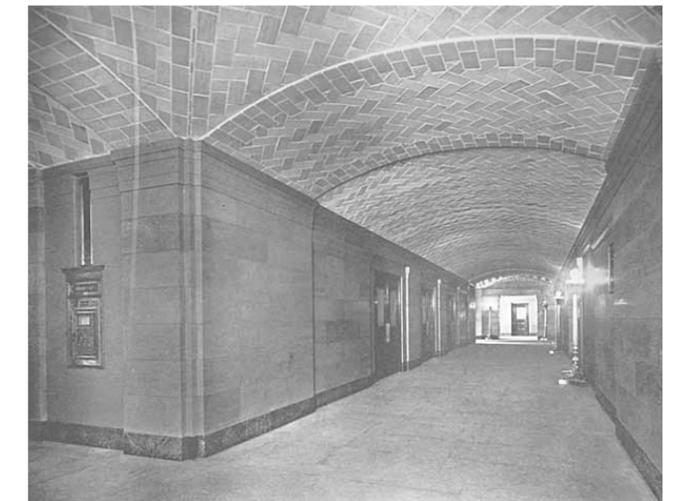
Chaska brick was specified and installed in the specifications for all locations except those calling for 'sewer brick.' The exact nature of the 'sewer brick' is unknown. Brick is the backup wall for all masonry walls.

Tile for Guastavino Vaulting

A number of floor areas within the building are supported by Guastavino "timbrel arch" construction. This system utilizes multiple layers of solid 1-inch thick tiles with mortar joints between to form thin, lightweight arches and vaults. In many locations, the tiles used at underside of the arches and vaults are exposed to provide a decorative finished ceiling. This construction is primarily evident in the public spaces and corridors around the rotunda. The first floor rotunda is also of Guastavino construction. Concrete fill is used over the Guastavino arches to provide a level floor surface. Where significant concrete fill would have been required to level the floors over arches with large rise, it is likely that hollow clay tile or other means were used to partly fill the volume over the arches, thereby reducing the quantity and weight of concrete fill. Original project documents indicate a required live load capacity of 150 pounds per square foot for all Guastavino floor construction. Guastavino tile is also used as the back up material for the the plaster above all major vaulted spaces: the House Chamber, the Senate, the Supreme Court and their galleries.

The specification calls for "Not less than three layers" of a 'specially prepared fire clay tile.'" The contractor was given the option to add more layers if he felt necessary; it is unknown if this was the case. No further information is available on the tile used and installed, though it is visible in many places.

There are three basic kinds of Guastavino tile: A green glazed tile for the exterior undersides of the three porte-corcheres, the exposed interior tile, originally unpainted, reported pinkish offwhite, now painted a plain white, and the unseen tile that supports the oval stair and dome.





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Unit Masonry
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Hollow Tile Masonry

Main roof areas are constructed from hollow terra cotta book tiles supported by steel tee sections which span to steel beams. Original project documents indicate concrete topping was provided over the book tiles. The evaluation in 1988² indicated calculated roof live load capacities of approximately 100 pounds per square foot, and original project documents indicate a minimum load capacity of 90 pounds per square foot at book tile roofs.

In the dome, the highest part of the marble dome is only a 18” thick shell of hollow tile and marble.

Other applications of hollow tile masonry include partition walls, which were specified to be brick, but some have been found to be hollow tile instead. It was used in the timber construction of the terraces, but this has been removed. It was also used during later renovations, especially at the basement level.

Concrete Masonry Units. This material is only used in the basement of the capitol, as a non-loadbearing partition. It was not present in the original construction.

Construction Issues

Availability: Chaska Brick is no longer manufactured, but is rarely exposed. Guastavino tile of the same type is not available, but could probably be duplicated. No other material is both historic and exposed.

References

Gilbert, Cass. “Specifications for the New Minnesota State Capitol Building, St Paul Minnesota.” Minnesota Historical Society, Capitol Site. 1897-1903. “Masonry,” and “Timber Arch Construction.”

Tarrago, Salvador. “Guastavino Co: Catalogue of Works in Catalonia and America”
Collegi d’Arquitectes de Catalunya, Barcelona 2002

² Ibid.

Previous Projects

No previous projects specifically deal with unit masonry, though any renovation on the Basement Level would include some work, as well as those projects on other floors that would have demolition at partition walls that would originally have been brick or hollow tile construction.

MINNESOTA STATE CAPITOL
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SECTION 3.5

METALWORK



3.5.1 Structural Steel and Iron: Background

The structure of the Capitol above the ground floor is a combination of steel beams and cast iron columns. These were fabricated and installed by the Universal Construction Company of Chicago.

Materials

Cast Iron: Cast iron was specified for columns, bearing plates and shear plates. Connections were to be riveted.

Steel: Steel is used for horizontal bearing members. The masonry timber arches that comprise the floor span between steel beams.

Stainless Steel: Structural of this metal replaced original steel in the dome and lantern. Stainless Steel was chosen for its resistance to moisture, which had caused deterioration of the original material.

Applications

Floors: Most floor areas are constructed of shallow brick and tile arches spanning to rolled steel beams. Steel beams are supported on a combination of masonry bearing walls, steel girders, and steel and cast iron columns. Concrete fill is used over the arches to provide a level floor surface. Original project documents indicate a total load capacity (dead plus live) of 165 pounds per square foot at steel-framed floors, and an evaluation in 1988¹ indicated calculated live load capacities ranging from 100 to 200 pounds per square foot.

Roof Supports: Main roof areas are constructed from hollow terra cotta book tiles supported by steel tee sections which span to steel beams. Original project documents indicate concrete topping was provided over the book tiles. The evaluation in 1988² indicated calculated roof live load capacities of approximately 100 pounds per square foot, and original project documents indicate a minimum load capacity of 90 pounds per square foot at book tile roofs.

Skylights: Steel-framed skylit domes form the roofs over the chambers. Circular skylit domes cover the Senate and Supreme Court chambers, and a semi-circular skylit dome covers the House of Representatives. The circular skylit domes are constructed of radial ribs and compression rings, while that over the House Chambers is framed with steel trusses.

Each skylit dome also has a steel service stair for cleaning the exterior.

¹ Miller-Dunwiddie and Associates, "Comprehensive Preservation Plan" 1988

² Ibid.

Main Dome

The structure of the main dome is comprised of three distinct components: the outer marble and masonry dome, the middle dome supporting the lantern, and the inner dome forming the ceiling of the rotunda. The outer dome is marble with hollow brick back-up and embedded steel tension bands. A large trussed tension ring resists thrust at the base of the dome. The middle "dome" is actually a conical steel structure supporting the steel-framed lantern of the dome. It is constructed from steel column ribs that connect to the tension ring at the base of the outer dome. Space between the columns is infilled with shallow brick arches. The inner dome is of Guastavino construction.

Condition of Structural Steel and Iron

The existing conditions of the Minnesota State Capitol structure have been reviewed during the course of a number of past studies and projects. A comprehensive evaluation in 1988³ generally found the structure to be in very good condition where accessible, with the exception of the dome and lantern and some portions of the exterior terraces. Review of several spaces within the main roof occurred in 2007⁴ and found no notable deterioration due to water intrusion. An investigation in 2009⁵ revisited a number of areas within the main dome and drum previously identified as having some corrosion or potential for deterioration. Some deterioration was discovered in the columns supporting the middle dome.

A review of several areas within the main building roof structure found no evidence of deterioration to the structural systems due to water infiltration. Areas reviewed include the House of Representatives Dome, the north half of the Senate Wing, the Senate Dome, the south half of the Supreme Court Wing, and the Quadriga.

The main dome and lantern has experienced much water infiltration in the past. The brick at the interior of the outer marble dome shows evidence of significant long-term exposure to moisture. A 1986 investigation⁶ revealed some level of deterioration in several areas of the dome and lantern.

Significant corrosion of the steel-framed lantern was discovered, extending to the tops of the middle dome columns. Moderate deterioration was also noted at connections between the base of middle dome steel columns and the trussed tension ring, although the tension ring itself showed little corrosion. The steel tension bands embedded within the brick of the outer dome showed slight to moderate surface corrosion.

³ Ibid.

⁴ HGA Architects Planners Engineers and Schooley Caldwell and Associates. "Minnesota State Capitol Predesign." 2007

⁵ HGA Architects Engineers and Planners and Schooley Caldwell Associates. "Water Infiltration Report." 2009.

⁶ Miller Dunwiddie. Op cite. Appendix.



**Section 3.5.1
Structural Steel
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As a result of the significant deterioration, the lantern structure was replaced in 1986 with a stainless steel frame. Recent observations of the lantern show the structure to be in very good condition.

An investigation of the dome in 2009⁷ revisited several areas previously identified as having some corrosion or potential for deterioration. The steel tension bands within the outer dome were again found to have minimal surface corrosion at the locations exposed, with some of the original paint still intact. Significant corrosion and loss of section was discovered on the flanges of several middle dome columns, occurring at the bottom of the columns near the connections to the main tension ring. The tension ring itself, however, was in very good condition with only light surface corrosion. As part of the recent dome repair and water mitigation project, the bases of all middle dome columns were reinforced and coated to limit future corrosion.

Construction Issues

Where water infiltration has been a problem, condition of original structural members may be poor.

Most structural steel and iron members are embedded in masonry.

Original structure may be coated with lead-based paint.

References

Gilbert, Cass, Original specification sections, as found in the Appendix: “Excavation and Concrete Work,” “Masonry,” “Terraces and Steps” and “Concrete and Drainage.” 1902

Capitol Commission, “Fourth Biennial Report,” 1900. (Minnesota Historical Society).

HGA Architects Engineers and Planners and Schooley Caldwell Associates. “Water Infiltration Report.” 2009.

See Appendix.

Previous Projects

2010: Project: State Capitol Dome Repair Work. HGA Architects Engineers and Planners and Schooley Caldwell Associates.

See Appendix for drawings.

⁷HGA Architects Engineers and Planners and Schooley Caldwell Associates. “Water Infiltration Report.” 2009.



3.5.2 Architectural Metals Summary: Background.

Metals are used extensively in the Capitol. Above the foundations, the structure of the building is steel, installed by Universal Construction Company out of Chicago. Ornamental ironwork was supplied by Flour City Ironworks of Minneapolis, Winslow Brothers of Chicago, Mitchell Vance Company and the Sterling Bronze Company.

Material Catalogue

Brass: Hardware is variously described as either Brass or Bronze. This confusion is compounded by the modern usage of 'Architectural Bronze,' which is technically Brass. In this section 'brass' will be used to describe all forms of brass, (a copper/zinc alloy). Most of the original interior hardware that is not along public corridors seems to be brass. The floor lights, or 'torcheres' were made of a combined cast iron and brass construction.

Bronze: See above for hardware. In this section, the word 'bronze' will be used to describe actual bronze (a copper/tin alloy) and not 'architectural bronze' which is a kind of brass. Bronze is used in door hardware (mostly along public corridors), ornamental heating grilles, light fixture brackets, and in sculpture. It was also used in the original elevators at floor indicator numbers.

Copper: Copper is used as a decorative metal on the South main entrance doors and vestibule on the first floor. Copper is also used as a roofing material on roofs above the House, Senate, Supreme Court Chambers, and the 'witch's hats'.

Gold: There is gilt-work on both the interior and exterior. The most visible application is on the ball of the Lantern and the sculpture work below it.

Aluminum: Is not an original material. Primarily used as a window framing material in subsequent renovations.

Ferrous metals: The specifications gave the contractor the option of using cast iron, wrought iron, or steel in his ornamental railings. The contractor was also given the option of using 'iron or steel' in the metal lathed plaster construction of the third floor ceilings, and in other places where decorative plaster is used.

Iron, cast: This is used in the stairs in the minor corridors of the House and Supreme Court, the light fixtures above the grand staircases, the spiral stair leading to the roof and was also specified to be used in the (removed) elevator doors. The floor lights, or 'torcheres' were made of a combined cast iron and brass construction.

Iron, wrought: Wrought Iron is used in the balusters of the House (oval) stair, in door glazing, the railings on galleries around the dome on the third floor,

Iron, galvanized: Galvanized iron was used as frames for all ceiling lights, except for over the Grand Staircases, and in the skylight supports. It is not known whether 'galvanized iron' was simply another term for what we call 'galvanized steel,' or if it actually was cast iron that was subsequently galvanized.

Steel: The building's structural framing is riveted steel. Water infiltration has been noted to have caused deterioration in some steel members, which have been replaced in the past. Steel was used for the large safe doors, which have all been subsequently removed. The doors of the original elevators may also have used steel, as the contractor was given that option. Steel doors, frames and hardware have been subsequently added in many locations.

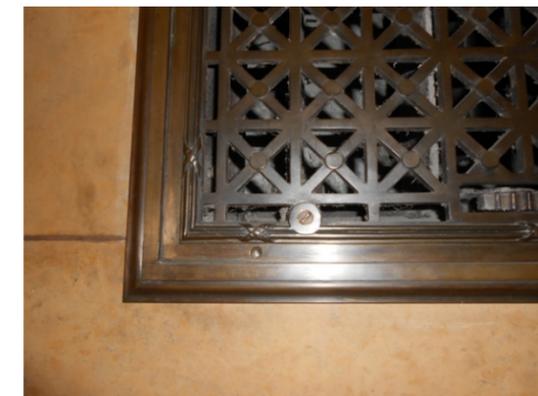
Stainless Steel: This material is not original. It is found mostly in the Rathskellar kitchen in the basement.

Nickel: Used in the rotunda Chandelier, and restroom fasteners and partition supports. The material is not pure nickel, but some sort of alloy, likely a nickel/chromium alloy.

Decorative Metal Applications:

Metal Grilles: Original grilles are one of two different types of metal: Bronze or Cast iron. Cast iron grilles are universally painted, while bronze grilles were left exposed, many developing a fine patina. The main patterns of grille are as follows, grilles are bronze unless noted as iron:

Standard: The standard grille, commonly used in all public spaces is has a Grecian pattern, surrounded by a bundled reed type border. These are found in the public corridors on all levels. These are almost always bronze.





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Sizes: (HxW)	Count	Floor
12" x 27"	2	1
15" x 19"	5	1,2
15" x 21"	6	G, 1, 2
15" x 21" (Iron, painted)	4	3
15" x 35"	4	2
18" x 27"	16	2,3
18" x 49"	3	B
19" x 17"	2	G
19" x 21" (Iron, painted)	2	F
19" x 27"	4	1
21" x 19"	2	1,2
21" x 21"	2	G
21" x 27"	8	1
27" x 22"	8	G
28" x 43"	2	G
28" x 52"	2	G

Fishscale: The next most common historic grille is a fishscale pattern grille which is used in minor corridors, offices, and other secondary spaces. Some of these are bronze while most are painted iron.



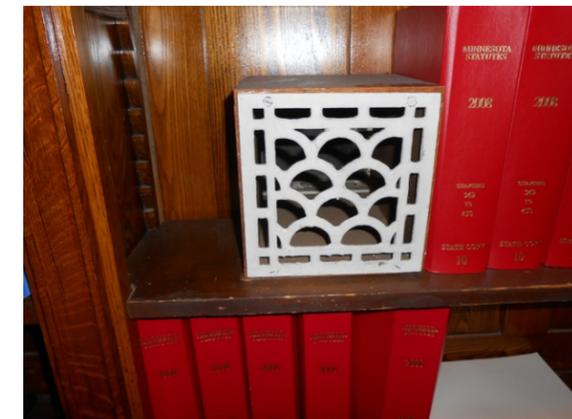
16" x 9"	(built into furniture)	1	2
16" x 11"		1	G
20" x 9"	(Iron, painted)	1	2
21" x 19"	(Iron, painted)	6	2

Special

In certain rooms of the Capitol, there are unique grilles found nowhere else.

The Supreme court chamber has a set of four cast iron grilles with a floral pattern. These are 20" high by 42" wide. There are also a number of very obviously contemporary grilles from the 1987 renovation.

The House has grilles that are original follow the same general fishscale pattern as found elsewhere. A number of non original grilles have been added, following the standard Grecian pattern, except with plain borders. They are painted aluminum grilles. The House retiring has added grilles near the ceiling that appear to be a modern replication of the fishscale pattern in bronze finished metal.



Sizes: (HxW)	Count	Floor
7" x 7" (built into furniture)	1	2
9" x 9"	4	2
15" x 9" (Iron, painted)	1	2
15" x 11"	3	1,2
15" x 11" (Iron, painted)	1	2
15" x 17" (Iron, painted)	1	3
15" x 19" (Iron, painted)	1	2

The Senate has curved grilles in the niches surrounding the chamber that follow the standard pattern, and are painted iron. These have been modified to add power and data connections. In the Senate Consulting chamber there are a pair of brass finished grilles with a highly decorative frame.



Governor's Reception Room Grilles:

There are two kind of unique grilles in the Governor's Reception room and anteroom. The first is a bronze grille similar in design but not in finish to the Senate Retiring Room grilles. The second is a highly decorative grille with an 'M' monogram found above the side doors to the Reception room.



Non Historic Grilles:

There are a variety of non historic grilles installed at various times during the Capitol's history. Most common are brass plates stamped with a similar Grecian pattern to the standard grille, but with different proportions and without any of the original ornamentation. These are found throughout the public corridors and especially at vestibules where heating elements were installed and date from the 1968-72 renovation by TKDA. One of the largest and most visible alterations to the Zone One areas is in the East Entry Corridor of the First floor, where grilles 9'-6" wide and 4'-4" tall were installed.





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In the renovations of the Chambers in the mid nineties, new grilles were installed. These match the standard grilles better than the ones installed in the earlier renovation, being aluminum with the same pattern and proportions of the original standard grille, but lacking the ornamentation. These are painted aluminum grilles.



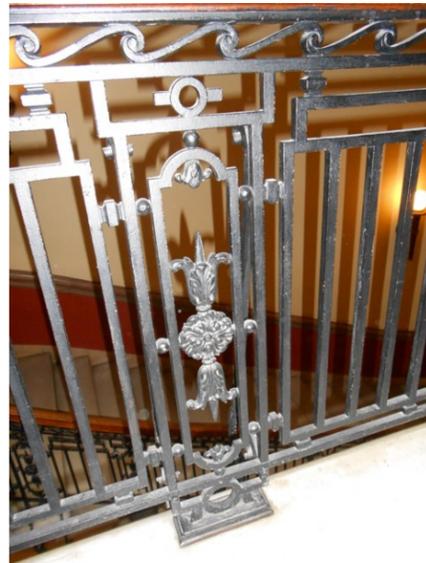


Metal Handrails:

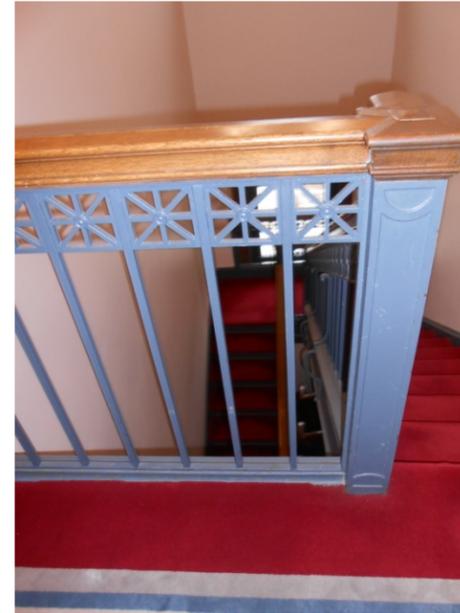
There are a variety of ornamental metal handrails in the Capitol. Iron handrails are found on the third floor of the rotunda:



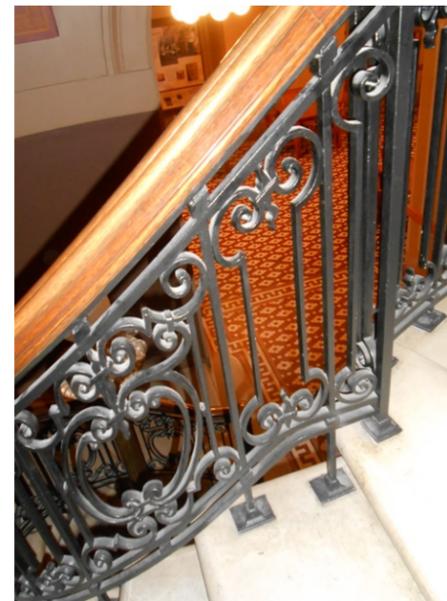
In the Oval (House) Stair,



the stairs of the minor corridors,



and in the stairs from the basement to the Rathskellar.





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Brass handrails and guardrails are found in the House Gallery and Senate Galleries,



and in the former law library mezzanine of the Supreme Court.



Metal Gates:

Each of the Chambers have their own bronze metal gate. The largest of these is the House gate, which is a double swing, and incorporates Minnesota’s state symbols; the gopher, the lady slipper, the loon and the

North Star. The Senate and Supreme Court gates are smaller, single swing gates with the same general design.

Metal Stairs at Roof:

Construction Issues:

- Lead paint abatement/encapsulation. Steel structural members and grilles were originally painted with lead based paint. See paint section for more information.
- Accurate metal matching. The original specifications are incomplete with regard to some of the original metals (i.e. the nickel alloy, bronze etc) If the design aim is to exactly replicate some particular item, greater analysis is needed.
- Code issues: Many of the railings do not comply with current standards of height and size of openings. While the ones at the grand staircases can be considered exempt due to the preservation codes, railings at other areas might not be.
- Size: As the mechanical systems have been upgraded, grilles have increased in size. Some of the newer grilles are completely out of scale to the originals, and are therefore especially intrusive to the character of the spaces.

