

## Chapter Four EXTERIOR



Figure 4-1  
An exterior view of the Capitol following completion, circa 1917.  
Photo: "from the Collection of the New-York Historical Society"

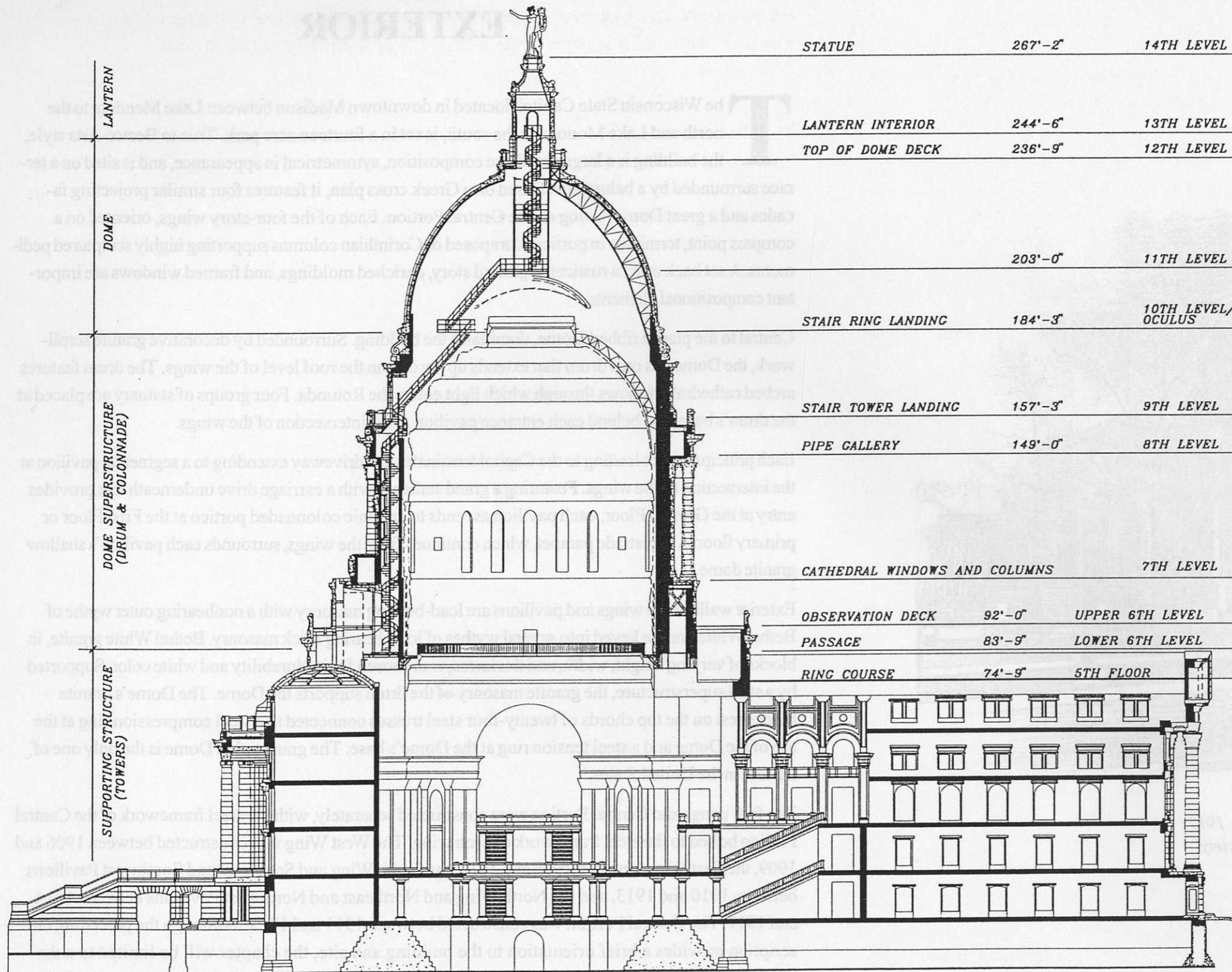
The Wisconsin State Capitol, located in downtown Madison between Lake Mendota to the north and Lake Monona to the south, is set in a fourteen acre park. True to Beaux-Arts style, the building is a large grandiose composition, symmetrical in appearance, and is sited on a terrace surrounded by a balustrade. Based on a Greek cross plan, it features four similar projecting facades and a great Dome resting on the Central Portion. Each of the four-story wings, oriented on a compass point, terminate in porticos composed of Corinthian columns supporting highly sculptured pediments. A set back attic, a rusticated ground story, enriched moldings, and framed windows are important compositional elements.