References:

Gilbert, Cass. “Specifications for the New Minnesota State Capitol Building, St Paul Minnesota.” Minnesota Historical Society, Capitol Site. 1897-1903. As found in the Appendix: “Ornamental Metalwork,” “Metal Furring and Lathing.”

Previous Projects:

1968-1970. Project: Capitol Remodelling: Phase I, II, III. Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix.

1970. Project: Elevator Cab replacement. Thorsen & Thorshov, Inc. See appendix for drawings.
Glass elevator cabs removed and replaced with opaque cars, doors and surround.

1988. Project: Restoration of the Senate Chambers. Miller Dunwiddie and Associates. Drawings in appendix.

1989. Project: Restoration of the House Chambers. Miller Dunwiddie and Associates. Drawings in appendix.

1990. Project: Supreme Court Restoration. Miller Dunwiddie and Associates. Drawings in appendix.

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SECTION 3.6

WOODWORK



3.6.1 Architectural Woodwork Summary: Background.

Wood was used extensively in the Capitol as a finish material. In the interests of long term durability and fireproofing, wood was not used as a structural material, in contrast to the previous capitol. Subsequent renovations have removed a great deal of the original wood, including virtually all the original wood floors, much of the interior casework, and may have introduced wood elements where they have not appeared previously.

Material Catalogue

Poplar: Poplar is specified to be used in the Governor's Reception room, anteroom and the Supreme Court's Conference Room. Actual wood used in the Governor's rooms is White Oak. The Supreme Court's room is painted, and the actual species is unknown.

White Oak: The majority of woodwork in the Capitol is specified to be White Oak. Oak doors facing into the public corridors are solid, quarter sawn White Oak. The floors of the justice's offices were also changed to quarter sawn oak during construction. All trim is also white oak, but is not quarter sawn. Original Oak floors remain in the Governor's room.

Maple: It is also used as part of the decorative floor borders in the Governor's Reception area and office. This 18" border contains 'white' and plain maple.

Pine: Three sorts of pine are mentioned in the spec: Yellow, White, and unspecified. Yellow and White are explained below. Unspecified pine is called out for use in the doors of utilitarian areas of the basement, and in trap doors.

Yellow Pine: The original window frames were constructed of Yellow Pine. The only original windows remaining are in the Attorney General's office on the first floor. Original floors in the office spaces were also pine. On plan, they are identified as 'Georgia Pine,' but the specifications make it clear that this is the same as 'Yellow Pine.' The original wood floors have been removed and replaced by concrete in the 1969-72, except in ceremonial areas like the governor's reception room and the retiring rooms.

White Pine: Also called Norway pine, is called out for leather covered doors. It is also called out for the sleepers beneath the wood floors. These sleepers had a concrete infill poured between them. When the wood floor was removed and replaced by a concrete topping, the latter was simply poured over the sleepers.

Mahogany: This wood was used in the Governor's suite in place of Oak. Doors, frames, and paneling is all this wood. It was also used in the interiors of the original elevator cars. It is also used as part of the decorative floor borders in the Governor's Reception area and office. This 18" border contains red and white mahogany. See Casework below.

Finishes: Wood stains were called out in the specs to be composed of linseed oil, turpentine, colored with burnt Sienna to 'the desired hue.' Wooden components were stained at the factory and varnished on site. The colors chosen were a light, clear hue at the ground and first floor, with a darker red color on the second, and a deep brown on the third floor. See paint analysis for more information.

Applications

See section 3.8: Doors and Windows for wood doors and windows and trim.
See section 3.12: Furnishings for furniture.

Trim: All office spaces in the Capitol were to have a 1" x 2 1/2" oak picture molding around the entire room. Baseboards also were wood, and these remain in some offices.

Flooring: The majority of wood office flooring has been removed and replaced with concrete and carpeting. Original floors would have been of Yellow (Georgia) Pine. Wood floors remain in the Governor's suite, and in the Retiring rooms.

Wainscot and paneling: Wood wainscot was original in several rooms, but not all wainscot that exists today is original. All original wainscot is Oak or Mahogany (in the Governor's suite only.) Good examples of original woodwork are found in the Attorney General's office, and Hearing Room 123, which has original wood paneling near the door, and non-original paneling throughout the room.

Carved Ornament: Carved wood ornament exists on the custom furniture of the House, Senate, and Supreme Court, the doors, frames and wainscot in the Governor's suite, on the doors of the House, Senate, and Supreme Court chambers and on other important entrance doors. No special instructions are given in the specifications for these carvings, besides giving the option of using papier-mache for 'certain applications,' probably those features that are gilded.

Casework: Original casework in the Minnesota State Capitol includes the desks, railings, and other furnishings of the House, Senate and Supreme Court chambers, still in place, the business counters in some



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of the office suites, all removed, and some miscellaneous cabinets throughout the office spaces, which are mostly gone. All casework in the chambers is mahogany, and has been well maintained.

Counters in business offices were 30” high, with a 5” to 10” marble base and ornamental panels on the visitor side and a variety of pigeonholes and storage on the office side. The carved ornamental panels alternated with larger, plain panels. Each room had a slightly different design.

The office casework was predominantly large filing and book cases. The typical case was 8’ tall and could contain shelves, pigeonholes, roller curtains made of wood slats to cover open storage, and wardrobes. Typical wardrobes had open panels top and bottom covered with a metal mesh, for ventilation. A few of these still exist, in the media meeting room on the third floor. These should be used as examples if replication is required.

Few examples of built in casework remains. On the ground floor, in corner offices, there are some original cabinets built directly into a recess in the wall. In the Supreme Court Justice’s room, there remains a curious bookshelf which had ventilation grilles built directly into it. These examples remain doubtless because their removal would have been complicated.

Construction Issues

The original counters in the business offices of the government departments have all been removed, which will make replicating them more difficult. It is not known if they were fabricated according to the drawings available.

Matching finishes and wood to original woodwork will be difficult, as finishes darken over time. Sleepers remaining inside concrete topping might complicate changes to the flooring.

References

Furhoff, Robert. “Evaluation of Painted Surfaces and Original Decoration, Minnesota State Capitol”. 1985. Minnesota Historical Society. See Appendix.

Gilbert, Cass. “Specifications for the New Minnesota State Capitol Building, St Paul Minnesota.” Minnesota Historical Society, Capitol Site. 1897-1903.
“Volume 2: Woodwork,” and “Volume 1: Painting and Glazing.” See Appendix.

Ulrich, Joan. “Minnesota State Capitol, Saint Paul Minnesota, Furnishing Plan Report.” Minnesota Historical Society. 1994. See Appendix.

Previous Projects:

1968-1970

Project: Capitol Remodelling: Phase I, II, III. Toltz, King, Duvall, Anderson and Associates. (TKDA). This project removed the wood floor throughout most of the Capitol, as well as other changes.

1974

Project: Redecoration of the Supreme Court spaces: Thorsen & Thorshov, Inc. The Justice’s bench was modified for more seats, casework added to Consultation Room.

Project: Window Replacement and Renovation Work. Rieke, Carroll, Muller Associates. See appendix for drawings.

Original wood windows removed and replaced with aluminum units.

1988

Project: Restoration of the Senate Chambers. Miller Dunwiddie and Associates. See Appendix for drawings. Major restoration of the Senate Chamber including, refurbishment of desks.¹

1989

Project: Restoration of the House Chambers. Miller Dunwiddie and Associates. See Appendix for drawings.

Work includes refurbishment of desks, and expansion of the rostrum.

1995

Project: Attorney General Office Renovation. Miller Dunwiddie and Associates. See Appendix for drawings.

The Attorney General’s suite was renovated. Woodwork in the Anteroom was restored.

¹ Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.



1998

Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction.

Miller Dunwiddie and Associates. See Appendix for drawings.

This project included wood trim.

2012

Project: State Capitol Window Replacement. HGA Architects Engineers and Planners. See Appendix for drawings.

This project saw the aluminum windows that had replaced the original wood windows removed and replaced with wood windows matching the originals. These were fabricated based on original drawings and two windows in the Attorney General's office that had not been replaced.

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SECTION 3.7

ROOFING, WATERPROOFING, INSULATION



Roofing, Waterproofing and Insulation Summary: Background.

The original roofing of the Capitol consisted of three types: a heavy building paper with tar, covered with tile as fireproofing, copper roofing over the three Chambers and ‘witches hats,’ and the roof of the dome itself, which is Georgia Marble. Problems with water infiltration began almost immediately, with damage to plaster reported not even ten years after the building was completed. This has led to a number of attempts to repair or reroof the capitol to halt this water infiltration, with mixed results. In all, the roof has been replaced three times: in 1954, in 1967-1970 with the major interior renovation that took place at that time, and in 1994. In addition to these projects, there were eight smaller repair projects. The roof system in place prior to the 2013 restoration project was a typical

Waterproofing on the terraces has also been an issue at the Capitol. Cass Gilbert’s original specifications call for a layer of ‘asphaltic paint,’ covered by three layers of felt and one of burlap, all impregnated with ‘asphaltic mixture.’ The terraces were repaired and waterproofed in 1932. This waterproofing consisted of a bituminous layer directly beneath the wearing slab, with no special insulation or drainage layers. Later reconstructions replaced this with the current modern system, described below.

Weatherstripping at exterior doors was first added in 1935. The most recent replacement of door weatherstripping was with the 2000 ADA hardware improvements project. The window replacement of 2012 includes all new sealant and weatherstripping at the new windows.

The Capitol was originally uninsulated. When the roof was replaced in 1967-70, insulation was added. The walls of the Capitol remain uninsulated.

Material Catalogue

Tile: a 4” tile was originally used as a fireproofing on top of the roof. Over time this was replaced by a more standard roofing paver. Current pavers are 5” x 8”.

Fluid applied membrane: This has gradually replaced earlier waterproofing systems. Early systems were bituminous membranes, while more recent ones are Bentonite. The original specifications call for an ‘asphaltic paint.’

Concrete (terrace): The terraces are paved with poured concrete slabs. The original system consisted of a 3” concrete wearing slab above a bituminous waterproofing layer, all over a structural concrete slab, with no insulation. In recent years, large sections of the terraces have been rebuilt and replaced. Areas of the terraces that have been reconstructed typically have a wearing slab, rigid insulation, and waterproofing proofing barrier over a concrete structural slab. The nature of the insulation and waterproofing varies

according to age. See T1/A106, 4, 5/A107 from the 1997 Miller Dunwiddie, Inc. “North East Terrace Reconstruction” project for more information.

Copper Roofing: This roofing was originally installed over the House, Senate, and Supreme Court Chambers, as well as some of the other roof features. It was all replaced in 1994, except for the decorative copper ornaments on the ridges, which were restored. Copper roofing takes two forms: Standing seam on the domes themselves, and a flat, soldered seam roof surrounding the domes.

Rigid Insulation: There was no insulation in the building originally, but it has been added in recent reroofing projects. All remaining rigid insulation dates from the nineties or later.

Georgia Marble: Used as roofing material at dome. The joints of the dome are open, allowing the stone to function as a rainscreen, with the middle dome being the water barrier. See Stone section.

Flashing: Original metal flashing has been removed in multiple reroofing projects. Current flashing dates from the 1994 reroofing and skylight renovation project.

Skylights: New skylights were installed in the 1994 reroofing project by Miller Dunwiddie Inc. The original skylights over the grand stairs and Supreme Court galleries and offices were not removed; the new double glazed system was installed over them. In the chambers and other minor skylights, the skylights were removed entirely and replaced with a double glazed system. Framing for all new skylights match original. Previous work on skylights had included covering several of the minor skylights from below, and in the case of the round skylights above the dome corridors, placing a modern plastic bubble skylight over the existing skylight. Seven skylights, all in the East Wing, are covered from below.

Sealants: The original construction used mortar as a sealant for all masonry joints. Elsewhere they relied on the same asphaltic paint as they used as a moisture barrier. With ever recurring moisture infiltration, attempts were made to improve the sealants, as far back as 1947 when the dome was caulked. The sort of material used then is not known, as it too failed and was replaced. In the stone assessment of 2011, it was noted that a polyurethane sealant had been improperly installed, with improper depth of backer rod, and improperly tooling being the most common problems. It is also known that these materials degrade under ultraviolet light. Other problems include motion and failure of the stone itself. Lead caps were recommended to be used in all applications not visible to the naked eye, especially on horizontal roof surfaces. See Comprehensive Stone Assessment, and 2013 Roof and Stone Replacement projects.



Section 3.7
Roofing Waterproofing and Insulation
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Construction Issues

- Water infiltration into the dome and surrounding areas has been a continuing problem for the entire life of the Capitol, defying many previous attempts to rectify it. It remains to be seen if the most recent attempts have been successful.
- The terraces surrounding the Capitol have also suffered greatly from water infiltration. The entire terrace has been reconstructed.
- The multitude of skylights and other roof features complicates the problem of waterproofing.
- The roof must also accommodate large numbers of visitors while maintaining its integrity.

References

Original specification sections, as found in the Appendix: “Roofing and Skylights.” “Terraces and Steps” “Minnesota State Capitol, Roof Review.”

Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota

Previous Studies

1988

Study: Minnesota State Capitol: A Comprehensive Preservation Plan and Implementation Strategy.
Miller Dunwiddie and Associates.
See Appendix

2003

Study: Humidity Study.
Miller Dunwiddie and Associates, William B Rose and Associates.
See Appendix for Study and drawings.

2009

Study: Pedestrian Tunnel Study
HGA Architects Engineers and Planners
See Appendix

Study: Water Infiltration Report
HGA Architects Engineers and Planners
See Appendix

2013

Minnesota State Capitol Roof Review
HGA Architects Engineers and Planners
See Appendix

Previous Projects

1932 Terrace repair/waterproofing.
No drawings exist ¹

1935 Roof Repair, Masonry repointing.
No drawings exist.

1939 Roof and skylight repair.
No drawings exist.

1943 Caulking of the dome to prevent water infiltration.
No drawings exist.

1946 Retiling on the roof and additional waterproofing. H. H. Witte.
No drawings exist.

1954 Reroofing. Tile and waterproofing removed, slab cleaned and roofing replaced. Skylights above elevators removed and replaced with a solid concrete slab. No drawings exist.

1957 Deck replaced on north wing roof, Northeast terrace rebuilt with insulation. A. J. Nelson, (State Architect)
No roof plans available.

1965 Roof drains repair/replacement.
No drawings available.

1967 Reroofing of West Wing.
No drawings available.

¹ Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.



1969 Roof tiling replaced, ventilators removed.
No drawings available.

1970 Work continues on North and South areas of roof. Ettel and Franz Co., Minneapolis.
No drawings available.
Some areas of copper roofs and copper gutters replaced at this time.

1981 Project: Reroofing. Sessing Architects
See Appendix for drawings.

1988 New waterproofing membrane added to stairs as they were reset.²
No drawings available.

1994 Complete restoration of the roof, including
A new roofing membrane.
Installation of new copper.
Refurbishing of ornamental copper.
Replacement of skylights and reinstallation of skylights previously removed.
Reinstallation of marble previously removed along sides of skylights.
Installation of new marble “targets” (the carved pieces that form the barrier along the Quadriga-level walkway).
Replacement of roof tiles over the entire roof.
Replacement of ladders, stairs and walkways.
Reinstallation of exterior lights.
Installation of a new lightning control system.
Miller Dunwiddie and Associates
Lundquist, Killeen, Potvin and Bender, Engineers
Inspec, Inc., Consultants, Golden Valley.
Lund Martin, General Contractor, Minneapolis.
See Appendix for drawings.

1997 Exterior Renovations. Miller Dunwiddie and Associates
North terrace restoration that included a thermoplastic fluid applied membrane.
See Appendix for drawings.

1998 Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction. Miller Dunwiddie and Associates
See Appendix for drawings.

Project: South Terrace Reconstruction and Masonry Repointing. Miller Dunwiddie and Associates
See Appendix for drawings.

2002 East and west loggias repaired, including new fluid applied membrane at both locations.

2004 Project: Water Intrusion Repair. Miller Dunwiddie and Associates
See Appendix for drawings.

2010 Project: State Capitol Dome Repair Work. HGA Architects Engineers and Planners
See Appendix for drawings.

2011 Comprehensive Stone Assessment. HGA Architects Engineers and Planners
See Appendix
This report was prepared for the current Exterior Stone Repair Project

2012 Project: University Avenue Tunnel at Capitol Complex. CNA Consulting Engineers.
See Appendix for drawings.

2013 Project: State Capitol Roof Replacement. HGA Architects Engineers and Planners
See Appendix for drawings

² Ibid.

MINNESOTA STATE CAPITOL
HISTORIC STRUCTURES REPORT
SECTION 3.8

DOORS AND WINDOWS



3.8.1 Doors and Door Hardware Summary Background

Most of the original doors in the Capitol are still in place. Additional doors have been added in various renovations over the course of the Capitol's lifetime, but the basic structure of the original rooms and suites have been respected. The biggest change to doors and hardware came in the year 2000, when a project was undertaken to improve access under the regulations of the Americans with Disabilities Act.

Material Catalogue

Original Door types: Note: Door type numbers listed below by three projects, the original numbers, the 2000 ADA upgrade by Miller Dunwiddie and Associates, and the 2014 renovation by HGA and SCA. The original Cass Gilbert drawings in possession of MHS are NOT the final set. Door type numbers may have changed subsequently. Where two dissimilar door types are identified as the same type on the original plans, the differing type is noted with a 'b' after the type. Some doors have been modified from their original appearance. See door survey for more information. Note that there is not necessarily a one-to-one correspondence between the door types on the three projects.

Original Door type: I
2000 ADA Upgrade type: A8
2014 Renovation type:
Exterior Double arched wood doors with full glazing: 2'-8" x 7'-4".
Total number: 12



Original Door type: II
2000 ADA Upgrade type: A7
2014 Renovation type:
Interior wood doors with half glazing: 2'-10" x 7'-8". These vestibule double doors swing both ways and have push plates on both sides.
Total number: 2



Original Door type: III
2000 ADA Upgrade type: A7
2014 Renovation type:
Interior wood doors with half glazing: 3'-0" x 7'-10". These single vestibule doors are swing both ways and have push plates on both sides.
Total number: 2



Original Door type: IV
2000 ADA Upgrade type: 11
2014 Renovation type:
Interior wood doors with full glazing: 3'-0" x 8'-0".
Total number: 7



Original Door type: V
2000 ADA Upgrade type: 18
2014 Renovation type: 9
Exterior arched wood door 2'-8" x 6'-8"
Total number: 1





**Section 3.8.1
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Original Door type: VIII
2000 ADA Upgrade type: 18
2014 Renovation type:
Interior wood doors with half glazing: 3'-10" x 8'-4". These doors have two panels in addition to their half glazing.
Total number: 10



Original Door type: X
2000 ADA Upgrade type: 11
2014 Renovation type:
Interior wood door with half glazing. 3'-2" x 8'-0". These doors, like other vestibule doors, originally swung both ways. The frames were modified at their head during the 2000 ADA Hardware and Door Modifications project to accommodate an automatic ADA operator. A horizontal stop was installed to keep the doors from swinging inwards. Total number: 6



Original Door type: VIIIb
2000 ADA Upgrade type: 4
2014 Renovation type:
Interior wood doors with full glazing: 3'-10" x 8'-4". This door has the same size as previous, with full glazing
Total number: 4



Original Door type: XI
2000 ADA Upgrade type: 5
2014 Renovation type:
Interior wood door, 3 panels no glazing. 3'-2" x 8'-2". Originally there were two of this type, with one being removed.
Total number: 1



Original Door type: IX
2000 ADA Upgrade type: -
2014 Renovation type:
Interior arched wood doors with grille. 2'-10" x 6'-4". These doors have an open decorative grille which allows air transfer. Hardware was not upgraded in the 2000 ADA project.
Total number: 4



Original Door type: XII
2000 ADA Upgrade type: 6.2
2014 Renovation type:
Interior wood door with half glazing and grille: 3'-0" x 8'-2". This restroom doors has an elaborate frame. Its lower panel is a grille.
Total number 1



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Original Door type: XIII
2000 ADA Upgrade type: 8
2014 Renovation type:
Interior double wood door with 3/4 glazing. 2'-10" x 8'-0".
Total number: 4



Original Door type: XXIV
2000 ADA Upgrade type: A5
2014 Renovation type:
Interior double wood doors with full height glazing: 2'-10" x 8'-8" These doors are between the east and west vestibules and the first floor east and west corridors.
Total number: 4



Original Door type: XXIII
2000 ADA Upgrade type: A4
2014 Renovation type:
Five paneled wood door: 3'-2" x 10'-0" These are the exterior doors at the North entry.
Total number: 6



Original Door type: XXV
2000 ADA Upgrade type: A5
2014 Renovation type:
Interior single wood doors with full height glazing: 2'-10" x 8'-8" These doors are between the east and west vestibules and the first floor east and west corridors.
Total number: 4



Original Door type: XXIIIb
2000 ADA Upgrade type: A3
2014 Renovation type:
Double wood door with full height glazing: 3'-2" x 10'-0" This type is similar to type XXIII, but the five panels are replaced with glazing.
Total number: 6