Central to the plan, a ribbed Dome, dominates the building. Surrounded by decorative granite scrollwork, the Dome sits on a drum that extends upward from the roof level of the wings. The drum features arched cathedral windows through which light enters the Rotunda. Four groups of statuary are placed at the drum's base, one behind each entrance pavilion at the intersection of the wings.

Each principal street leading to the Capitol terminates at a driveway extending to a segmental pavilion at the intersection of the wings. Featuring a grand staircase with a carriage drive underneath that provides entry at the Ground Floor, each pavilion ascends to an Ionic colonnaded portico at the First Floor or primary floor. A balustrade parapet, which continues from the wings, surrounds each pavilion's shallow granite dome.

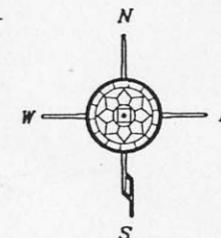
Exterior walls of the wings and pavilions are load-bearing masonry with a nonbearing outer wythe of Bethel White granite keyed into several wythes of load-bearing brick masonry. Bethel White granite, in blocks of varying height, width, and thickness, was chosen for its durability and white color. Supported by a steel superstructure, the granite masonry of the drum supports the Dome. The Dome's granite blocks rest on the top chords of twenty-four steel trusses connected to a steel compression ring at the top of the Dome and a steel tension ring at the Dome's base. The granite clad Dome is the only one of its kind in the United States.<sup>1</sup>

The four wings and Central Portion were constructed separately, with the steel framework of the Central Portion bolted to the steel framework of each wing. The West Wing was constructed between 1906 and 1909, the East Wing between 1908 and 1910, the South Wing and Southeast and Southwest Pavilions between 1910 and 1913, and the North Wing and Northeast and Northwest Pavilions between 1914 and 1917. The Central Portion was constructed between 1911 and 1915. Although the preceding description provides a brief orientation to the building and site, the chapter will be limited to a discussion of those exterior components comprising the Central Portion. These components include the Podium Wall, the Lower and Upper Drum, the Dome, and the Lantern.



**HISTORIC STRUCTURE REPORT  
WISCONSIN STATE CAPITOL  
CENTRAL PORTION**

**SECTION**



NOT TO SCALE

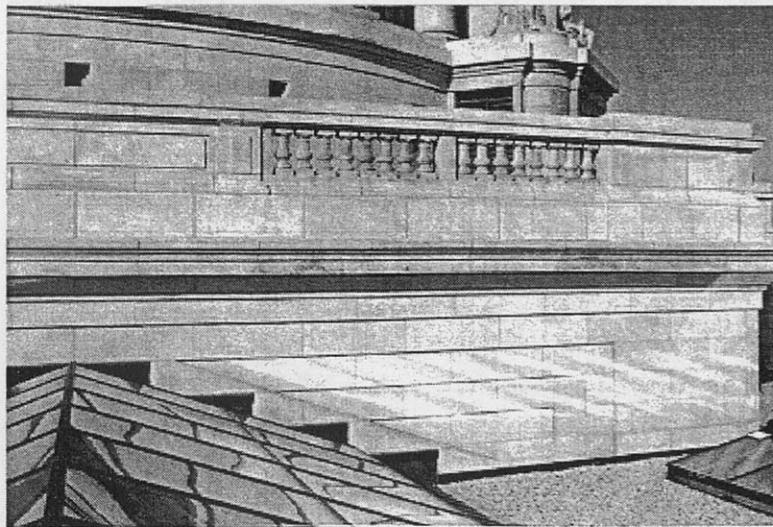
## Central Portion Description

### Foundation and Structure

The Dome and its supporting tower are independent from the wings, being built on separate foundations. The foundations, composed of four masses of reinforced concrete, form the footings for eight concrete piers in which are embedded the steel columns of the substructure.<sup>2</sup> The space defined by the configuration of these structural steel members and their enclosure by concrete piers forms the volume of the Rotunda as it rises through the Central Portion. All eight concrete piers are faced with marble in the Rotunda's interior. The tops of the piers, at elevation 78', are capped by girders, forming a ring course octagonal in plan.<sup>3</sup> Across the ring course are cantilever girders in a radial configuration. The inner ends of the cantilevers carry steel columns 90' high, rising from the drum's base. On the tops of these columns are arch-trusses that support the stone covering of the outer Dome. Outer ends of the cantilevers carry steel columns that support a stone colonnade at the Lower Drum.<sup>4</sup>