Original Door type: XXVI
2000 ADA Upgrade type: 18
2014 Renovation type:
Interior wood doors with full glazing: 3'-2" x 7'-8".
Total number: 2





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Original Door type: XXVIIb
2000 ADA Upgrade type: 5, 6, 25
2014 Renovation type:
Interior wood doors with three panels: 3'-2" x 8'-2".
Total number: 4



Original Door type: XXIX
2000 ADA Upgrade type:
2014 Renovation type:
Interior half glazed wood doors: 3'-4" x 7'-10". Doors XXIX, XXX, XXXV, XL, XXXVI are identical in size and detailing. This door has its top panel glazed.
Total number of XXIX, XXX, XXXV, XL, XXXVI: 95



Original Door type: XXVII
2000 ADA Upgrade type: 4
2014 Renovation type:
Interior double fully glazed doors: 2'-10" x 9'-0".
Total number: 6



Original Door type: XXX
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-4" x 7'-10". Doors XXIX, XXX, XXXV, XL, XXXVI are identical in size and detailing. This door has jamb lining and no glazing.
Total number of XXIX, XXX, XXXV, XL, XXXVI: 95



Original Door type: XXVIII, XXXVII
2000 ADA Upgrade type:
2014 Renovation type:
Interior half glazed wood door: 3'-8" x 7'-10". It is unclear what the intended difference between the two types was.
Total number: 23



Original Door type: XXXIII
2000 ADA Upgrade type: A1, A2
2014 Renovation type:
Copper Clad wood door: 3'-6" x 7'-6" These are the six interior doors leading to the vestibule at the main south entrance. At the South entrance, there are three sets of 2 double doors. The inner door swings into the building, and the outer door swings out, around a narrow vestibule.
Total number: 6





Original Door type: XXXV
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-4" x 7'-10". Doors XXIX, XXX, XXXV, XL, XXXVI are identical in size and detailing. This door is solid except where it has a transom, with no jamb lining.
Total number of XXIX, XXX, XXXV, XL, XXXVI: 95



Original Door type: XLVI
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 2'-8" x 6'-8".
Total number: 7



Original Door type: XXXVI
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-4" x 7'-10". Doors XXIX, XXX, XXXV, XL, XXXVI are identical in size and detailing. This door has a glazed top panel and a transom.
Total number of XXIX, XXX, XXXV, XL, XXXVI: 95

Original Door type: XLVIII
2000 ADA Upgrade type:
2014 Renovation type:
Interior double sliding wood doors: 3'-0" x 11'-0" These are the main doors to the House, Supreme Court and Senate Chamber. While they may have been intended to be different at one time, the doors that were installed seem to be identical. The House and Senate Chambers have one type of hardware, with a mechanical pull, deadbolt, hook and eyelet to secure the doors. The Supreme Court doors have only the mechanical pull.
Total number: 6



Original Door type: XL
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-4" x 7'-10". Doors XXIX, XXX, XXXV, XL, XXXVI are identical in size and detailing. This door has a glazed top panel, transom and jamb lining.
Total number of XXIX, XXX, XXXV, XL, XXXVI: 95



Original Door type: XLIX
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-2" x 7'-10". These doors, in the rear of the Supreme Court, are similar to type XXIX, except that one face has ornamental trim around its panels.
Total number: 8





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Original Door type: Supreme Court Consultation room
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood door: 3'-6" x 7'-10" This door has four panels on its interior, three on the exterior, and a unique frame. On its exterior face its panels have a detail similar to that of door type XLIX, and is plain on the interior.
Total number: 1



Original Door type: Senate Retiring room: A
2000 ADA Upgrade type:
2014 Renovation type:
Interior leather covered wood doors with glazed lite: 3'-2" x 7'-6". These are similar to the house doors, but have frosted glazing and lever hardware.
Total number: 4



Original Door type: Supreme Court
2000 ADA Upgrade type:
2014 Renovation type:
Interior leather covered wood doors: These leather covered wood doors are installed inside the large chamber doors (Type XL) for extra sound protection and privacy. Now they are used exclusively to close the chamber, with some longtime Capitol employees unaware that the 11'-0" doors exist.
Total number: 2



Original Door type: Senate Retiring room: B
2000 ADA Upgrade type:
2014 Renovation type:
Interior wood doors: 3'-2" x 8'-0". These doors have a plain side, similar to type XLIX, and a more ornate side, that faces the Senate Retiring Room. This side has a six panel face that bears little relation to the other side.
Total number: 4



Original Door type: House Retiring room
2000 ADA Upgrade type:
2014 Renovation type:
Interior leather covered wood doors with glazed lite: 3'-2" x 7'-6"
Total number: 6



Original Door type: Governor's Reception Room A.
2000 ADA Upgrade type:
2014 Renovation type:
Interior double wood doors: 3'-0" x 7'-10". These doors have a plain side, and a more ornate side, that faces the Governor's Reception Room. Both sides have gold leaf. These doors are mahogany.
Total number: 2





Original Door type: Governor's Reception Room B.
2000 ADA Upgrade type:
2014 Renovation type:
Interior single wood doors: 3'-0" x 7'-10". These doors have a plain side, and a more ornate side, that faces the Governor's Reception Room. These doors have one mahogany face and one oak face.
Total number: 5



Original Door type: Governor's Office C.
2000 ADA Upgrade type:
2014 Renovation type:
Interior single wood door with half glazing: 2'-6" x 7'-10". This door is similar to A, but is narrower and glazed.
Total number: 1



Original Door type: Governor's Office A.
2000 ADA Upgrade type:
2014 Renovation type:
Interior single wood doors: 3'-0" x 7'-10". These doors have a plain side, and a more ornate side, that faces the Governor's Office.
Total number: 3



Original Door type: Governor's Office D.
2000 ADA Upgrade type:
2014 Renovation type:
Interior single wood door: 3'-0" x 7'-10". This door has one face matching the door to the Governor's office, and one matching the Governor's Reception Room.
Total number 1.

ADA Doors: These doors were replaced during the 2000 ADA upgrades by Miller Dunwiddie and Associates.

Original Door type: Governor's Office B.
2000 ADA Upgrade type:
2014 Renovation type:
Interior single wood doors: 3'-0" x 7'-10". This door is similar to A, but have matching ornate sides.
Total number: 1



A9: 2'-4" x 7'-3" Originally. Replaced in 2000 with a single 3'-0" x 7'-4" door. These double doors were replaced with a single door for the 2000ADA improvements. They were half-glazed wood doors. The replacement door is similar in form but not proportion. They are located at the side vestibules on the south ground floor.
Total number: 2 (was 4)

A10 3'-4" x 7'-3": These doors were also replaced with the ADA improvements project. The doors were always half glazed wood doors similar to A9.
Total number: 2

Original French Doors: These were all restored during the 2012 Window Restoration project.

A11: Fully glazed 10 panel exterior wood balcony doors. 2'-6" x 8'-9". These French doors lead from the existing 2nd floor offices to the south balconies.
Total number: 12



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A12: Fully glazed 10 panel exterior wood balcony doors. 2'-6" x 8'-9". These French doors lead from the existing 2nd floor offices to the north balconies.
Total number: 12

A13: Fully glazed 10 panel exterior wood balcony doors. 2'-6" x 8'-9". These French doors lead from the East and west loggia balconies into the Supreme Court and Senate retiring rooms, respectively. They differ from the others in that they swing in.
Total number: 12



A14: Fully glazed 10 panel exterior wood balcony doors. 2'-6" x 8'-9". These French doors lead from the North and South loggia balconies into the House retiring room and rotunda, respectively. They differ from the others in that they swing in.
Total number: 12

A15: Hollow metal Lantern access door. 3'-0" x 6'-0" This is an ordinary hollow metal door, except shorter. It provides access to the inner dome via the rooftop walkway.
Total number: 1

A16: Hollow metal door with square window. 3'-0" x 6'-0" This hollow metal door provides access from the spiral stair to the rooftop quadriga walkway.
Total number: 1

Other Doors of note:

Original Door type: Senate Closet.
2000 ADA Upgrade type:
2014 Renovation type:
Interior folding wood doors: 2'-8" x 6'-8". These folding doors were installed in 1972 replacing a door similar to type XLVI.
Total number: 2

Original Door type: None
2000 ADA Upgrade type: none
2014 Renovation type:
Wood half sized door: approx. 3'-0" x 4'-0": This door, found in the basement, is believed to be a door remaining from the original construction, though it could possibly be from an early, undocumented renovation.



Original Door Type: None
2000 ADA Upgrade type:
2014 Renovation type:
These wood doors are similar in type and size to existing corridor doors, and open into the Ground floor hearing room.

Total number:4



Original Door Type:
2000 ADA Upgrade type
2014 Renovation type:
These single 36" exterior doors replaced a pair of original double doors at the Ground floor vestibules during the ADA upgrade of 2000.



Original Door Type:
2000 ADA Upgrade type:
2014 Renovation type:
These doors are in the locations originally occupied by doors that separated the Historical Society Hall from the public areas of the Ground floor. Documents are unclear as to whether these doors are originals that were restored to the original location, or if they are replicas.





Hardware on Original Doors: The original hardware was provided by Gardner Hardware of Minneapolis. Extensive changes to hardware were made in the 2000 ADA accessibility upgrades project. New hardware was fabricated by Brian Leo of Richfield, MN. The hardware that was removed, as well as the molds for the new hardware, are retained by the Minnesota Historical Society. See Appendix: ADA Hardware project, Miller Dunwiddie and Associates, 2000, for more information.



Locking mechanisms:

Most doors have an office function lock that is always unlocked from the inside of the room, and can be locked so as to require a key from the exterior. The original hardware had a two button system within the latch to operate the lock, the majority of these have been replaced with a switch in the same location, again during the 2000 hardware upgrade. Doors that retain their original knob also usually have the original two button system. There are also deadbolts and thumbturn latches on several doors. Most are not original and vary in type by age. The capitol is keyed to a Sargent system.

Pull Handles, Push Bars and Plates:

At the main south entry at the first floor, the doors have unique original push bars and handles. The ADA lever installed in 2000 was modeled on the pull handle on the main doors.



The leather covered doors to the Senate and House retiring rooms also have similar, but less ornate pull handles. Some of them have plain brass push plates, while others do not.

Escutcheon Plates:

There are three types of escutcheon plates: a plain 2 1/2" by 7" beveled plate, a 3" x 9" 'special' ornate brass plate with State Seal and floral patterns, and a large special plate of the same design, but 4" x 20" in size. Typically, the ornate escutcheon plates are found on door faces on major corridors. The inside face will also have the ornate escutcheon if the space is (or was originally) a public waiting room. The plain beveled plates are found both on faces of doors facing offices and minor corridors.

Knobs and Levers:

The original openers consisted of brass knobs. In the year 2000, all of the knobs in doors serving rooms were replaced with lever handles of two types: 3" x 5" handles of 3/4" thickness, mounted on the plain and smaller special escutcheon plate, and a 3 1/2" x 6" handle of 1" thickness, mounted on the larger plates. Doors which were not required to be ADA accessible retain their original knobs.



Hinges:

The majority of doors have three hinges, though some have two or four. These hinges consist of three types: the typical mortise hinge, and the heavier barrel hinge that is exclusively found on the leather covered doors to the House and Senate Chambers, and the concealed two way swing hinges at the inner vestibule doors. All of these hinges are steel, most have a brass finish, but some of the mortise hinges have a chrome/nickel finish when installed in a bathroom.





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Head and Sill Latches:

Every double door has one leaf that has a head and sill latch. These are original and largely unchanged. Most of them are still operational.



Hold Opens:

There is a great variety of hold-opens in the Capitol, and much evidence that older hold opens existed and were removed. The hold opens shown here are at the front doors. These spring loaded hold opens appear to be original.



Kick Plates:

Double swing vestibule doors, Leather-covered doors, and one face of exterior doors are all equipped with kickplates. Some doors serving closets or that have been sealed permanently retain their original hardware.

Stops:

Most original doors do not have stops, and numerous marks and dings on the doors themselves and surrounding surfaces attest to the need for stops. The only original stops are found on the exterior, at the first floor south entry.



Special Hardware:

Some Historic Doors have special or unique hardware. The large, sliding doors at the House and Senate Chambers have a hook and eye for securing the door from the inside. The Supreme Court Chamber does not. All sliding doors have a push button released handle for ease of closing.

Electronic Door Features:

No electronic features are original, but a number of them have been subsequently added. Without exception, the electric strikes that have been installed have caused damage to the frames.

ADA push button operation: This is the most typical application. Installed operators are of two types, the low power electrical LCN 4800 series, and an Electro Hydraulic Operated system by Dor-O-Matic 1910 series. These date from the 2000 ADA Hardware & Door Modifications. The LCN operator is in most general use, with the Dor-O-Matic operator is used at exterior doors where the hinges are concealed.

Other Door Hardware: Doors added by subsequent projects have a variety of different hardware types, depending on their age.

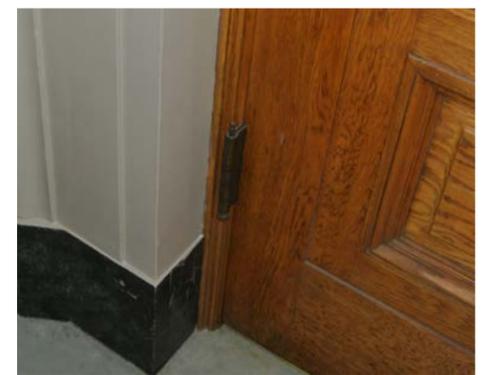
Door Frames:

Doors in the Capitol are surrounded by casing that is wood, plaster or stone. For doors on the central public spaces on the first floor or above, the public side of the door typically has a stone frame of the French Echallion marble. Doors on the ground floor corridors have plaster frames. Oak is typically used as a framing material on the interior of these locations, and on both sides at all other locations. Doors in frames other than wood will typically have a small (1/4") wood casing around the opening for wear and hardware attachments.

Frame type 1: Used with door types X, XXIV, XXV. Note for doors at the ground floor south vestibule (shown) the frame has been modified to prevent the door from swinging both ways, as intended.



Frame type 3: Width: exterior 3/4" interior 7 1/2"
Used with door types IV, VIII, XXVI. This door has the typical wood profile on the inside, but a stone or wide plaster frame on the outside. These are found on the public corridors of the Capitol.





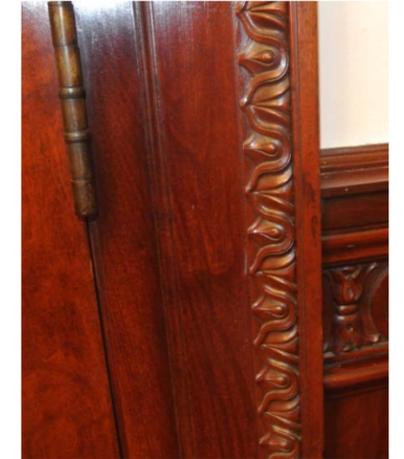
Frame type 103: Width: 5 1/2"

This is the most common type of door frame in the Capitol. It comes in two main varieties: with a jamb cover, which is an extra piece of trim for thick walls, used with door type XXIX, XL. Without door type XXX, XXXV, XXXIX, XXXVI. Jamb covers are frequently damaged by the new hardware, which have a bolt longer than the original hardware.



Frame type 103 GO:

This frame is the decorative frame found in the Governor's office. It has a large carved decorative feature above each door on the interior. On the exterior, the frame matches the typical condition of the exterior: 103 GR for the door into the reception room, frame 7 for the corridor, and frame 3 for the vestibule.



Frame Type 5: Width 5 1/2"

Used with door types VI, XI, XVII, XVIII, XX, XLV, XLVI. Similar in profile to Frame type 103, it is not as wide, and never has a jamb cover. It has the same profile on either side. Also similar to the interior side of frame type 3.



Frame type 103 GR:

This frame, used in the Governor's reception room, is similar to frame 103. The difference lies in the gilded ornament and mahogany on the interior. It has jamb covers on the exterior side just as frame 103 has.



Frame type 103 R:

This frame type is similar to 103, and is used at the House retiring room

Frame type S: Width 5 1/2"

This frame is used at the Supreme Court Consulting room. On the inside of the room, it has a 5 1/2" wide profile similar to, but similar than type 5. Its exterior profile is 2 1/2" wide. On the interior, it has a decorative pediment above it.



Section 3.8.1
Doors and Door Hardware
Historic Structures Report

Minnesota State Capitol Restoration
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Construction Issues:

- Balancing the desire for historically appropriate hardware with needs of ADA and security.
- Rationalizing/replacing the different sorts of doors and hardware installed over time.
- Long term durability of replacement materials.
- Over time, many of the lever handles have become unbalanced, causing them to fail to latch properly.

References:

Gilbert, Cass. "Specifications for the New Minnesota State Capitol Building, St Paul Minnesota." Minnesota Historical Society, Capitol Site. 1897-1903. Interior Woodwork and Hardware.

Miller Dunwiddie and Associates. Minnesota State Capitol: A Comprehensive Preservation Plan and Implementation Strategy. 1984

Previous Projects:

Any project that involves remodeling will include doors and hardware. The examples here cited focus on doors and hardware to an unusual level.

2000 Project: ADA Hardware and Accessibility improvements.

Miller Dunwiddie and Associates

See Appendix for drawings, project manual.

Project: State Capitol French Door Replacement

HGA Architects Engineers and Planners and Schooley Caldwell Associates

See Appendix for drawings



3.8.2 Windows and Window Hardware Summary: Background:

The original wood windows in the Capitol were removed in 1974 and replaced with Aluminum windows. Only four original windows remain in the Capitol, all in the Attorney General's office. The Aluminum windows were removed in turn in the 2012 Window Restoration project and replaced with Wood windows built to match the originals, using the four surviving windows and the original drawings as a guide.

The original frames were still in place, as the Aluminum windows had been installed within them, rather than in the rough opening. The internal pulleys, weights and hardware that balanced the windows had been removed. The original frames were restored or replicated depending on their condition.

The new windows duplicate the originals in hardware but not operability: Due to security and energy concerns, they have been fixed closed, though they could at any time be made operable if policies were to change.

The window glass is a modern double glazed window with a low-e coating. It replaces the thermally broken double glazed system that lacked a coating from the 1974 replacement. The original windows would have had only a single pane of plate glass between 5/32 to 10/32" thick, depending on its size.

Most of the original interior windows and glazing is intact. The most notable instance of loss of glazing is in the Elevators, who's front was originally totally glazed. The specifications call for this glazing to have been 'AA' double thick plate glass with one side ground for vision protection. The specifications call out this sort of glass for all interior doors and windows within 8' of the ground.

The Capitol also contains three examples of Glass Flooring: the Capitol Rotunda and two stair landings at the Senate Gallery Access stairs. The Rotunda glazing is specified to be 1" unpolished plate glass while the landing glass is 3/4". The frame at the Rotunda is brass.

Material Catalogue

Double Hung Wood Windows: These windows were equipped with lead or iron counterweights and pulleys with chains for both the upper and lower sash, so that they could be moved independently. There are 18 different types of double hung windows: See next page for types.

Storm Windows: The Capitol was equipped with removable storm windows as part of the WPA projects of the mid thirties. These were intended to be put up during the winter months for added protection and savings to the heating bill. In practice, this was a great deal of labor, and historical pictures show that it was rarely done. The renovation did not replace the storm windows. Where the two original windows remain, new, permanent storm windows were added that resembled the historic ones. The original specification describes the storm windows, but MHS records say they were not installed until the WPA projects. It is possible they were omitted from the original construction as a cost saving measure.

French Doors: See Door section.

Drum windows: These are the windows on the upper part of the rotunda, above the third floor roof but below the actual dome. There are twelve of these windows. They had been replaced in 1973, and again in 1988¹ and most recently in 2012. Unlike other windows on the Capitol, these were originally steel windows with copper cladding. They also had one operable lite each. Replacement windows failed in turn, probably due to failure of sealant, poor detailing of the corner joint, and failure of technology. These were replaced with modern thermally broken insulating windows in 2012. Decorative 'acorns' at the junction of the mullions were reused. See following pages for more information.

Interior Windows:

There were no original interior windows, except where part of a historic door, frame, transom or elevator door. See door and frame types for more information. See Summary above for glass flooring.

Skylights:

See Roofing and Waterproofing Section 3.7

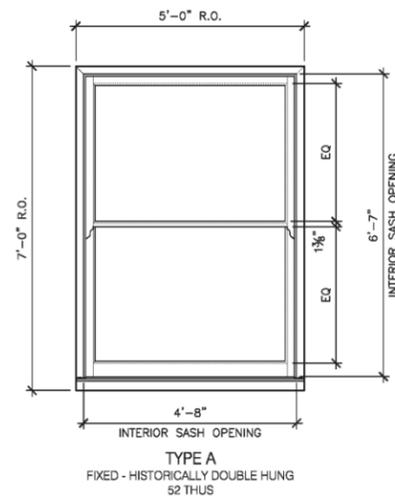
¹ HGA Architects Engineers and Planners and Schooley Caldwell Associates, "Minnesota State Capitol Drum Window Review," 2011



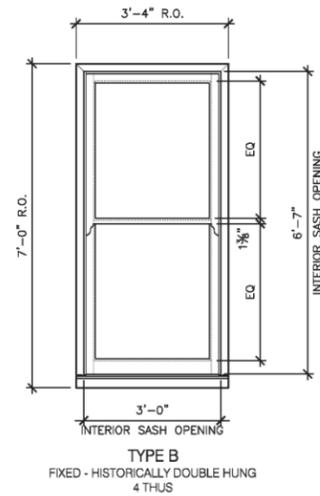
Section 3.8.2
Windows and Window Hardware
Historic Structures Report

Minnesota State Capitol Restoration
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Architectural Integrity. Building Functionality. Life Safety

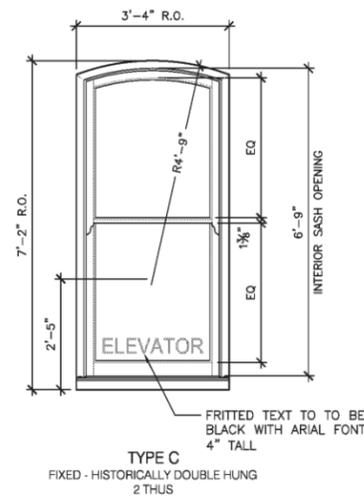
Window Type A: Used at offices on the Ground floor.