### Podium Wall

The Podium Wall, originating at -1'-4" below grade on top of the footings and extending to 91'-5" at the base of the Lower Drum, internally defines the volume of the Central Portion. It becomes visible on the exterior of the Central Portion as the walls that rise above the intersection of the building's wings at elevation 59' and extend to 91'-5". The Podium Wall thus visually makes the transition from the wings to the Drum and Dome. A cornice topped by a balustrade terminates the top of the Podium Wall at the Observation Deck. The balustrade is similar to those on the roof level of the four wings of the building.<sup>5</sup>



*Figure 4-3*  
The Podium Wall, rising above the roofs on the wings, separates the Central Portion from the wings.  
Photo: Wiss, Janney, Elstner Associates, Inc.

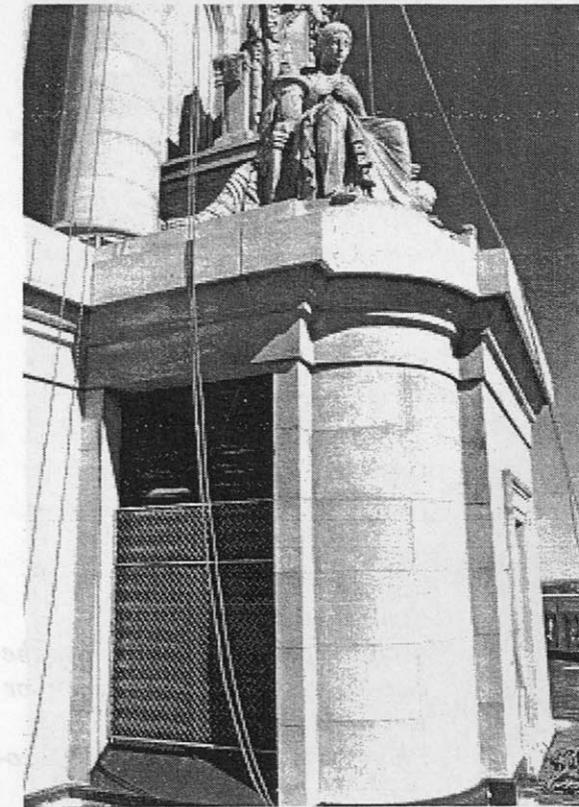
Original drawings indicate that the granite blocks that form the exterior of the Podium Wall, are keyed or notched, into a brick masonry backup wall. The load bearing Podium Wall supports the cornice and balustrade. Three small windows are placed in the Podium Wall behind each pavilion.

### Observation Deck

The Observation Deck, also referred to as the Sixth Upper Level or Observation Level, is formed by the octagonal roof of the Podium Wall. Providing a transition from the wings to the Dome, the Observation Deck functions as a wide walkway, framed by a balustrade, that encircles the drum overlooking the City of Madison. Originally designed as the first resting stop for visitors as they climbed to the Lantern, the Observation Deck, accessed from the Passage (Sixth Level/Museum), is now the only upper exterior area accessible to the public. Granite bases, placed behind each of the northwest, northeast, southeast, and southwest entrance pavilions at the base of the Lower Drum, provide pedestals for the statuary groups, doorways to the Observation Deck, and structures for the fresh air intake system.