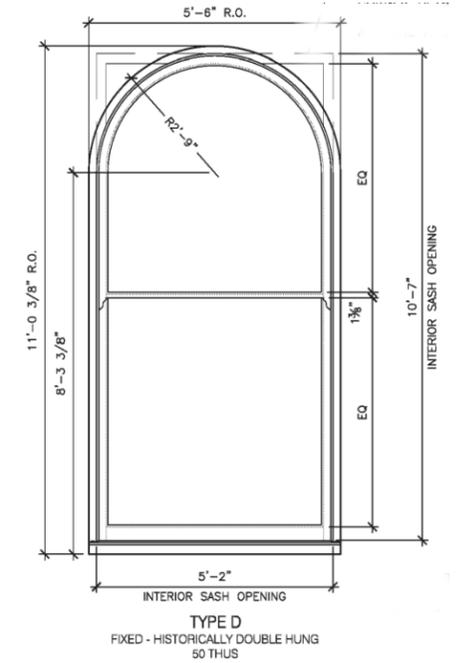
Window Type B: Used only at the stairs of the Ground floor.



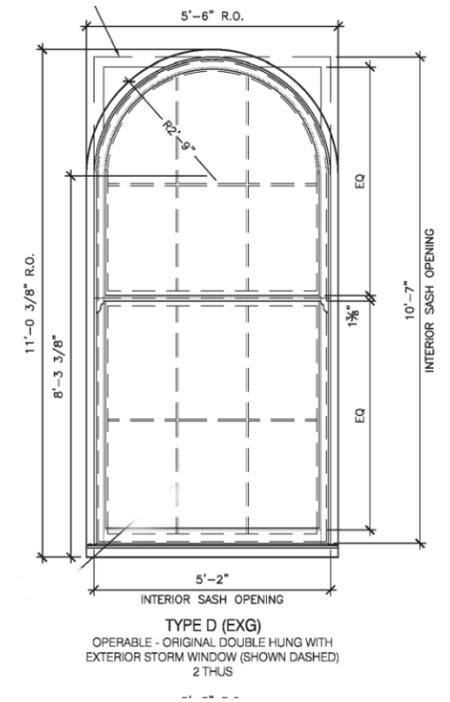
Window Type C: Lights the Elevator Shaft.



Window Type D: Used at Offices on the First floor.

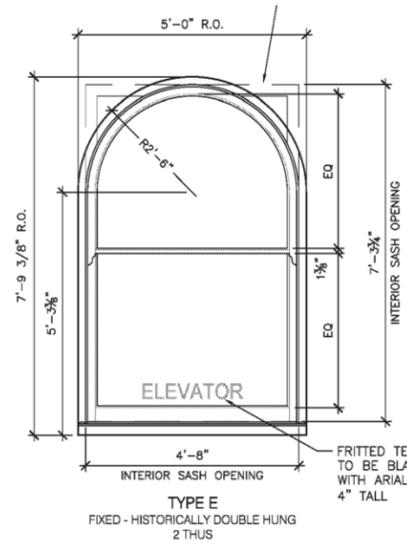


Window Type D (EXG): The two remaining original windows, restored and protected by a new storm window.

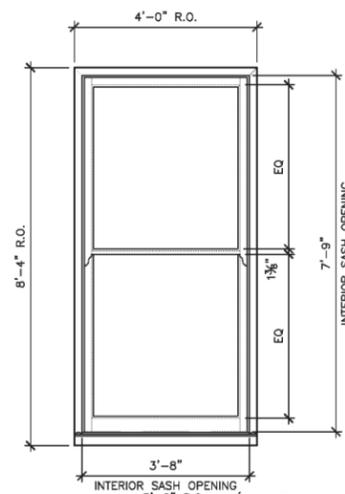




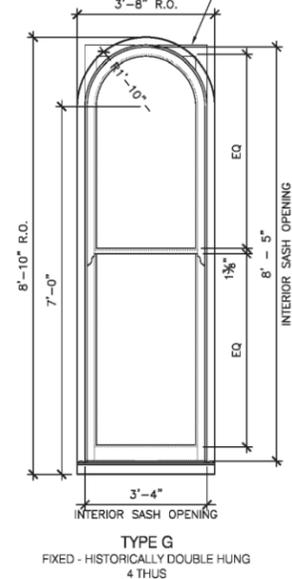
Window Type E: Elevator at the First floor.



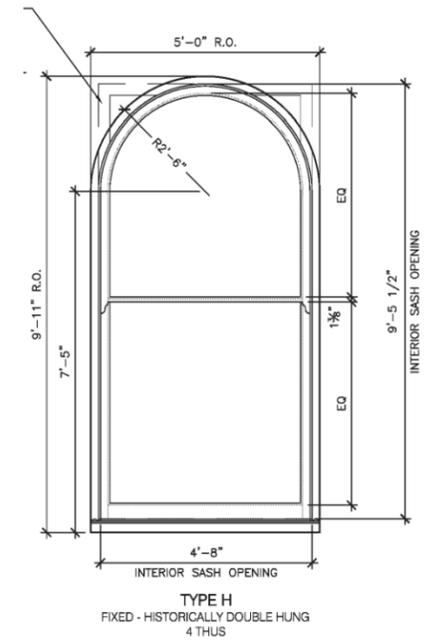
Window Type F: At toilet and opposite office on First floor.



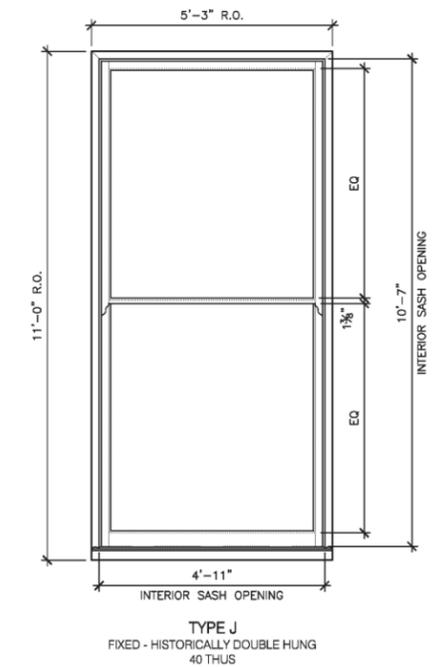
Window Type G: At minor stairways on First floor.



Window Type H: Used at offices adjacent to Rotunda on the First floor.



Window Type J: Used at Second floor offices.





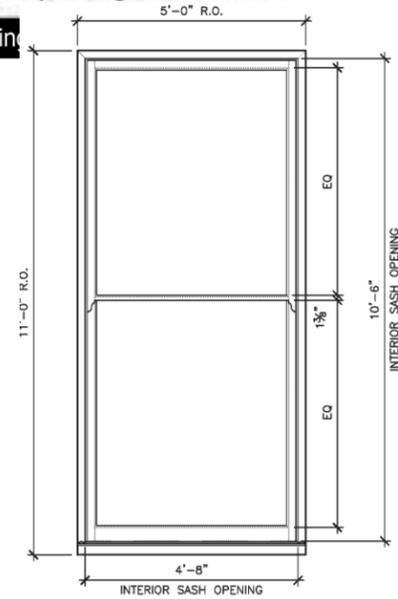
**Section 3.8.2
Windows and Window Hardware
Historic Structures Report**

Minnesota State Capitol Restoration

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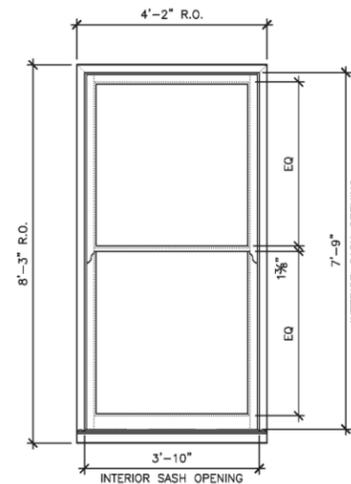
Architectural Integrity. Building

Window Type K: At north end of north wing on Second floor.



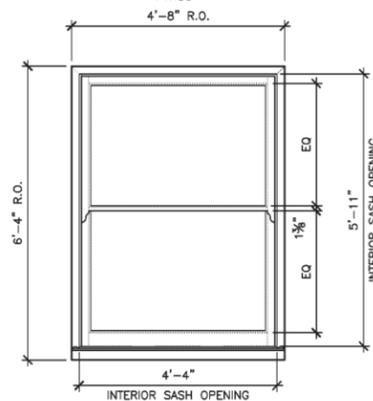
TYPE K
FIXED - HISTORICALLY DOUBLE HUNG
4 THUS

Window Type O: Used at minor stairs on Second floor.



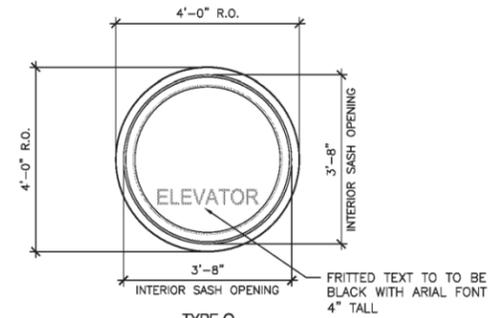
TYPE O
FIXED - HISTORICALLY DOUBLE HUNG
4 THUS

Window Type P: Used at Third floor offices.



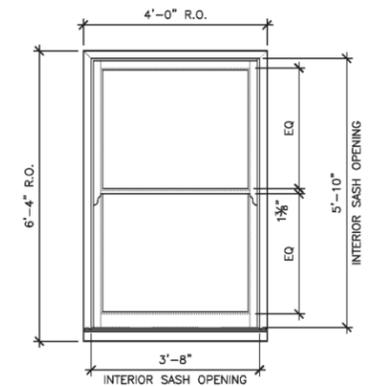
TYPE P
FIXED - HISTORICALLY DOUBLE HUNG
50 THUS

Window Type Q: Used at the elevator shafts on the Third floor.



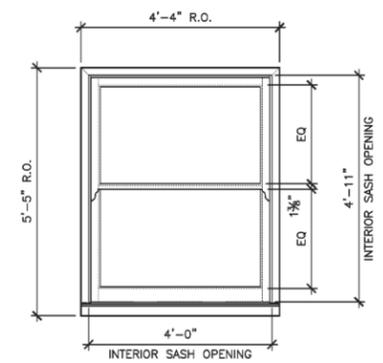
TYPE Q
FIXED - HISTORICALLY FIXED

Window Type R: Used at the north end of the north wing on Third floor.



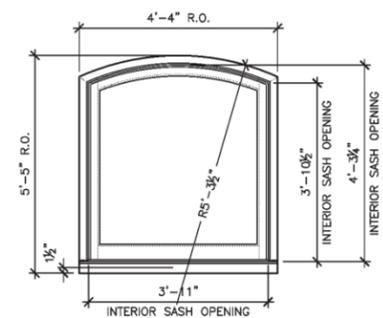
TYPE R
FIXED - HISTORICALLY DOUBLE HUNG
2 THUS

Window Type S: Used at the north end of the north wing on Third floor.



TYPE S
FIXED - HISTORICALLY DOUBLE HUNG
11 THUS

Window Type T: Used at Third floor Dome corridor.



TYPE T
FIXED - HISTORICALLY CASEMENT
3 THUS



Long term durability of replacement materials.
Modern energy codes and historic materials.

References

Additional Materials

Gilbert, Cass. "Specifications for the New Minnesota State Capitol Building, St Paul Minnesota." Minnesota Historical Society, Capitol Site. 1897-1903. "Painting and Glazing." "Woodwork."

Previous Projects

Ca 1934
Project: WPA Projects. L.A Johnson, Capitol Custodian.
No drawings available.

1974
Project: Window Replacement and Renovation Work. Rieke, Carroll, Muller Associates.
See appendix for drawings.

1983
Project: Glazing Replacement
Department of Administration
See Appendix for drawings.

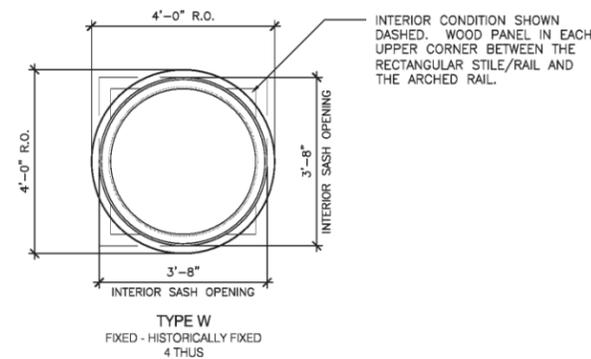
2012
Project: State Capitol Window Replacement. HGA Architects Engineers and Planners and Schooley Caldwell Associates
See Appendix for drawings

Project: State Capitol Drum Window Replacement
HGA Architects Engineers and Planners and Schooley Caldwell Associates
See Appendix for drawings

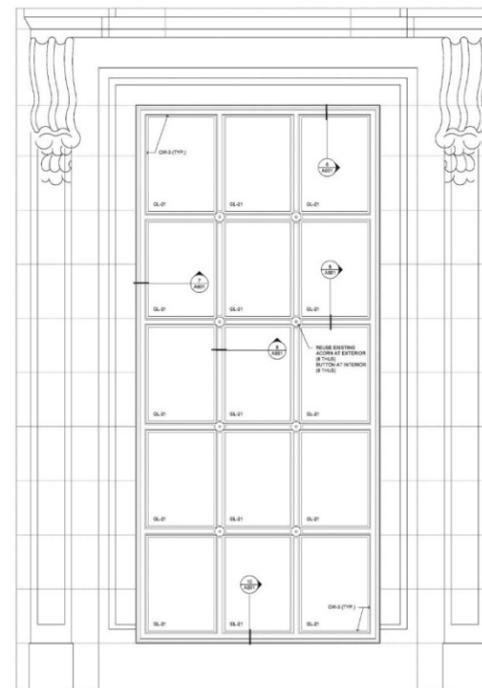
Previous Studies:

2011
Minnesota State Capitol Drum Window Review
HGA Architects Engineers and Planners and Schooley Caldwell Associates

Window Type W: Used at minor stairs on Third floor.



Drum Window: This is a thermally broken insulating window. Note that it is not to the same scale as the other windows here. Window dimensions are 8'-0" x 3'-8"



Construction Issues

Balancing the desire for operability with energy and security concerns.
Protecting the remaining original windows in a historically appropriate fashion.

MINNESOTA STATE CAPITOL
HISTORIC STRUCTURES REPORT
SECTION 3.9

FINISHES



3.9.1 Plastering

Summary

Plaster is the most common original wall and ceiling finish, and decorative plaster is also very common in the Minnesota State Capitol. Most of the existing plasterwork is original, or a recreation of the original, as subsequent renovations generally used drywall and acoustic ceilings in lieu of plaster.

Original plaster is applied to metal lath, or directly on masonry walls.

Note: Information from the original drawings is particularly lacking when it comes to plaster. Many of the drawings are missing, and several that do are contrary to what exists in the field. Drawings of plaster details and profiles or shop drawings of the same seem to be lacking. Previous studies seem to have focused on the decorative painting of the plaster surfaces, rather than the profiles of moldings. For more information on plaster profiles, research at the NYHS or field investigation is required.

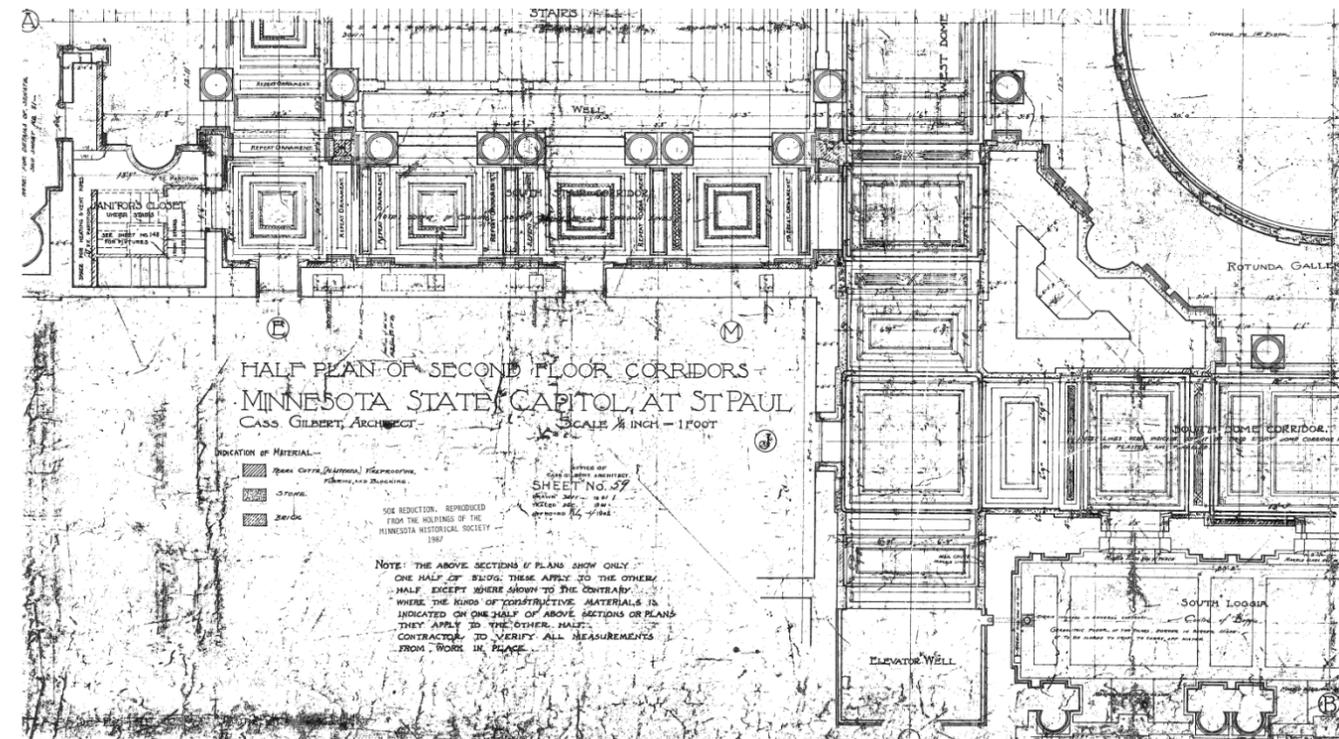
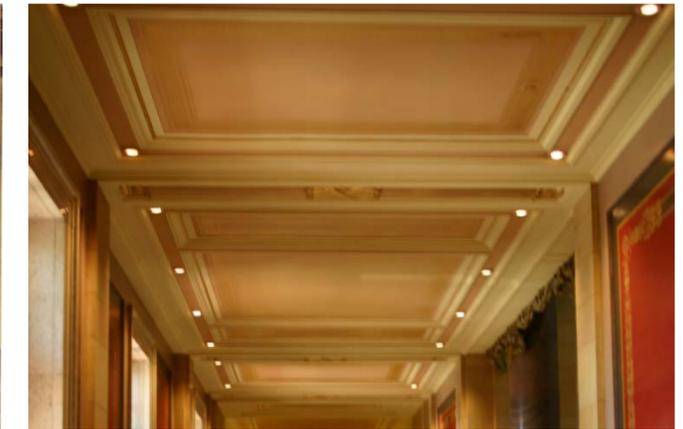


Photo Credit: Ulrich, Joan. "Furnishing Plan Report." 1994



The plan to the left shows the Second Floor Ceiling, and the photograph shows it installed. These plans at least are true to what was installed. Details are missing, and the floor details on the same page do not seem to be correct.

Material Inventory

Typical Plaster: Plaster finish was applied to standard expanded metal lath in the standard three layer process: scratch coat, brown coat and finish coat. The specifications called for the scratch coat to include fibers from jute or oxbair to strengthen it. This reinforcement was omitted when plastering walls. The final coat was to be 'hard finished' with a layer of lime putty, plaster of paris, and marble dust.

Ornamental Plaster:

Typical offices were specified to have no ornamental plastering; only plain plaster on its walls and ceilings. Office rooms on the first floor and the retiring rooms of the Supreme Court, House, and Senate all were to have a plaster cornice. (this specification is at odds with drawings from the 1968-1972 TKDA renovation. Interior elevations show that cornices exist in second floor offices, but not first) In addition, ornamental plaster was called for the second story minor corridors, vaulted ceilings over to the grand staircases, the rotunda, with its walls, arches, cornices, panels and pilasters, including the underside of the dome, the dome corridors, the Senate, House and Supreme Court chambers, and the House, and Supreme Court lobbies, House (oval) staircase, and the Governor's reception room are specified to have ornamental plaster. The caps of all columns in the House, Senate, Supreme Court chambers, as well as the columns in the rotunda and other public areas, are also all plaster.

Plaster cornices are called out to be run in place rather than prefabricated and attached. Ornamental items were molded and applied.



**Section 3.9.1
Plastering
Historic Structures Report**

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Each major space has its own unique plaster profiles, which have not been thoroughly documented. Fortunately, few of these spaces has been fundamentally altered. What has been lost is the decorative plaster cornice that was called out for first floor office spaces.

Keene’s Cement: This material is specified for high traffic areas, such as the house stair, Senate and Supreme Court chambers, galleries and lobbies. This is a high strength plaster with added alum. This is specified to be at least 1/8” thick in all applications, and replaced the ‘hard finish’ above.

Plaster Condition

Interior Plaster has been damaged several times due to problems with water damage. This has been especially a problem in the dome and the dome corridors of the third floor.

Dome: As early as 1912, plaster in the dome had deteriorated to such an extent that one of the murals fell off the wall.¹ (Murals in the dome are painted on canvas which is adhered to the plaster) This provoked a series of restoration efforts that culminated in 2010 with the Dome Repair Project. Over the course of this project, large amounts of plaster was restored. In addition to the water damage, a strip of plaster was removed, including decorative elements, in order to install a new rain leader. This plaster was restored to its original condition afterwards.



Dome Corridors: Plaster in the Dome Corridors was also recently restored. Widespread cracking and delamination had threatened this area, but enough of the existing material remained in good condition for the decorative painting to be studied and replicated in restored areas. Photo Credits: Conrad Schmitt Studios, inc. Photos show ceiling during restoration.



Vestibules: First floor vestibules also show signs of plaster deterioration, possibly caused by water intrusion. Both the East and West vestibules show such signs, but have not been thoroughly investigated.

Grand Staircases: There is some plaster damage visible in the Grand Staircases. The Oval stair has several patches in its underside where plaster has delaminated and fell, revealing the substrate. It is important to note that this is one of the direct applications of plaster to masonry substrate, with no metal lathe. There is also a similar case in the west grand stair, between the ground floor and first floor. These have not been investigated for causes.

¹ Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.



The Oval staircase also shows some signs of cracking on the decorative plaster surrounding its skylight. Further investigation is required to determine whether this is a problem with the plaster, perhaps caused by water infiltration through the skylight, or if it is merely paint cracking. It is also important to note that this was detected only because a person can get close enough to the skylight to see it at the Oval Stair. An examination of the plaster surrounding the other major skylights is recommended.

Traffic and Incidental Use Damage: There is considerable damage throughout the Capitol from traffic. Plaster is most affected in the following locations:

Ground Floor Corridors,

1. Door casings. The casings on the ground floor corridors are plaster rather than stone, as on the other floors. These have suffered some damage from traffic.
2. Temporary Space Adaptations. The ground floor corridors have been the default location for overflow offices for much of the Capitol's history. Walls should be inspected and restored for damage caused by incidental use.

First Floor, North Corridor.

1. Heavy Use. This area of the Capitol is frequently used as a display area. Its walls and niches show signs of heavy use, especially at corners, which are frequently battered.

Third Floor, Dome Corridors.

1. The plaster column capitals. These are within reach of people here, and show signs of staining and occasional damage.
2. Water damage in this area has also been noted.
3. Temporary Space Adaptations. This area is another which has been and continues to be used for temporary offices and storage space.

Plaster Restoration Materials

Materials used in plaster restoration in recent projects, besides replacement plaster, include the following:

Glass Fiber Reinforced Gypsum (GFRG). This was used in the restoration of the dome to replace moldings and other decorative elements. Casts were made of existing profiles and these were replicated in GFRG.²

² HGA Architects Planners and Engineers and Schooley Caldwell and Associates. "Specification Section 09723 Glass Fiber Reinforced Gypsum." 2010.



Applications

Decorative plaster is very common in the Capitol, especially in the public areas, but most opulently within the Senate, Supreme Court and House chambers, and retiring rooms, and also the Governor’s Reception room. Decorative plaster comes in the form of decorated ceilings either in the form of false beams or false vaulting, cornices, rosettes, consoles, column capitals, and many others.



Fig. 5. Main Stair leading to ground floor, ca. 1905. MHS. no. FM6.15Cp9.



Photo by EDMUND A. BRUSH

Supplement to
The Western Architect
October, 1905

MINNESOTA STATE CAPITOL
Cass Gilbert, Architect

FIREPLACE IN JUDGES' CONSULTATION ROOM
DETAIL IN JUDGES' CONSULTATION ROOM



Justice's Office



House Laylight
Photo: Ulrich, Joan. "Minnesota State
Capitol, Saint Paul Minnesota, Furnishing Plan Report."
Minnesota Historical Society; Capitol Historic Site 1994



Construction Issues

- Lead Paint was used to paint plaster surfaces, any changes must address this.
- Choice of appropriate restoration material.
- Difficulty of access to assess plaster conditions in high areas.

References

Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.

HGA Architects Planners and Engineers and Schooley Caldwell and Associates. “Specification Section 09723 Glass Fiber Reinforced Gypsum.” 2010.

Previous Projects

1968-1970

Project: Capitol Remodelling: Phase I, II, III.
Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix. See diagrams.

1974

Project: Redecoration of the Supreme Court spaces:
Thorsen & Thorshov, Inc.
See appendix for drawings.

1986

Project: Restoration of the Dome and Lantern.
Miller Dunwiddie and Associates
See Appendix for drawings.

1995

Project: Attorney General Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings.

1998

Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction
Miller Dunwiddie and Associates
See Appendix for drawings.

2004

Project: Water Intrusion Repair
Miller Dunwiddie and Associates
See Appendix for drawings

2010

Project: State Capitol Dome Repair Work
HGA Architects Engineers and Planners and Schooley Caldwell Associates
See Appendix for drawings

Previous Reports

1988

Study: Minnesota State Capitol: A Comprehensive Preservation Plan and Implementation Strategy.
Miller Dunwiddie and Associates.

1994

Study: “Minnesota State Capitol, Saint Paul Minnesota, Furnishing Plan Report.”
Joan Ulrich. Minnesota Historical Society; Capitol Historic Site

2003

Study: Humidity Study.
Miller Dunwiddie and Associates, William B Rose and Associates.
See Appendix for Study and drawings.

2005

Study: The Minnesota State Capitol Third Floor Corridor Condition Report
Conrad Schmitt Studios Inc.
See Appendix

2009

Study: Water Infiltration Report
HGA Architects Engineers and Planners and Schooley Caldwell Associates
See Appendix

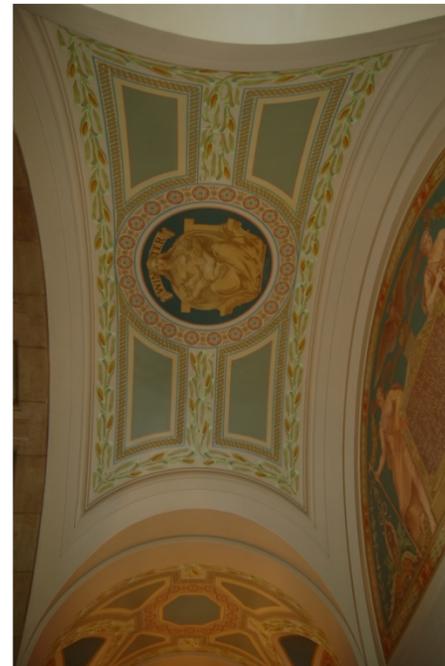


3.9.2 Painting Summary: Background:

In 1985 Robert A. Furhoff was commissioned to provide a detailed paint analysis of the Minnesota State Capitol. To briefly Summarize:

The original interior painting of the Capitol consisted of three coats of paint: a light primer coat, a darker base coat and a finish coat. The composition of the original paints are listed below.

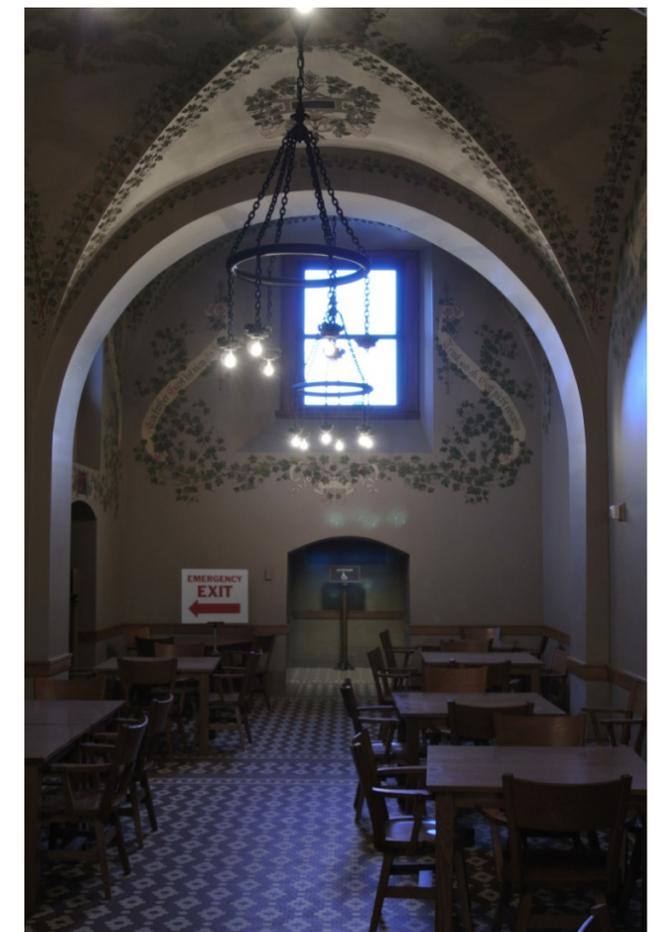
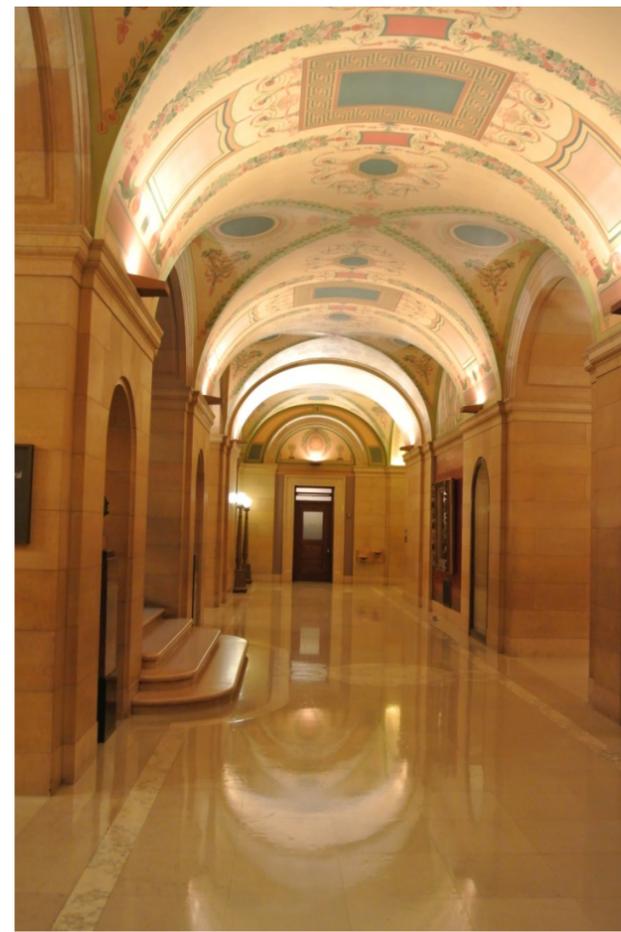
Wall areas contiguous with Kasota Stone surfaces were painted a flat matching color with no attempt to imitate the stone's texture or color variation. Walls not contiguous to stone were painted differently according to their location. Major wall panels in public corridors were treated as a single panel, with a border consisting of three alternating green, gray and green lines. The base colors for these panels was a golden tan for the ground floor, a Pompeiian Red on the first floor, and a "Pompeiiian Yellow" on the third floor. The second floor scheme is slightly more elaborate. In the Dome corridor areas, the center of the panel was the same Pompeiian Red, but it was surrounded by a wide brown border with an orange stripe. The original border was painted with an impasto technique that added texture to border. This in turn was surrounded by a raised plaster area that was painted purple. The corridors adjacent to the Grand Staircases followed the same pattern, with an additional plaster panel surround, around the purple band, which was grey in color. Walls in vestibules on the ground floor had their panels divided into two sections, a lower section two feet off of the base with the panel beginning above that. Minor corridors were painted a single color, a grayish pink.



Ceilings are either plain or contain a decorative paint embellishment. On the ground floor, Guastavino vaults were originally unpainted. Flat surface ceilings were off-white. The decorative painting in the Restaurant (Rathskeller) has recently been restored to its original condition.¹ On the first floor, the vaulted ceilings of the Dome Corridors have their original color and decorative painting. These show signs of minor staining and streaks. The second floor ceilings in the corridors also are original, though the outer bands have been overpainted in a slightly darker shade than original, and the moldings were overpainted in a slightly different white color. The third floor ceilings have been overpainted in a color and style that matches the original in color but not in quality.

Furhoff divides the different states of repainting into three categories:

1. High quality redecoration that occurred in the 1920s. These areas were undecorated in the original scheme, and were subsequently decorated according to the same patterns and artistic standards. These areas include the ceilings of the vestibules of the first floor. Throughout his reports, this is referred to as 'second period decoration.'



¹ Miller Dunwiddie and Associates, "Cafeteria/Kitchen Renovation & NW Terrace Reconstruction" 1998



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2. Other redecoration that occurred early, and is sympathetic to the original decoration, but is not of sufficient quality to be considered for preservation over the original. This includes the rotunda walls on the first floor as an example.
3. Recent redecoration that attempts to reproduce the original. This varies in quality from the very successful, such as the north corridor of the first floor, to the less successful changes to the Senate Lobby.

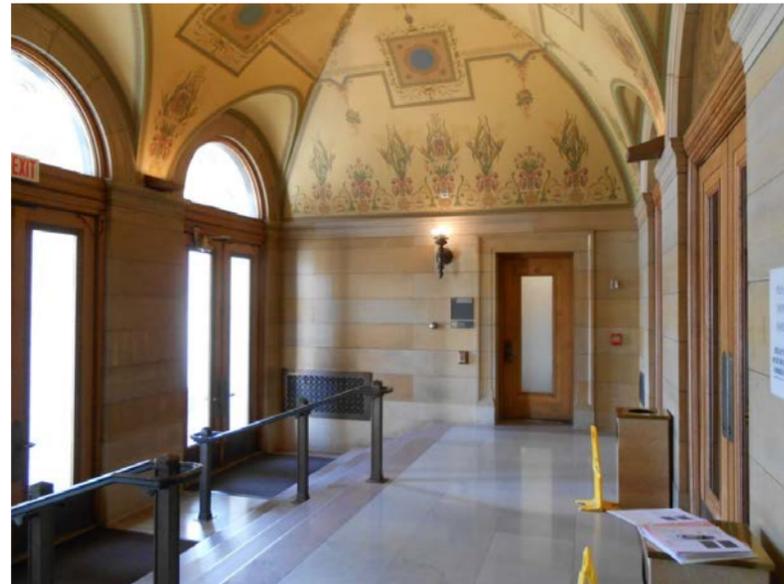
He further categorizes three problems with age or repeated maintenance causing drift from the original design intent:

1. Painted areas no longer match the stone in the way they were intended to.
2. Wall panel colors have changed in hue or have become darker, due to overpainting or wear to the finish coat.
3. Panel borders changing in profile, color or location due to lack of care during repainting.

In addition he singles out as a serious problem of damage to the plaster which necessitated the overpainting of decorative painting, with the resultant loss of the decorative character of the original. The best example of this is in the vaults above the Dome Corridors on the third floor.

Detailed analyses for the Chambers and Governor’s Reception rooms are also included in the report.

For more information and color specifications, see “Evaluation of Painted Surfaces and Original Decoration: Minnesota State Capitol,” Robert A. Furhoff. Restoration of Interiors. 1985 with addendum dated 1989.



Material Catalogue

Original Painting Materials

The specifications call for the following materials to be painted:

Exterior Painting:

All exterior doors, sashes and frames, whether of wood or iron, and any other exterior exposed woodwork. (excepting the copper covered doors and frames and wood doors to be varnished). Three coats of Lead and Linseed oil paint were to be used. Painted exterior door frames are in poor condition, with the paint visibly peeling. See appendix for paint analysis.

Interior Painting:

Wood: The same specification applies to interior window sash. The three coats were to be slightly different colors ‘as directed by architect.’ Doors and frames in the Basement were also to be painted, unlike wood doors elsewhere in the building, except for the restaurant areas, which were to be the same standard as upstairs. This paint was to be composed of ‘lead, zinc oxide, linseed oil and turpentine,’ on account of the doors being pine rather than oak.





Plaster: Typical application is a three coat system of primer, base coat and finish coat. The primer was ivory in color, and the base coat was generally darker than the finish coat. For architectural features such as column capitals, arches, cornices, etc, all layers were of similar color, with color matching the Kasota Stone. However, over time the stone and paint have aged differently, causing their colors to diverge.

Guastavino Tile: The vaulted ceilings on the Ground Floor were originally unpainted.²

Ferrous metals: Interior and exterior ironwork were to be painted with four coats of lead and linseed oil paint, as above.

Decorative Painting. Only the vaulted first floor ceilings, the second floor corridors around the dome and the Governor's reception room had original decorative paint in 1905. More decorative painting was added over time. The painting at the east and west first floor vestibules, the side corridors to the house chamber, and the walls and ceiling of the house lobby was added sometime in the twenties.³

The third floor was originally decorated with a leaf motif which originally would have been flat and stylized had a more naturalistic leaf painted over it. For this reason, a number of investigations were commissioned to determine the original state of the decorative painting, and its results are included in the appendix to this document. The Minnesota Historical Society retains the original paint chips included with the study.



Gilding: Found on the Second floor corridors, the House, Senate, and Supreme Court lobbies, the Governor's Reception and Anteroom, House, Supreme Court and Senate Chambers. All areas covered in gold leaf are original and have not been substantially altered.

Aluminum leaf: Used as an accent on the cornices in the House Chambers, it is covered with shellac to give it a goldish appearance.⁴ This should not be confused with real gilding, which is present throughout the Capitol.

Staining and Varnishing: Interior oak, which comprises most interior woodwork, except for the pine in the Basement and mahogany in the Governor's suite, was to receive three coats of varnish. The varnish was identified as manufactured by the Twin City Varnish Company. The mahogany received the same varnish, while the pine was painted (see above).

New Painting Materials:

Modern painting projects usually specify a latex eggshell finish paint. The paint colors included in the Furhoff study are modern colors available in any sort of modern latex or epoxy paint.

Construction Issues:

1. Determining the era of painting to restore to.
2. Achieving correct color. This issue is complicated not only by the difference in paint available now versus paint available at the time, but also because some paint colors were originally selected to match other materials, for example, the Kasota stone, which has darkened over time. Which color should be matched, the original paint, and the original stone, or the stone as it is now?
3. Moisture issues.
4. Lead paint encapsulation/abatement for all new penetrations and openings.

References

Previous Projects

Virtually every interior project would include some painting. Projects where painting is of particular importance include:

1974

Project: Redecoration of the Supreme Court spaces:
Thorsen & Thorshov, Inc.
See appendix for drawings.

⁴ Ibid "House Chambers"

² Furhoff, "Evaluation of Painted Surfaces and Original Decoration: Minnesota State Capitol,"

³ Ibid.



Section 3.9.2
Painting
Historic Structures Report

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1986

Project: Restoration of the Dome and Lantern.
Miller Dunwiddie and Associates

1988

Project: Restoration of the Senate Chambers.
Miller Dunwiddie and Associates

1989

Project: Restoration of the House Chambers.
Miller Dunwiddie and Associates

1990

Project: Supreme Court Restoration. Miller Dunwiddie and Associates
See Appendix for drawings

1998

Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction
Miller Dunwiddie and Associates
See Appendix for drawings.

Previous Studies

Robert A. Furhoff. "Evaluation of Painted Surfaces and Original Decoration: Minnesota State Capitol," Restoration of Interiors. 1985 with addendum dated 1989.

Conrad Schmitt Studios Inc. "The Minnesota State Capitol Third Floor Corridor Condition Report" 2005

Additional Materials

Gilbert, Cass. "Specifications for the New Minnesota State Capitol Building, St Paul Minnesota." Minnesota Historical Society, Capitol Site. 1897-1903. "Painting and Glazing."



Section 3.9.3 Other Flooring

Summary:

See Section 3.4.1 Stone Masonry for Stone floors.

See Section 3.6 Wood for Wood floors.

See Section 3.3 Concrete for Concrete floors.