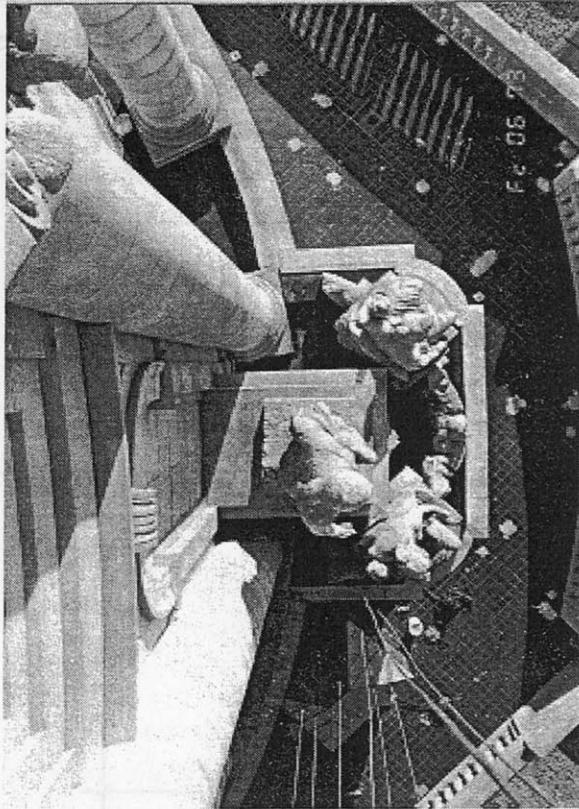
### Statuary

Cut from Bethel White granite, the statuary groups are placed on granite pedestals on the Observation Deck at the Dome's base, one group directly behind each of the four pavilions. The statuary groups, each consisting of three figures, represent the themes "knowledge," "strength," "prosperity," and "faith,"

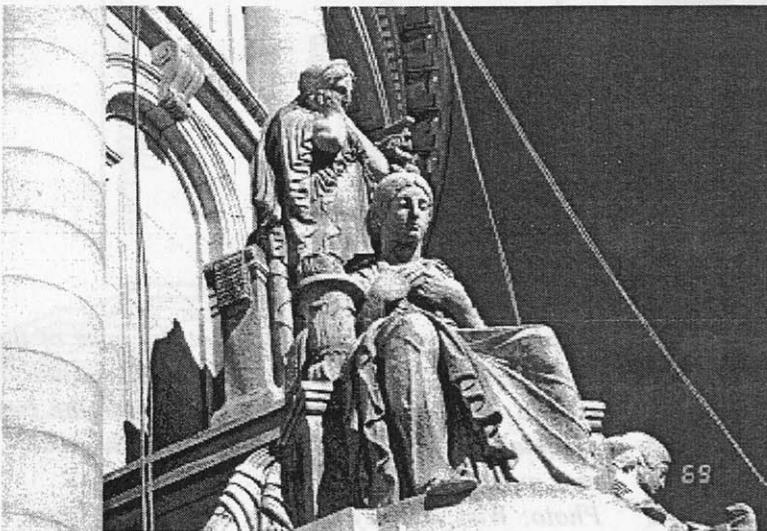


*Figure 4-4*  
Four granite pedestals, placed at the base of the Lower Drum, provide pedestals for the statuary groups, door access, and a structure for the fresh air intake system. Shown: "Faith" on the southeast axis.  
Photo: Wiss, Janney, Elstner Associates, Inc.

symbolizing fundamental characteristics of the State of Wisconsin. The middle figure, about 12'-0" high, is placed on a base behind the two minor figures. Each pair of minor figures is connected at the base by an eagle with outspread wings. A more complete description of the statuary may be found in Chapter 3—Historical Research.



*Figure 4-5*  
An overhead view shows the spatial relationship of the statuary group to the columns and the surrounding Observation Deck.  
Photo: Wiss, Janney, Elstner Associates, Inc.



*Figure 4-6*  
A close-up of "Faith" displays the carved granite details by sculptor Karl Bitter.  
Photo: Wiss, Janney, Elstner Associates, Inc.

## Drum

The Drum, defined as the cylindrical wall below the Dome, is divided into a Lower Drum and an Upper Drum.

### Lower Drum

The Lower Drum, located above and behind the Podium Wall between elevation 91'-5" and 152'-0", includes a circular dome base and an inner drum wall surrounded by a Corinthian colonnade. The wall of the base is composed of granite blocks keyed into a brick masonry backup supported by the Dome's steel superstructure. In addition, the original drawings indicate that supplemental steel members are encased in the masonry.<sup>6</sup> Small windows in the base allow light into the Passage (Sixth Floor/Museum).

The base supports the inner drum wall which is composed of twenty-four vertical segments, each topped with a hood molding and keystone.<sup>7</sup> Twenty segments have triple-hung cathedral windows with a recessed coffered panel above each window. At the corner of each segment a free-standing column supports the entablature above, except at the statuary groups. Behind each statuary group, placed on the secondary axis, a rectangular bay faced with granite and corner engaged columns, projects outward. The four bays formed allow space for the interior stair towers that provide access from the Sixth Level to the Ninth Level. Eight small windows allow light into each stair tower.