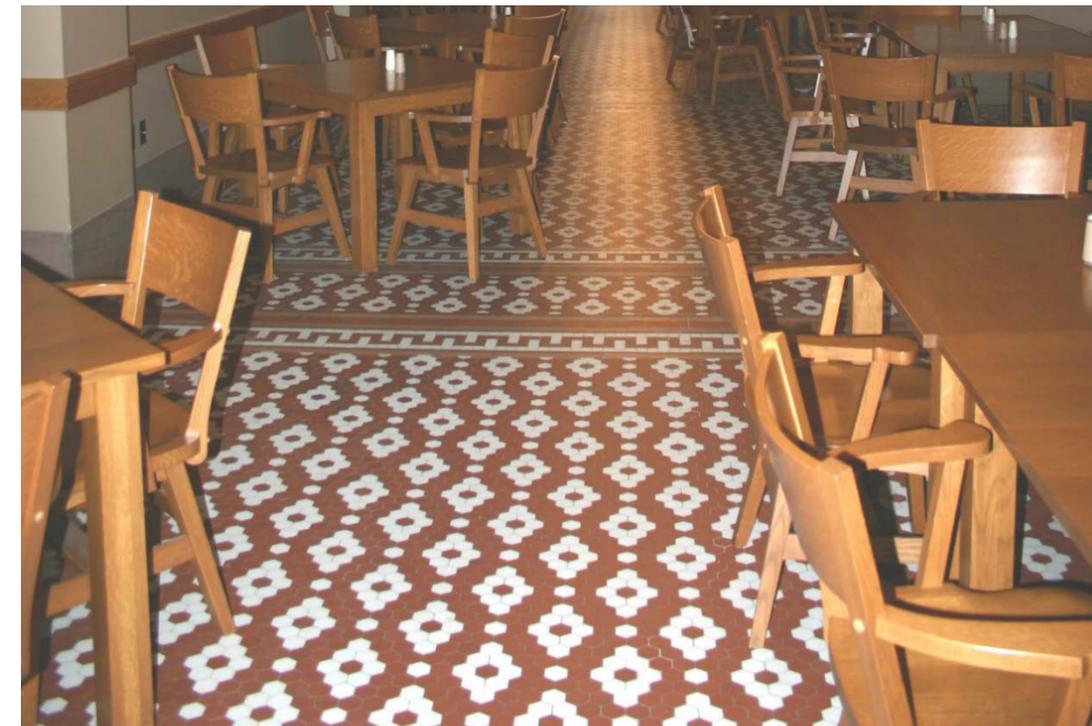
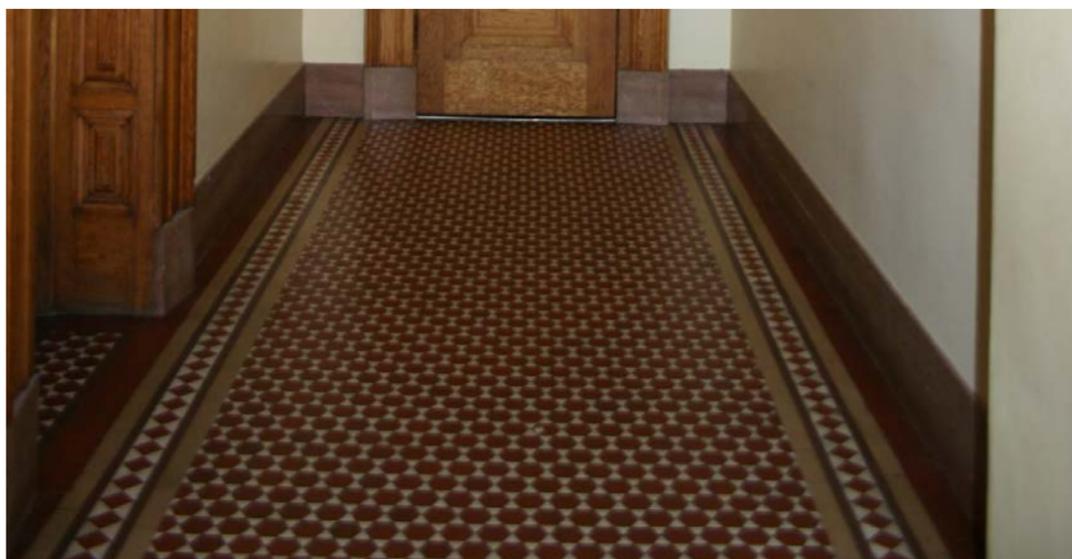
See Section 3.8.2 Windows for Glass floors.

The remaining types of original flooring in the Capitol are Tile, Terrazzo, and Carpet.

Tile floors were original to the Minor corridors, the third floor mail room, and the Rathskellar. Terrazzo floors were not common, they are found in the former Justice's restrooms on the second floor. (now AV room, and Server room) Carpeted floors were uncommon in the original Capitol, but now are very common. The Senate and the Supreme Court chambers were originally carpeted, but the House chamber was not.

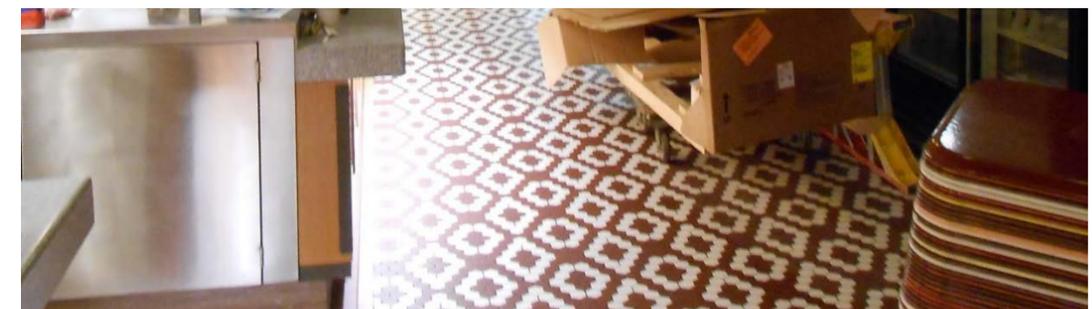
Material Catalogue

Floor tile: The original floor tile of the Capitol minor corridors is a four color pattern of 1" hexagonal red tiles, with white triangular tiles between them, with a tan, dark brown, and red border. This tile remains visible only on the third floor. Historic photos reveal that the Second floor mail room (now House office) had a similar pattern that may still exist beneath its carpet.



hexagonal ones. The same colors of tan exist in the borders between sections.

New Tile: When the North Terrace was rebuilt in 1998, the kitchen and serving area adjacent to the cafeteria/restaurant were also expanded. The floor there is also finished with tile.



The pattern is complementary to the tile in the Rathskellar, with white hexagonal tiles and red field tiles. The fact that the pattern is slightly larger and the red borders narrower differentiates the historical from the new.



Section 3.9.3
Other Flooring
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The kitchen areas are finished with a tan quarry tile, with no decoration. The other area of floor tile is the hallway leading down from the cafeteria/restaurant to the rest of the basement. The colors of this tile match the tan and red used in the original tile, adjacent, but the 6" square tile is dramatically out of scale with its neighbor. A color that is pleasant as a border may not be as appropriate as a field.



Terrazzo: This flooring material is used only in two rooms. It was provided by the Drake Mantel and Tile Company of Saint Paul. It is two inches thick and composed of "Italian [and] Tennessee Marble."¹ No new terrazzo has been added to the Capitol.

¹ Drake Mantel and Tile Company. "Letter to Cass Gilbert" Feb 13, 1903. Minnesota Historical Society Collection.



Carpeting: Three kinds of carpeting were named in the original specification: “Wilton,” Brussels and “Axminster” weaves. These were wool carpets. The Wilton was used in public spaces, the Axminster for the Governor’s private office and Supreme Court consulting room and the Brussels for other private offices.² See Joan Ulrich “Minnesota State Capitol Furnishing Plan Report” Appendix, in the Appendix for more information on historic Carpets.

The Minnesota Historical Society retains samples of the reproduction carpets used in chambers.

Reproduction Carpets exist in the Supreme Court (left) and the Senate (right).

The rug in the Governor’s reception room is not original. The House chamber was not originally carpeted, but a carpet similar to other historic carpets in the Capitol was added in 1968, when the wood floor was removed.³ The House and Senate retiring rooms were recarpeted in 1940 and 1928, respectively, and only a few black and white photos hint at what the original carpet was like.

² Ulrich, Joan. “Minnesota State Capitol, Saint Paul Minnesota, Furnishing Plan Report.” Minnesota Historical Society; Capitol Historic Site . 1994. Pg 205.

³ Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.



Newer Carpeting: Current carpeting generally dates back to whatever was the most recent renovation. For most of the office spaces, this means the mid nineties. The appearance and quality of the carpets varies, but there does seem to be a standard emerging for carpet of the Senate office spaces.

This example, in the Senate Clerk’s office, is one of the more elaborate installations. The blue field with the grid of contrasting decorations, in this case flowers, is typical. The border is not so typical. The 1989 Furnishing Plan Report concludes that original office carpets were blue with a similar pattern and a border.⁴

⁴ Ulrich. Op cite. Pg 206, 209.

Other carpet installations include the minor corridor carpeting on the third floor, that imitates the tile (that hopefully remains) below. If the tile is the same as the other minor corridor, the resemblance is fairly abstract.

Elsewhere in the Capitol, there are other kinds of carpet, though the other examples are older, and generally not as well thought out as the examples shown here. A non geometric blue gray pattern is common on the ground floor offices, and some other offices have a deep navy blue carpet. The offices in the former House gallery have a vivid green carpet.

Construction Issues

1. Carpets were laid over the tile in the minor corridors to reduce noise and echo. This will have to be dealt with if restoring the tile is desired.
2. Condition of tile beneath carpet is unknown.



References

Ulrich, Joan. "Minnesota State Capitol, Saint Paul Minnesota, Furnishing Plan Report." Minnesota Historical Society; Capitol Historic Site . 1994.

Fuller, Sherri Gebert, "Alterations Study," A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.

Previous Projects

1968

Project: House of Representatives Remodelling.
Toltz, King, Duvall, Anderson and Associates. (TKDA)
No drawings available.

1974

Project: Redecoration of the Supreme Court spaces:
Thorsen & Thorshov, Inc.
See appendix for drawings.

1985

Project: Remodel of State Capitol
Rafferty Rafferty & Associates.
See Appendix for drawings.

1987

Project: Senate Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings.

1988

Project: Restoration of the Senate Chambers.
Miller Dunwiddie and Associates
See Appendix for drawings, paint analysis.

1989

Project: Restoration of the House Chambers.
Miller Dunwiddie and Associates
See Appendix for drawings.

Project: North Wing Senate Remodelling
Miller Dunwiddie and Associates
See Appendix for drawings.

1990

Project: Supreme Court Restoration
Miller Dunwiddie and Associates
See Appendix for drawings

1995

Project: Attorney General Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings.

MINNESOTA STATE CAPITOL
HISTORIC STRUCTURES REPORT
SECTION 3.10

RESTROOM FIXTURES AND ACCESSORIES



3.10.2 Toilet Finishes and Accessories Summary: Background.

The original toilet rooms throughout the Capitol were designed with a uniform set of finishes and accessories. Over the years they have changed in the face of losses of material, needs for ADA access, and space configurations.

Material Catalogue:

Stone Flooring, Wainscot, Counters and Partitions: All stone elements in the toilets are Tennessee Pink Marble. (see section 3.4, Stone for more information) Original counters are located at 29" AFF. Counters have chrome/nickel legs and have recessed floor beneath to catch small leaks. Floors are similarly recessed at WC locations. Stone wainscot is 84" high and 1" thick in all cases. Stone stall dividers are 1 1/2" thick and stand the same 84" high. Some have 10" spaces beneath them, while some are solid full height. In general, the dividers that divide the stalls from each other have the space while those that divide them from some other function are full height.

Stone in bathrooms is in relatively poor shape, due to frequent renovations, changes in fixtures and need for new access doors.



Wood Doors: The wood doors are either original or replica four panel wood doors. They have barrel type hinges.

Metal hardware: All original hardware and other metallic items in toilets have a chrome/nickel finish. These include the hinges, latches, strikes, hooks, and other ordinary restroom accessories, but also partition support legs, and a structural pipe system above the partitions which supported the original light fixtures. Only two restrooms retain these, but most of them retain the matching stall and counter legs. There are also brackets at toilet stall dividers with the same chrome/nickel finish. Note that the original specification called for 'bronze' hardware. This was presumably changed during construction to the chrome/nickel finish.

There are several types of hinges and other hardware in evidence. Original hardware can be distinguished from replacement by its yellowish patina, which is a characteristic of nickel. Newer hardware has a much shinier finish.



Fixtures: The fixtures have been changed for new. Marks on the wainscot clearly show where original piping was located.

Mirrors: Original mirrors are 35" high, have 2" metal frames, and vary in length from 30 to 120 inches. This particular example is missing its corner piece.





Section 3.10.2
Toilet Accessories
Historic Structures Report

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Access Doors:

Most bathrooms have access doors to the pipe chase. These doors are always stone set into the wainscot panels and have visible hardware. The only original doors that remain are in the small men's room on the 2nd floor south Supreme Court Minor corridor. See picture far left. These are the full height of the panel. Other doors have newer hardware, and match surrounding panels poorly.

Modern Accessories:

All restrooms have been outfitted with modern accessories, including multi-roll plastic toilet paper dispensers, stainless steel towel dispensers, plastic soap dispensers and diaper changing stations. None of the original equivalents of these things remain.

Construction Issues

1. Matching: There have been a number of fairly obvious changes to the stone in the restrooms. Despite being the same sort of marble, it is easy to distinguish the stone installed later. The non original stone is mostly on the floors, but also on the faces of the stalls.
2. It is not likely that the original hardware can be matched commercially. Existing quantities probably insufficient.
3. Counters with their current support system not high enough for ADA.

References:

Gilbert, Cass. "Specifications for the New Minnesota State Capitol Building, St Paul Minnesota." Minnesota Historical Society, Capitol Site. 1897-1903. "Volume 3; Hardware"

Previous Projects:

1976

Project: Toilet room remodeling. Toltz, King, Duvall, Anderson and Associates. (TKDA)

See Appendix for drawings.

1992

Project: Accessibility Modifications

Miller Dunwiddie and Associates

MINNESOTA STATE CAPITOL
HISTORIC STRUCTURES REPORT
SECTION 3.11

EQUIPMENT



3.11.1 Kitchen Equipment

Summary:

In 1998, the North Terrace was rebuilt, with more space beneath it. This was put to use as an enlarged kitchen and serving area, as the previous situation was overcrowded, with half the seating area of the rathskeller having been turned to use as a serving line. The new kitchen, beneath the foundations of the North Stairs, was fitted with new kitchen equipment. With three food preparation areas adjacent to the serving lines of the cafeteria, as well as two additional prep areas in the rear, with walk in refrigerator, freezer, separate kitchen utensil and serving dishware cleaning areas the kitchen could serve the users of the building far more efficiently. Fifteen years later, the stainless steel industrial kitchen equipment appears to be in good condition. It is unknown whether any have been replaced, but they all remain in their original location as shown by the 1998 Miller Dunwiddie and Associates drawings.

Equipment schedules from Miller Dunwiddie and Associates. "Cafeteria and Kitchen Renovation." Robert Rippe and Associates, cons. 1998. Sheet K101

EQUIPMENT SCHEDULE			
ITEM #	QTY.	DESCRIPTION	REMARKS
1	8	DRY STORAGE SHELVING	
2	4	PAN STORAGE SHELVING	
3	3	UTILITY CART	
4	1	POT AND PAN SINK	
5		OPEN NUMBER	
6	1	DISPOSER W/SPRAY RINSE	
7	4	HAND SINK	
8	1	WALL SHELVING	
9	3	CATERING CARTS	EXISTING/RELOCATE
10		OPEN NUMBER	
11	1	VEGETABLE CUTTER	
12	2	REACH-IN REFRIGERATOR, 2-SEC	
13	1	VEGETABLE PREP COUNTER W/SINKS & OVERSHELVES	
14	1	DISPOSER W/SPRAY RINSE	
15		OPEN NUMBER	
16	3	TRASH BIN	
17	2	WORKCOUNTER	
18	1	SLICER	
19	1	20 QUART MIXER W/STAND	
20		OPEN NUMBER	
21		OPEN NUMBER	
22	1	FIRE PROTECTION SYSTEM	
23	1	EXHAUST HOOD W/FIRE PROTECTION SYSTEM	
24	1	REACH-IN REFRIGERATOR/FREEZER, 2-SEC	
25	1	COUNTERTOP STEAMER, 1-COMPARTMENT	
26		OPEN NUMBER	
27		OPEN NUMBER	
28	1	RANGE W/OVEN & SPREADER	
29	1	CONVECTION OVEN	
30		OPEN NUMBER	
31	1	WORKCOUNTER W/SINK	
32	1	WALL SHELVING	
33	1	COFFEE BREWER	
34	1	REFRIGERATION SYSTEM	
35	1	WALK-IN REFRIGERATOR/FREEZER	
36		OPEN NUMBER	
37	1	FREEZER SYSTEM	

EQUIPMENT SCHEDULE			
ITEM #	QTY.	DESCRIPTION	REMARKS
38	1	ICE MAKER W/BIN	EXISTING/RELOCATE
39	1	TRENCH DRAIN	BY DIV. 15
40		OPEN NUMBER	
41	1	SODA SYSTEM	BY VENDOR
42	6	REFRIGERATOR/FREEZER SHELVING	
43	2	MOBILE REFRIGERATOR RACK	
44	6	STORAGE SHELVING	
45	4	LOCKERS	BY GC
46	1	WALL SHELVING	
47	1	MOP SINK	BY DIV. 15
48	1	CLEAN DISHTABLE	
49	1	BOOSTER HEATER	
50		OPEN NUMBER	
51	1	TRAY DOLLY	
52	2	DUCT RISER	
53	1	DISHMACHINE	
54	1	SOILED DISHTABLE W/SCRAPPING TROUGH	
55	1	TRASH BIN	
56	1	DISPOSER W/SPRAY RINSE	
57	1	RACK SHELF	
58	3	BUSSING CART	
59	1	RECYCLING COUNTER	BY GC
60	4	RECYCLING BIN	
61		OPEN NUMBER	
62	1	CENTRAL WATER FILTER	
63	1	TRAY STAND	
64	1	DELI COUNTER/WORKCOUNTER W/SINK	
65	6	HOT FOOD WELL	
66	1	WALL CABINET	
67	1	PASS-THRU REFRIGERATOR, 1-SEC. PASS-THRU	
68	1	SERVING COUNTER	
69	1	EXHAUST HOOD W/FIRE PROTECTION SYSTEM	
70		OPEN NUMBER	
71	1	MOBILE EQUIPMENT STAND	
72	1	RANGE	
73	1	PLATE DISPENSER	
74	1	WORKCOUNTER W/HAND SINK	





Section 3.11.1
Kitchen Equipment
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EQUIPMENT SCHEDULE			
ITEM #	QTY.	DESCRIPTION	REMARKS
38	1	ICE MAKER W/BIN	EXISTING/RELOCATE
39	1	TRENCH DRAIN	BY DIV. 15
40		OPEN NUMBER	
41	1	SODA SYSTEM	BY VENDOR
42	6	REFRIGERATOR/FREEZER SHELVING	
43	2	MOBILE REFRIGERATOR RACK	
44	6	STORAGE SHELVING	
45	4	LOCKERS	BY GC
46	1	WALL SHELVING	
47	1	MOP SINK	BY DIV. 15
48	1	CLEAN DISHTABLE	
49	1	BOOSTER HEATER	
50		OPEN NUMBER	
51	1	TRAY DOLLY	
52	2	DUCT RISER	
53	1	DISHMACHINE	
54	1	SOILED DISHTABLE W/SCRAPPING TROUGH	
55	1	TRASH BIN	
56	1	DISPOSER W/SPRAY RINSE	
57	1	RACK SHELF	
58	3	BUSSING CART	
59	1	RECYCLING COUNTER	BY GC
60	4	RECYCLING BIN	
61		OPEN NUMBER	
62	1	CENTRAL WATER FILTER	
63	1	TRAY STAND	
64	1	DELI COUNTER/WORKCOUNTER W/SINK	
65	6	HOT FOOD WELL	
66	1	WALL CABINET	
67	1	PASS-THRU REFRIGERATOR, 1-SEC. PASS-THRU	
68	1	SERVING COUNTER	
69	1	EXHAUST HOOD W/FIRE PROTECTION SYSTEM	
70		OPEN NUMBER	
71	1	MOBILE EQUIPMENT STAND	
72	1	RANGE	
73	1	PLATE DISPENSER	
74	1	WORKCOUNTER W/HAND SINK	





References:

Previous Projects

1998

Cafeteria and Kitchen Renovation and North Terrace Reconstruction
Miller Dunwiddie and Associates. Robert Rippe and Associates, cons.



MINNESOTA STATE CAPITOL
HISTORIC STRUCTURES REPORT
SECTION 3.12

FURNISHINGS



Section 3.12.1 Furnishings Summary

Furniture:

Cass Gilbert paid great attention to the furnishings of the Minnesota State Capitol. He designed a number of pieces himself and purchased others from high quality commercial stock. The Minnesota Historical Society estimates that there are 800 remaining pieces of original furniture in the Capitol or elsewhere in the Capitol complex.¹ This is about half of the original, with the rest having been lost or removed during a century's time.

Original furniture was built by a variety of firms. Known fabricators are listed below.

Furniture Fabricators:²

Herter Brothers of New York City. (custom, ornate furniture and casework)

Marble and Shattuck Chair Company, Cleveland. (custom and regular chairs)

American School Furniture Company, Chicago (theater style seating in House and Senate galleries)

Passman & Dauere, New York (benches for public corridors)

B Burnett, New York. (settees for the Supreme Court)

Hajek Marble Company, New York. (marble benches in 2nd floor rotunda gallery)

Catok & Beller, New York. (Supreme Court, House conference tables)

F. Mohr and Company, New York. (Ornate tables)

Stillwater Manufacturing Company, Stillwater (wardrobes, sign pedestals)

Bohn Manufacturing Company, Saint Paul. (plain work tables with drawers)

Doten & Dunton Desk Company, Boston. (desks in Senate, house chambers)

Derby Desk Company, Boston (roll top desks for offices)

Grand Rapids Desk Company, Muskegon Michigan (flat desks for offices)

John Danner Manufacturing Company, Canton Ohio (revolving bookcases)

The Herter Brothers and the Marble and Shattuck Chair Company provided the majority of the pieces. Cass Gilbert himself designed the majority of furniture in prominent spaces like the Governor's and Lieutenant Governor's offices, the Senate and House chambers and the retiring rooms. Other furniture was purchased, often from the same companies that fabricated the custom furniture, to provide for the ordinary offices. Some of Gilbert's designs were more decorative versions of the off the shelf furniture.

¹ Minnesota Historical Society, Capitol Historic Site. "Attention to Detail, 1905 Furniture of the Minnesota State Capitol." St Paul, 1989.

² Ibid.

Types of furniture:

For a full listing of Capitol Furniture types, see "Attention to Detail" by the Minnesota Historical Society, in Appendix.

The following general types of furniture give a sense of what was originally included in the Capitol:

Ceremonial Chairs: These chairs are leather covered straight backed swivel chairs with an ornate carving at the top and scrolled armrests. They appear in the Senate, Supreme Court, and House with slight modifications.

Legislator desks: Each representative and senator has one in the House and Senate chambers.

Gallery Chairs: These are found in House and Senate galleries. The upholstery colors vary.

Leather Swivel Chairs: These chairs are found in the Senate and House chambers. The ones in the House are reproductions. Other, similar swivel chairs were provided in large numbers for the offices. These were generally less ornate and had lower backs.

Easy Chairs: These were provided for retiring rooms and offices.

Ornate Tables: Several types of ornate table exist in the Capitol. They are found in conference rooms and retiring rooms.

Desks: There are several types of desks and worktables in the Capitol. They came from several different companies.

Wardrobes: Once common, now nearly gone.

Couches and Settees: Found in public spaces, and in the public seating area of the Supreme Court.

Furniture Losses:

Furniture in the Capitol has suffered from a great deal of losses over the years. While some of this is the result of outright theft, much of it is the result of confusion and lack of documentation. For example, as departments moved from the Capitol to various office buildings in the Capitol complex, they often took 'their' furniture with them. The Minnesota Historical Society, Capitol Site has taken great pains to track down, document and label original Capitol furniture. Nevertheless, a great number are still missing. The



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ordinary furniture of the offices have suffered the greatest loss, for instance, more than three quarters of the 83 the common wardrobe designed by Cass Gilbert and found throughout the office spaces have vanished. Some were found in places as various as the State Office building and the Governor’s Mansion.

In 1968, the House chamber was renovated, and the original chairs were removed and replaced with matching reproductions.³

Replica Furniture Additions:

Replica furniture has been added to the Capitol at certain times. In the Supreme Court chamber, the number of Justices has increased twice, to seven and then to nine. This has required replica chairs and an enlargement of the bench. These new additions were made with such care as to be indistinguishable to the originals.

The number of desks in the Chambers was increased around 1913 by 13, and by 4 in 1959.⁴ Accessible desks were added to the House (2) in the 1989.⁵

Other Capitol Furniture:

Furniture that has been added to the Capitol varies according to its age and purpose. Very few pieces of furniture have been added to public areas of the building.

Wastebaskets: These brass topped stone waste receptacles are found throughout the public spaces on all floors of the Capitol. The stone matches the Kasota stone that is used as a finish in these spaces. They are generally unobtrusive.

Minnesota Historical Society Desk: This desk was added at some time after the second renovation from 1969-1972. Curiously, the MHS Alterations study does not include the addition of this desk.

Bulletin Boards and display cases: Several bulletin boards and miscellaneous display cases have been added to the Capitol at various times during its history.

³ Fuller, Sherri Gebert, “Alterations Study,” A study of the alterations to the Minnesota State Capitol, 1986, Capitol Historic Site, Minnesota State Capitol, Minnesota Historical Society.

⁴ “Attention to Detail” op cite. Pg 45

⁵ Fuller, op cite.

Office Furniture:

The State of Minnesota office design guidelines is currently based on a 6’x8’ cubicle for permanent employees.⁶ Systems furniture of this sort is common throughout the Capitol, mostly dating from the most recent round of Senate office Renovations. Senators generally bring their own furniture to their offices. There are no predominant standards.

References

1989. Study: Attention to Detail; 1905 Furniture of the Minnesota State Capitol. Minnesota Historical Society; Capitol Historic Site.

See Appendix.

1994. Study: “Minnesota State Capitol, Saint Paul Minnesota, Furnishing Plan Report.” Joan Ulrich. Minnesota Historical Society; Capitol Historic Site

See Appendix.

Previous Projects

1968

Project: House of Representatives Remodelling.⁷

Toltz, King, Duvall, Anderson and Associates. (TKDA)

Floor replaced, carpet added, desks modified, chairs replaced, tapestries installed,

No drawings available.

1968-1970

Project: Capitol Remodelling: Phase I, II, III.

Toltz, King, Duvall, Anderson and Associates. (TKDA)

Drawings in appendix.

1974

Project: Redecoration of the Supreme Court spaces: Thorsen & Thorshov, Inc.

See appendix for drawings.

⁶ Department of Real Estate and Construction Services. “Space Guidelines,” Minnesota Department of Administration, 2012.

⁷ Ibid.



1987

Project: Senate Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings.

1988

Project: Restoration of the Senate Chambers.
Miller Dunwiddie and Associates
See Appendix for drawings, paint analysis.

1989

Project: Restoration of the House Chambers.
Miller Dunwiddie and Associates
See Appendix for drawings.

1990

Project: Supreme Court Restoration
Miller Dunwiddie and Associates
See Appendix for drawings

1995

Project: Attorney General Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings.

MINNESOTA STATE CAPITOL
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SECTION 3.13

SPECIAL CONSTRUCTION



3.13 Terraces and Stairs

The space beneath the terraces were originally dirt floored spaces to be used as storage. They were lit by Prismatic glass panels that formed a walkable surface on the terrace level above. They were filled beyond the limit defined by the first level of stairs, but these areas were dug out converted in the 1930s WPA projects into useable spaces. The terraces suffered from water damage and were rebuilt in the as early as 1932, with most of the work happening in the 1990s. Note: the collection of construction documents are incomplete. Limits defined by the drawings at hand exclude areas that have obviously been reconstructed. It does not appear that there is any area which has not been reconstructed.

The terraces also included fresh air intakes and a structure that allowed access to the basement kitchen.

Materials

Terrace structure and paving:

Terrace Deck Construction. The Terraces were constructed of timbrel arches, like the other floors of the building. Unlike the other floors, the terrace deck was not filled in with light concrete and masonry. Instead, short walls constructed of hollow tile 18" OC were to be built up from the timbrel arch. A concrete slab spanned between that to form the walking surface of the Terrace.

Where exposed to view, as beneath the porte cocheres, a green glazed finish tile was used for the timbrel arch. See Section 3.4.2 Unit Masonry.

The best impression of the original form of construction for the terraces can be found beneath the South Stair.



Foundation: There was no substantial difference between the specifications for the terrace foundation and the building foundation, save that the contractor had the option to substitute brick for the winona limestone. The contractor used Winona limestone with brick for interior walls. Current material is poured concrete, from later replacements.



Granite cladding, ballusters and treads at stairs: Granite work did not differ substantially from the general building. No special instructions are given for granite. Of note is the inclusion of red granite as accents, which are not part of the Capitol itself. See Section 3.4.1 Stone Masonry



**Section 3.13
Terraces and Stairs
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Prismatic Lights: Referred to on drawings as ‘Prism Lights,’ were translucent floor panel, with a cast iron frame with 5 ½” x 2 ½” openings for glazing. Glazing is not specified, as a sample was provided. It can be assumed

that this is similar to the 1” heavy plate glass that forms the glazed flooring of the interior rotunda. These were operable with a worm gear mechanism. They have all been removed.

Stair Enclosure: The stairs to the kitchen had cast iron posts, treads and risers, a wrought iron rail and steel stringer. The enclosure was similarly steel structured, with a steel door and panels. A copper roof and plate glass windows completed it. This was removed and replaced at the time of the North Terrace reconstruction, 1998.

Iron conduit: this was run to supply the lights. It was waterproofed with asphalt.

Bronze Window Grilles: 4 were ordered to cover small windows to either side of South entrance steps.

Fresh Air Intakes. These took the form of three small granite kiosks on the north side of the building, and four wall openings on the south side of the building. The granite intakes are 12’ square and 5’ tall, providing a free area of approximately 80 square feet times the free area of the grille, which is not known. The one to the north west remains in place, the other two have been relocated further from the building.

Historically, the terraces suffered greatly from water infiltration, and did not prove as robust as the masonry of the building foundations themselves. The typical terrace has a three inch wearing slab over two to three inches of insulation and waterproofing, with additional drainage board, all over a six inch concrete structural slab.

See Section 3.3 Concrete.

Construction Issues

1. The fact that all terraces had to be replaced, more than once in some cases, indicates that water damage is a continuing problem.

References

Gilbert, Cass, Original specification sections, as found in the Appendix: “Excavation and Concrete Work,” “Masonry,” “Terraces and Steps” and “Concrete and Drainage.” 1902

Capitol Commission, “Fourth Biennial Report,” 1900. (Minnesota Historical Society)

Previous Projects

South East Terrace Reconstruction. 1932. C.H. Johnston. No drawings available.

North East Terrace. 1957. A. J. Nelson, (State Architect) Only one drawing remains, see Plant Management archives.

North West Terrace Replacement. 1990. Miller Dunwiddie and Associates. See State Architect’s Office for drawings.

Exterior Plaza. 1995. Miller Dunwiddie and Associates. See Appendix for drawings. (South Plaza)

Exterior Renovations. 1997. Miller Dunwiddie and Associates. See Appendix for drawings. (includes reconstruction of North East terrace.

Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction. 1998. Miller Dunwiddie and Associates. See Appendix for drawings.

South Terrace Reconstruction and Masonry Repointing. 2000. Miller Dunwiddie and Associates. See Appendix for drawings.

University Avenue Tunnel at Capitol Complex. 2012. CNA Consulting Engineers. See Appendix for drawings.

State Capitol West Plaza and Stair Repair. 2012. HGA Architects Engineers and Planners. See Appendix for drawings

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SECTION 3.14

ELEVATORS



3.14.1 Elevator Summary: Background.

The proposed number and arrangement of elevators in the Capitol changed several times during the design process. In the end, the elevators were installed in the same configuration that exist now: Two small elevators in the West shaft and one larger elevator in the east shaft.

The elevators were originally glass faced with elaborate ironwork doors and cars finished in mahogany paneling and rubber floor. These were furnished by Herter Brothers, New York, with the doors being produced by Flour City Ornamental Ironworks of Minneapolis. (Now Flour City International of Kingsport, Tennessee). Otis Elevators provided the equipment itself. They also provided 'sidewalk lifts,' which may have been the operators for the Prismatic lights on the terrace level.



Dumbwaiter: there exists one dumbwaiter adjacent to the Supreme Court. It allowed books and reference materials to be sent up to the law library from the Court. It is no longer functional.

Governor's Elevator: There is an elevator from the Governor's suite to the office suite below. Presumably, it was already in place in 1968. Date of completion unknown.

Freight Elevator: This was installed during the Second Renovation, 1968-1972.

1 Photograph of backlit elevator doors. Exact location and photographer unknown. Minnesota Historical Society



Construction Issues

1. Difficulty in replicating 1905 elevator cars and fronts. Documentation is scarce. There might be more at the New York Historical Society.

References

Original specification sections, as found in the Appendix: “Ornamental Metalwork,” “Metal Furring and Lathing.”

Previous Projects

1964

Project: Elevator installation.

Thorsen & Thorshov.

See Plant Management archives.

Freight Elevator added to North East Terrace.

1970

Project: Elevator Cab replacement

Thorsen & Thorshov, Inc.

See appendix for drawings.

Glass elevator cabs removed and replaced with opaque cars, doors and surround.

1997

Project: Elevator Renovation.

Miller Dunwiddie and Associates

See Appendix for drawings.

This upgraded the public elevators for ADA accessibility

MINNESOTA STATE CAPITOL
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SECTION 3.15

MECHANICAL AND PLUMBING



3.15.1 Mechanical Systems Summary: Plumbing Systems

Building Utilities

Domestic Water:

The Capitol is served by two 4" CW lines extended from the 16" main under University Avenue. One 4" CW line is located on the North side of the West Wing. This service was provided as part of a 1983 utility upgrade. The other 4" CW line is located on the North side of the East wing. This service was provided during the original construction of the building. Each 4" domestic water service is metered and provided with backflow prevention. The two services are interconnected inside the building. The piping is suitable for the current waste fixture loads in the building.

There are currently no water pressure booster systems. There is minimal water pressure to the fixtures at the upper levels of the building - the need for a domestic water pressure booster system will be determined as the project requirements are further defined.

Sanitary Sewer:

The building sanitary waste currently leaves the building at two locations. The primary sanitary waste is a 12" line at the South end of the West Wing. This service was installed in conjunction with a 1993 storm/sanitary sewer separation project. The secondary service is a 5" sanitary sewer line at the West end of the West Wing. This service was installed as part of a 1970 Civil Defense Operations Center remodel project.

All existing waste piping within the building footprint is in poor condition, leaking, and will be removed and replaced with new piping. New sanitary waste piping will be connected to the existing services where they transition through the exterior foundation wall or to new services provided in similar locations.

The sanitary sewer mains serving this building area adequately sized to handle the current waste fixture loads and appear to be adequate for some potential additional fixture loads. The 12"W line has capacity for 4,600 drainage fixture units or DFU (at 1/8 inch per linear foot slope). The 5" line has capacity for 390 DFU (at 1/8 in./ft. slope). The invert elevation of this line is roughly 5'-0" below the existing basement floor elevation. Any new fixture wastes that can flow by gravity into either of these two sanitary waste mains will be directly connected. Any plumbing fixture waste branch lines that cannot flow by gravity into the existing services will be routed to sewage collection sumps and then pumped up and into the sanitary sewer system. Each required sump would be provided with duplex (two) pumps.

Storm Sewer:

Four storm sewer mains currently serve the Capitol. The first is a 12" storm main at the South side of the West Wing. The second is an 8" storm main at the South side of the East Wing. The third is an 8" storm main at the north side of the east wing. The fourth main is an 8" storm main at the North side of the West Wing.

Per the latest edition of the Minnesota Plumbing Code, the 12" storm main has capacity for 33,300 square feet of roof area (at 1/8 inch per foot slope). Each of the three 8" storm mains have capacity for 11,500 square feet of roof area (at 1/8 in./ft. slope). The total capacity of the existing storm services would allow for drainage of 67,800 square feet. The roof area of the capitol is approximately 68,000 square feet. The invert elevation of the 12" storm main is approximately 8'-0" below the existing basement floor elevation. The invert elevation of the three 8" storm mains will be determined as the project progresses.

Additional plaza drains were connected to the 8" storm drain that exits the Capital building along the south side of the east wing after the original building was constructed. This additional flow may be above and beyond the capability of this 8" storm drain. A new larger 12 storm main will be required to replace this 8" main, to accommodate the additional flow from the plaza drains. The two 12" storm mains will then be combined and routed to connect to the existing main located beneath Dr. Martin Luther King Jr. Boulevard.

Fire Protection:

The Minnesota State Capitol building is served by a 12" combined water service which connects to a 16" watermain in University Avenue. This service splits into a 4" domestic water service and an 8" fire service outside of the building. The fire service enters the building on the North wall of the Northwest Wing. The combined services were provided as part of the 1983 fire protection upgrade project.

A 750 GPM, 30 HP, electric fire pump was also provided in 1983 to boost the available water pressure in order to serve the upper floor hose cabinets. The pump is connected to emergency power through a transfer switch. The fire pump is located in the basement. There is no exterior access to the fire pump room. A 3" fire protection water service was provided to the building during original construction. This original 3" fire service does not appear to be actively serving any fire protection systems. The 1983 construction documents indicate 6" fire department connection piping and 6" fire pump test header piping extending to yard connections on the North side of the building.



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A comprehensive sprinkler system was provided for the basement level and four hose cabinets were provided for each of the other occupied levels in 1983. Zoning of this system consisted of 3 sprinkler zones for the basement and one standpipe zone which served hose valves. These zones are located in the fire pump room in the Basement.

Sprinkler coverage was expanded to specific other areas as a result of projects that occurred in 1987, 1989, 1995, and 2000. Each of these projects was focused to add sprinkler coverage in limited areas, predominantly office areas, and did not provide comprehensive coverage in any wing of any floor. The ornate public areas of the building, for example, do not have fire sprinkler protection.

The fire sprinkler projects after 1983 also involved removal of hose cabinets on floor levels above the Basement. The removal of these cabinets created a situation where the majority of areas without fire sprinklers do not have adequate protection from standpipes either. A fire in any of the public or private areas without sprinkler coverage can only be suppressed by the fire department operating fire hoses. The lack of properly located standpipes or hose cabinets in the building means that the fire department, in most locations, must carry hoses into the building to suppress a fire. These hoses would need to extend to a pumper truck or fire hydrant located outside the building.

Due to the lack of fire sprinklers throughout the building and a lack of standpipes at required locations, the fire sprinkler and standpipe systems do not meet the minimum requirements of the currently adopted building and fire codes.

Natural Gas:

The only remaining natural gas service to the building is located in the recently remodeled cafeteria. This service is sized adequately to meet current and future food service needs.

HEATING, VENTILATION, AIR CONDITIONING (HVAC)

Heating Hot Water Systems:

St. Paul District Energy has provided a 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 service only serves the Capitol heating needs 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. The building secondary hot water heating loop water is heated by use of a heat exchanger that transfers the heat energy from the district hot water side to the building secondary hot water system.

The Capitol building has averaged (since 1984) a peak heating load demand of 1600 kW or about 5.5 million Btu/hr. The peak heating demand for the building occurred during the year 2003. The heat exchangers are designed to provide a maximum 90 deg. F temperature differential between supply and return water. This peak heating demand was 1908 kW or approximately 6.5 million Btu/hr.

Chilled Water Systems:

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 20" CHW service is 17,250 gpm. In 2005, the peak flow rate for the Capitol was around 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, as well as 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 should district energy fail. The chilled water backup consists of (1) 2,500 ton chiller and (3) 1,000 tons chillers.

Chilled water is piped throughout the Capitol building to the various air handling systems throughout the building. The piping is in poor condition.

Steam Humidification

There is an electric steam humidification boiler system in the basement of the building. Steam is piped from this boiler system to steam dispersion tubes in air handlers. Humidification is run on very cold days and over long extended cold periods of time only.



Air Handling Systems:

Central station air handling units (systems) 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 and also 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 very recently installed systems. Most of the air handlers respond to space located thermostatic control to provide the heating or cooling requirements of each area served. 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 large 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 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 areawells 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 – this needs to be further investigated before a determination can be made as to whether there is adequate outdoor air for economizer.

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 to recent 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.

The building has numerous decorative grilles that are used for supply, return, relief and exhaust air purposes. These are original to the building, very ornate and will not be removed. The grilles will be reused and restored to their original condition where it is possible.

There are numerous grilles and registers that are more current type and style that are not intended to be used for the renovation.

The control systems are pneumatic throughout. There are some original thermostats and covers still in use.

There are perimeter hot water finned tube radiation systems under windows, most of them enclosed within sheet rock or wood enclosures. There are grilles to allow warm circulation air into, through and out the top of the enclosures to warm the window surfaces.

There is a House media room that has servers within the room. This room is very warm. There is House air supplying this room. There is an old computer room cooling unit that supplies this room, connected to condenser water piping from a dry cooler on the roof. This unit is no longer working and has been disconnected.

References:

Previous Projects:

1954

Project: Pothead Project: Kinney Electrical
No drawings available

1964

Elevator installation
Thorsen & Thorshov
See Plant Management archives



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1968-1970

Project: Capitol Remodelling: Phase I, II, III.
Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix
See diagrams

1970

Project: Elevator Cab replacement.
Thorsen & Thorshov, Inc.
See appendix for drawings.