Twenty-four Corinthian columns around the Lower Drum are comprised of unfluted shafts with seventeen 1'-9" high segments that taper from a 3'-7" diameter at the base to a 3'-1" diameter below the capital. Each Roman Corinthian capital features four volutes in a top row with two rows of acanthus leaves below, while the column's base displays convex and concave moldings. The drum base is located between elevations 91' and 106'. The colonnaded portion of the Drum, above elevation 106', is supported by a series of steel ring beams.<sup>8</sup>

### Upper Drum

The Upper Drum, between elevations 152' and 175', provides the transition to the Dome. It includes a segmented balustrade with a narrow walkway. The walkway was used originally to view the city but is now accessed only by maintenance personnel. The configuration of a cornice and twenty-four pilasters that alternate with twenty-four windows is similar to that of the Lower Drum but are compressed. All the lines in the Upper Drum extend from the Corinthian columns in the Lower Drum. These lines continue through the Upper Drum pilasters to the Dome ribs. The Upper Drum has multiple wythe walls with the outer wythe of Bethel White granite units of varying thickness keyed to the inner brick wythes. Again, steel structural elements are encased in the masonry.<sup>9</sup>

## Dome

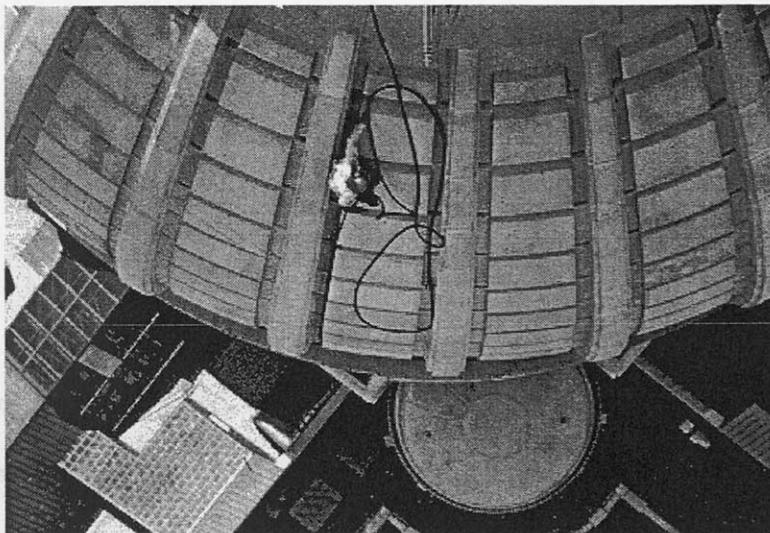
### Dome Exterior

The Dome extends above the Upper Drum to the Lantern from an elevation of 175' to 236'. It is composed of twenty-four radial segments and fourteen courses of granite between the skirt course below the Lantern and the scroll course or console at the Dome's base. Supported on the top chords of twenty-four steel trusses, the granite panels are widest at the Dome's base and taper toward the Dome's top. Rib panels, 1'-8" thick, are located directly over each built-up steel truss. Granite panels between the ribs are typically 8" thick. All units are connected to the adjacent steel trusses at alternating horizontal joints by a bent rod attached to a continuous horizontal angle spanning between the trusses, or are connected directly to the trusses. All horizontal joints, keyed together by a 1" lap cut into the panel ends, allow positive water drainage. The panel's top surface, between the ribs, is cut to create a reveal that slopes down from the inner edge.<sup>10</sup> At the base of each Dome rib (elevation 183'), is a decorative carved granite scroll with masonry backup with masonry-backed granite spandrel panels set between the scrolls. All space between the trusses and directly behind the granite panels is infilled with clay tile. Drawings indicate a 2 inch air space between the granite's back face of the granite and the face of the clay tile.<sup>11</sup>

The top of the Dome consists of a granite skirt course (elevation 231'), a balustrade (elevation 235') and Lantern (elevation 235'), all supported by the steel Dome trusses. The top ends of the steel trusses are connected to a steel compression ring, 10'-6" in diameter. The bottom of each truss is connected to a steel column, each connected to a steel tension ring 80'-0" in diameter.<sup>12</sup>

### Outer and Inner Dome Structural System

The Outer Dome truss structural system exists below the Dome's granite covering and the inner terra cotta clay tile system. The granite actually rests on the upper chord of the arched truss structural system