1976

Project: Toilet room remodeling
Toltz, King, Duvall, Anderson and Associates. (TKDA)

1983

Project: Fire Protection
NewMech Companies
See Appendix for drawings
Basement Sprinkler added

1989

Project:
Chiller Replacement.
Gausman & Moore
See Appendix for drawings

1990 Project: Supreme Court Restoration

Miller Dunwiddie and Associates
See Appendix for drawings

1993

Project: Fire management System Renovation
Miller Dunwiddie and Associates
See State Architect's Office for drawings

Project: Sewer Separation

Amberger Associates
See Appendix for drawings

1998

Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction_Miller Dunwiddie and Associates
See Appendix for drawings

2005

Project: Heating System Upgrade
LKPB Engineering
See Appendix for drawings

2010

Project: State Capitol AHU #26 Replacement
HGA Architects Engineers and Planners
See Appendix for drawings

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SECTION 3.16

ELECTRICAL, LIGHTING AND TELECOMMUNICATIONS



3.16.1 Electrical Systems Summary

Background:

The Minnesota State Capitol marked two major milestones in terms of its electrical systems. It was the first building in Minnesota to be electrically lit throughout. It accomplished this with direct current (DC) power generated from the mechanical/electrical plant that was connected to the Capitol by tunnel, and distributed in cast iron conduits. Second, with the WPA projects in the 1930s, it was the first state capitol to install electronic voting systems for both the House and Senate.

Over time, DC was changed to AC (alternating current) in 1954, and the Capitol has had a number of significant changes to its electrical systems since.

Electrical Systems Summary

Electrical Systems

The Minnesota Capitol is currently served by two (2) 1000 KVA; 13.8kVolts/208Volts double ended substations located in underground switch rooms on the north side of the building. The substations are fed at 13,800 volts from two (2) circuits off of the campus primary grid. The power is stepped down to 208Y/120 volts which is subsequently distributed throughout the Capitol for power to mechanical equipment, lighting and general power. The existing substations are in good working condition and could be reused in the updated service if necessary. However, it is not recommended that the 208V substation be reused if the service is upgraded to a 480V substation system. Reusing the existing substations provides minimal benefit, if any at all. Reusing them would require increased feeder sizes and increase the cost of the project due to the increase in the amount of copper conductors necessary to modify existing distribution within the building.

It has been determined that the existing load profile of the building is approximately 1 megawatt. This means it is feasible to operate the building with only one substation. This would allow one of the existing electrical switch rooms to be converted to other usable space. It is recommended that the East switch room be kept as the primary electrical room if one switch room were to be converted. The East switch room provides the most flexibility for electrical modifications and additions due to its larger size.

Primary Service

Two (2) feeders from the campus primary circuits with radial feeds to each end of the double ended sub stations. Each primary feeder will terminate into each end of a double ended substation. Each primary switch is a 600 ampere, load interrupting, medium voltage switch (MVS). Primary fuses are current-limiting type 175A. Station class surge arrestors rated 9kV MCOV are installed on the load side of the primary switches. Existing primary switches will be maintained and reused to feed existing or new substations as they are reconfigured.

Normal Distribution and Power

Many of the existing electrical panels are not located in designated electrical rooms. Most electrical panels are located in spaces where code and OSHA required working clearances have been violated due to storage. The existing 208Y/120 volt distribution system throughout the building could remain in place and be utilized to maintain or extend the existing distribution system. Again it should be noted that any major renovation which would require moving existing distribution equipment from these substations could add a significant amount of cost due to the additional copper feeder required at this voltage compared to a 480 volt system. Many of the existing distribution system panel boards are in good working condition and could be reused or maintained where possible.

Emergency Power Systems

Emergency power is supplied to the building from an existing 600kW generator located in the Powerhouse. This generator currently supplies 3 automatic transfer switches that serve the Powerhouse building emergency lighting and standby loads. The generator feeds a main emergency panelboard (located at the Powerhouse building) and then feeds three existing transfer switches at the Capitol building. Currently the feeder to the electric fire pump does not meet the latest code and would need to be separated from the emergency system feeder. Another feeder from the Powerhouse generator to the Capitol fire pump would be required to meet code. There are currently three generator distribution systems in the building, one for Life Safety Emergency Distribution, another for Legally Required systems and equipment (currently serving the elevators), and the third serves Optional Standby Emergency Distribution. Currently the existing Life Safety Emergency system does not extend through the entire building, which means there are areas of the building that don't have adequate emergency egress lighting. The Optional Standby distribution is supplying a mixture of loads including some that should be connected to the Life Safety Emergency distribution. Clear segregation of two distribution systems should be performed.



References:

Previous Projects:

1907

Project: Original conduit wiring system for electric lighting
W.I. Gray and Company
Drawings: See Plant Management Archives

1932

Project: WPA Projects
L.A Johnson, Capitol Custodian
No drawings available
Included electronic voting system

1954

Project: Pothead Project
Kinney Electrical
No drawings available

Project:
Capitol converted from DC to AC power
G.M. Orr Engineering
Plans in Appendix

1962

Project: Electrical upgrades to lighting and wiring
State Architects Office
See Plant Management archives

1968-1970

Project: Capitol Remodelling: Phase I, II, III
Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix

1973

Project: Interior Lighting
Thorsen & Thorshov, Inc.
See Plant Management archives

1974

Project: Redecoration of the Supreme Court spaces
Thorsen & Thorshov, Inc.
See appendix for drawings

1979

Project: Fire Alarm
Environmental Engineering
See State Architect's Office for drawings

1987

Project: Media Services Alterations
Miller Dunwiddie and Associates
See Appendix for drawings

Project: Senate Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings

1988

Project: Restoration of the Senate Chambers
Miller Dunwiddie and Associates
See Appendix for drawings and paint analysis

1989

Project: Restoration of the House Chambers
Miller Dunwiddie and Associates
See Appendix for drawings



Project: North Wing Senate Remodeling
Miller Dunwiddie and Associates
See Appendix for drawings

1990
Project: Supreme Court Restoration
Miller Dunwiddie and Associates
See Appendix for drawings

1994
Project: Capitol Complex Energy and Retrofit
Ellerbe Becket
This project saw improvements and replacement of ballasts in the Capitol's light fixtures

1995
Project: Attorney General Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings

1997
Project: Elevator Renovation
Miller Dunwiddie and Associates
See Appendix for drawings
This mainly affected the elevator's controls

Project: Senate Voice and Data cabling upgrade
LKP Engineers
See Appendix for drawings

1998
Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction
Miller Dunwiddie and Associates
See Appendix for drawings



3.16.2 Lighting Background

The Capitol building is a diverse structure and its lighting systems complement the range of diversity.

Two suppliers provided the original lighting to the Capitol. They were the

The original lighting system in public corridors on the Ground Floor and Floors 1 through 3 is a family of highly decorative lighting fixtures featuring cast bronze wall sconces and torcheres with glass globes. The original incandescent lamps have been replaced with twist style screw-in compact fluorescent lamps. Many of the decorative chandeliers feature rings and clusters of bare bulbs, which use low wattage incandescent lamps with decorative filaments. Some lamps in bare bulb chandeliers have been fitted with globe-shaped compact fluorescent lamps.

The decorative lighting in the corridors is supplemented with a secondary lighting system installed c1990 to provide increased illumination levels, and to enhance the aesthetic qualities of the building. Indirect wall sconces were installed on the Ground Floor, and the First and Third floors to illuminate vaulted ceilings. Many of these ceilings include complex decorative painting details.

Lighting Summary

Fixture Types: See Schuler-Shook Historic Lighting Presentation in the Appendix for more information. Selected examples from that work are shown here.

Freestanding Candelabras: The Capitol has several different types of brass candelabras, with different number of light fixtures, bases and shaft detailing. This one is type SH5 and is found in ground floor corridors.



Wall Mounted Fixtures: These fixtures differ in their shape, number of bulbs, and their mounting details. Torches, candelabras, floral and plain fixtures are common types. This is type SH1, and is found on the ground floor entry corridors.



Rosettes: These ceiling mounted light fixtures resemble flowers, and are found mostly in the chambers as part of a plaster composition, and also in the corridors of the ground and second floors. This is type SH2.





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Chandeliers: Hanging Chandeliers are common on the first floor, where they display the vaulted ceilings with their decorative paint very well. They are also found in the restaurant/cafeteria and in the rotunda.

This is type SH8, from the first floor.



Bare Bulbs: Bare bulbs are used as accent lights in the chambers and grand staircases. They are incorporated within a large decorative plaster composition.

This is type SH52, found in the ground floor hearing room.



Freestanding Globes: Surround the rotunda beneath the third floor soffit. Type SH24



Historic Uplights: Unlike the newer uplights, these historic fixtures are as ornate and eye catching as any of the other historic fixtures. Type SH32, from the House chamber.





Applications:

The Basement and Ground Floors house General Offices, the Cafeteria, and utility spaces. Lighting in most of these spaces reflects general commercial building lighting. The spaces are lighted with general purpose light fixtures containing four foot linear fluorescent or compact fluorescent lamps. There is the occasional incandescent light fixture left over from previous eras, but these generally use twist fluorescent lamps as an updated source. The linear fluorescent light fixtures include lensed troffers and parabolic louvers in the offices, and industrial strips in utility spaces. Compact fluorescent lamps are typically used in down lights.

The central circulation corridor on the Second Floor has a flat ceiling 16'-0" AFF with relatively simple painting. A layout of recessed downlights provides supplemental lighting in this area, which also includes the original cast bronze torchieres. Circulation corridors in the East and West Wings lead from the central square to the House Chamber and to the Supreme Court. These U-shaped walkways feature highly decorative coffered ceilings 30'0" AFF. Decorative chandeliers at the center of each coffer provide uplight and downlight, and feature a ring of bare bulbs. The coffered ceilings are supported on one side by an open marble colonnade that surrounds grand staircases leading up from the First Floor. At the top of the columns is an architrave that includes many decorative set-backs and shelves. Indirect wall sconces have been added on both sides of the architrave to provide additional uplight at the decorative coffers, and to illuminate the ribs of the barrel-vault skylights over the grand staircases.

The architrave above the staircases in the east and west wing have linear bare lamp strips intended to illuminate the high ceiling. The same style fixture occupies the high ceilings in each legislative chamber. These coves contain 25 watt Edison lamps in bare bulb fixtures. These fixtures are almost impossible to maintain due to the inaccessibility of their location. As a result, only a very few fixtures are operational. The positive note on their lack of maintenance is that they use no energy.

The legislative chamber lighting occurs on multiple levels. Each chamber is ringed with high output quartz down lights across the ceiling and theatrical spot lights around each dome. As elevations drop, decorative incandescent lighting is installed across arches and along walls. The study team took particular note of the wall sconces in the House Chamber room that have a total of six (6) 500 watt quartz lamps up lighting the center of the arch supports.

The Governor's area lighting is also highly decorative. The fixtures almost exclusively use decorative filament incandescent lamps.

Office areas on floors 1 through 4 also use decorative lighting, but primarily light spaces with lensed and parabolic light fixtures. Many of the lensed fixtures are 1970's vintage and have received retrofits that installed highly specular reflectors and T8 lamps. Where ever the decorative lighting resides, twist fluorescent lamps have replaced incandescent lamps.

Several offices contain architectural coves using bare lamp strips. This lighting system mimics the system found in the State Office Building.

Existing Controls

Interior offices and general work spaces control lighting with manual switches. Mechanical spaces and storage areas are switched manually as well. Occasionally, a motion sensor is installed to turn off lighting in small spaces.

The public areas of the capitol have two forms of manual control. The first form is a quite labor intensive system.

The globe style post lights, stair lighting, and chandeliers connect directly to panelboards located in electrical closets on the 1st, 2nd, and 3rd, floors. Capitol Security accesses these panelboards in the morning to turn on lighting, and in the evening to turn off lighting. The guard physically switches a dozen or more breakers in each panelboard to control the public area lighting. It should be noted that the circuit breakers are not switch rated and may show signs of overuse because of daily activity.

The second form of control employs a set of contactors that control six panelboard feeders. These feeders leave a lower level mechanical room to panelboards located at several locations in the building. At the beginning and end of each day, the maintenance staff activate/deactivate the contactors via momentary contact switches. These switches are wall mounted in a secure basement level mechanical room. The contactors control the supplemental lighting system (corridor up lights and public area down lighting).

There are several large chambers and conference areas that use local automated control systems. Each has a main control station and several auxiliary remote stations. The following is a list of the areas and their respective control systems:

- House Chamber – Old Strand Dimming System
- G15 – Same as house
- Senate Chamber
- Old Supreme Court Chamber (possibly just wall dimmers)



**Section 3.16.2
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- House Conference Room 112
- Senate Conference Room 107
- Supreme Court Conference Rooms 217, 316
- Support Hearing Area 123

References

2013 Schuler-Shook Historic Lighting Presentation in the Appendix.

Previous Projects

1907

Project: Original conduit wiring system for electric lighting
W.I. Gray and Company
Drawings: See Plant Management Archives.

1932

Project: WPA Projects
L.A Johnson, Capitol Custodian
No drawings available. Basement added

Project: Capitol converted from DC to AC power
G.M. Orr Engineering
Plans in Appendix

1962

Project: Electrical upgrades to lighting and wiring
State Architects Office
See Plant Management archives

1968-1970

Project: Capitol Remodelling: Phase I, II, III
Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix

1973

Project: Interior Lighting. Thorsen & Thorshov, Inc.
See Plant Management archives.

1987

Project: Senate Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings

1988

Project: Restoration of the Senate Chambers
Miller Dunwiddie and Associates
See Appendix for drawings, paint analysis

1989

Project: Restoration of the House Chambers
Miller Dunwiddie and Associates
See Appendix for drawings

Project: North Wing Senate Remodelling
Miller Dunwiddie and Associates
See Appendix for drawings

1990

Project: Supreme Court Restoration
Miller Dunwiddie and Associates
See Appendix for drawings

1994 Project: Capitol Complex Energy and Retrofit
Ellerbe Becket

This project saw improvements and replacement of ballasts in the Capitol's light fixtures

1995

Project: Attorney General Office Renovation
Miller Dunwiddie and Associates



See Appendix for drawings

1998

Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction

Miller Dunwiddie and Associates

See Appendix for drawings



3.16.3 Telecommunications Summary:

General Description and Existing Conditions

Capitol Campus phone service is supplied to the Capitol Building by MN.IT with some Stake Holders choosing to use their own phone systems. Many of the Stake Holders have IT file/application servers located in their respective office spaces in unsecured areas.

There is existing infrastructure cabling terminated in the Basement that is utilized by MN.IT, other Stake Holders and the local carrier to provide voice and data services to the Capital and other buildings in the Capital complex. It is quite possible that the existing infrastructure cabling feeds to the Capitol Building (from MN.IT, Stake Holders, and the local phone carrier in the Capitol complex) will need to be re-routed to new Equipment Room Locations on the Basement Level as part of this renovation. There is an existing Distributed Antenna System (DAS) that provides wireless LAN and cellular service inside the building.

Security Systems

As electronic security systems have become available, they have been employed to protect the public, staff, and property at the State Capitol Building and the buildings composing the Capitol Complex. Current security systems including video surveillance, card access, and emergency intercom are monitored at the Capitol's Security Command Center. While the Capitol Building operates as a stand-alone facility, the Security Command Center monitors security systems for the buildings in the Capitol Complex including Department of Transportation, Veterans, Lab/Agriculture, Orville Freeman Office Building, Judicial, Powerhouse, Admin, State Office Building, History Center, Department of Revenue, the 14th Street Ramp, and Retirement facilities. The security systems serving the Capitol Complex must be considered as a unified system. Any updates to the Capitol Building security systems must be compatible with the other security systems in the Capitol Complex. A Positron Viper 911 system, Computer Aided Dispatch (CAD), and Motorola radio system are also operated at the Security Command Center. The security systems are fully backed up by redundant system in the Retirement building. Existing Capitol Building security command center is 725 square feet with two fully redundant security consoles.

Video Surveillance System

The existing Bosch Video Management System (BVMS) is a hybrid of analog and digital cameras and analog and digital viewing stations. The analog viewing stations will be replaced by the end of 2012 with large screen monitors fed from digital decoders. There are indoor and outdoor cameras viewing the facility. The current first line of exterior visual monitoring is the remote security cameras, while the first line of internal

monitoring is provided by volunteer tour guides of the Minnesota Historical Society in the Rotunda. Each camera is recorded continuously and video is retained for 30 days unless it is archived for later use.

Access Control System

Access control is part of the Honeywell EBI system. Electronic card access is used on rooms that require security and where an audit trail is required to document who has entered a room. Many spaces are publicly accessible and are either left unlocked or locked with a key.

Call-For-Assistance (CFA) Emergency Intercom System

The existing Stentofon intercom system is an analog based system that is monitored by the Security Command Center operators. Intercom stations are located at building entrances and in public spaces such as corridors and elevator lobbies.

Fire Alarm System

The Minnesota State Capitol Building and Capitol Complex are protected by a Honeywell fire alarm system that is managed through Honeywell's Enterprise Building Integration (EBI) platform. The system was compliant with NFPA 1996 code at the time of installation. The fire alarm system is a voice-based notification system that uses strobes, speakers, and speaker/strobes for notification. The fire alarm notification signal may be a tone followed by a pre-recorded voice message, or live directions may be spoken into microphone stations. Initiation devices include smoke/heat detectors and manual pull stations. The fire alarm is interfaced with the HVAC system for damper actuation and Air Handler Unit shutdown upon smoke detection, and is interfaced with the building's sprinkler system and fire pump for monitoring the status of water flow, valve tampering, and fire pump status. It interfaces with fire doors and fire shutters (where installed), smoke control systems (Rotunda), and elevator recall as necessary. A limited automatic detection system will be made up of a signal from the fire suppression system, HVAC system smoke detectors, elevator lobby detectors, and from detectors used to activate the smoke control system. The Capitol Fire Alarm Sequences of Operation is maintained by the Department of Administration, Plant Management Division.

Audio/Video Systems

There are independent Audio/Video systems for Hearing Rooms, Senate Chamber, Minnesota Supreme Court, House and House Hearing Rooms. There is also a unified television distribution system to serve those spaces. Broadcast infrastructure exists throughout the facility and in the Media Production facilities. Assistive listening systems are installed in some of the Chambers and Hearing Rooms.



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Historic Structures Report**

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Senate Video/Television

Facilities currently set up for providing content over the dedicated internal Radio Frequency (RF) channels and to remote feeds such as Twin Cities Public Television (TPT) and the Department of Administration for web streaming. A control system in B29 operates the sixteen cameras located in the Senate Chamber and Hearing Rooms 15, 107, and 112. Room G4 serves as the Senate studio and includes a sound booth and editing suite.

Hearing Rooms 15, 107 and 112

The Hearing Rooms audio reinforcement but no permanently installed visual presentation infrastructure or displays. A portable video system is used to allow the Senators to view presentations.

Conference Rooms 123 and 125

The conference rooms have the capability of displaying audio and video content using existing analog equipment.

Senate Chamber

There is audio re-enforcement in the Senate Chamber using microphones at each Senator position and at the presiding positions. Existing ceiling speakers are mounted along the base of the dome and suffer from a strong echo factor that makes speech unintelligible at times. Video cameras are positioned around the Chamber for recording and broadcasting proceedings.

Minnesota Supreme Court

In the Supreme Court Chamber, there is an existing audio re-enforcement system of microphones and speakers. There is an existing video recording system in place, but no permanently installed video presentation infrastructure or displays.

Attorney General

Facilities are in place for conducting press conferences.

References:

Previous Projects:

1907

Project: Original conduit wiring system for electric lighting
W.I. Gray and Company
Drawings: See Plant Management Archives

1932

Project: WPA Projects
L.A Johnson, Capitol Custodian
No drawings available. Included electronic voting system

1954

Project: Pothead Project: Kinney Electrical
No drawings available

Project: Capitol converted from DC to AC power
G.M. Orr Engineering
Plans in Appendix

1962

Project: Electrical upgrades to lighting and wiring
State Architects Office
See Plant Management archives

1968-1970

Project: Capitol Remodelling: Phase I, II, III
Toltz, King, Duvall, Anderson and Associates. (TKDA)
Drawings in appendix

1973

Project: Interior Lighting
Thorsen & Thorshov, Inc.
See Plant Management archives

1974



Project: Redecoration of the Supreme Court spaces
Thorsen & Thorshov, Inc.
See appendix for drawings

1979
Project: Fire Alarm
Environmental Engineering
See State Architect's Office for drawings

1987
Project: Media Services Alterations
Miller Dunwiddie and Associates
See Appendix for drawings

Project: Senate Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings

1988
Project: Restoration of the Senate Chambers
Miller Dunwiddie and Associates
See Appendix for drawings, paint analysis

1989
Project: Restoration of the House Chambers
Miller Dunwiddie and Associates
See Appendix for drawings

Project: North Wing Senate Remodeling
Miller Dunwiddie and Associates
See Appendix for drawings

1990
Project: Supreme Court Restoration

Miller Dunwiddie and Associates
See Appendix for drawings

1994
Project: Capitol Complex Energy and Retrofit
Ellerbe Becket
This project saw improvements and replacement of ballasts in the Capitol's light fixtures

1995
Project: Attorney General Office Renovation
Miller Dunwiddie and Associates
See Appendix for drawings

1997
Elevator Renovation
Miller Dunwiddie and Associates
See Appendix for drawings. This mainly affected the elevator's controls.

Project: Senate Voice and Data cabling upgrade
LKPB Engineers
See Appendix for drawings

1998
Project: Cafeteria/Kitchen Renovation and North Terrace Reconstruction and Northwest Terrace Reconstruction
Miller Dunwiddie and Associates
See Appendix for drawings