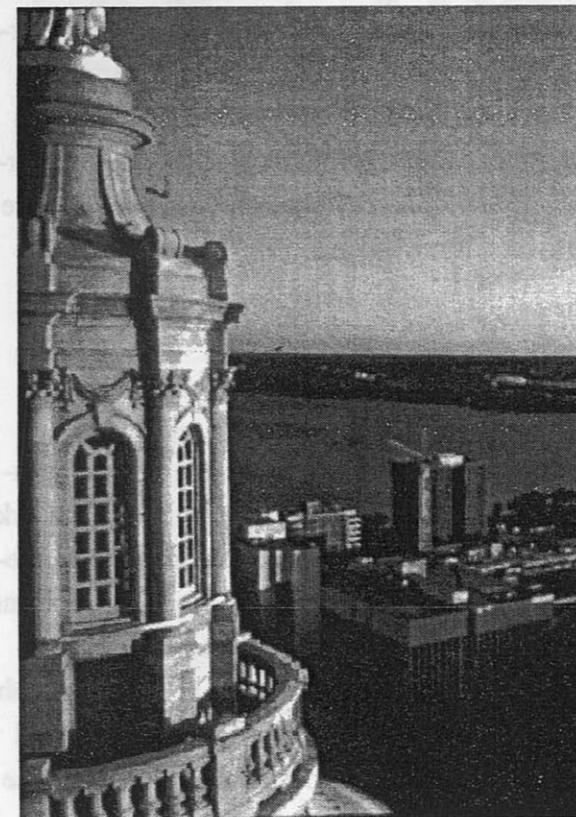
*Figure 4-7*  
The rib panels of the Dome taper from the base toward the top.  
Photo: Wiss, Janney, Elstner Associates, Inc.

of steel riveted construction. Steel T-shaped members, acting as purlins, span the trusses. The truss elements, connected by the T-shaped members with the upper ends riveted to the compression ring below the Lantern structure, are held to the tension ring at the Dome base by shoe pins.<sup>13</sup> The inner face of the lower chord of the truss is clad first with terra cotta clay tile and then plaster.

The Inner Dome is composed of twenty-four radial lattice-web ribs riveted at elevation 146' to the faces of the steel columns that rise from the foundation. The upper ends are riveted to the web of a ring plate girder, 26'-6" in diameter, at elevation 180'. Twenty feet above this opening is a concave ceiling, 36'-3" in diameter, that provides the framing for Blashfield's mural. The top chord of the arched truss for the Inner Dome is also sheathed with terra cotta clay tiles and plastered. Metal furring, attached to the bottom chord of the arched truss, is spanned by a plaster wire lath that supports the decorative coffered ceiling seen from the Rotunda floor.<sup>14</sup>

### Lantern

The Lantern, set on a base surrounded by a balustrade, is a windowed granite superstructure that crowns the Dome. Arched windows with muntins are set between engaged Corinthian columns. Each window is surmounted with a keystone and a garland above. "Wisconsin," the statue symbolizing Wisconsin, acts as a finial to the Dome structure. An additional granite skirt beneath the statue sheds water.



*Figure 4-8*  
The Lantern, a windowed superstructure, crowns the Dome. A balustrade separates a small walkway from the Lantern's base.  
Photo: Kite Aerial Photography

## Statue

“Wisconsin,” the hollow bronze statue designed by the American sculptor Daniel Chester French, was cast in six sections with a height of 15'-5" from the bottom of the base to the top of the headdress and has a weight of approximately three tons. The monumental figure is fitted with classical robes beneath a cape gathered over the shoulders and held in place by an ornamental clasp decorated with an elaborate “W” insignia. The headdress, modeled after a Greek helmet, is embellished with two cornucopias, ears of corn, and flowers, and is topped by a badger, the Wisconsin state animal.<sup>15</sup>

The left arm is upraised with an open hand pointing southeast, while the right arm is bent at the elbow with the hand holding an orb surmounted by an eagle. Wearing sandals, the figure stands on a convex base inscribed with the words “D.C. French, Sc. 1912” and “Cast by Roman Bronze Foundry, N.Y.”<sup>16</sup> More information regarding the statue may be found in Chapter Three-Historical Research.

## History of Maintenance and Repairs

A review of records held by the Division of Facilities Development and interviews with the Wisconsin State Capitol staff provided information on the methods and materials used to maintain and repair the Central Portion, specifically, the Dome. These records span the years 1957 through 1990. Tuck pointing projects are referenced in the Division of Facilities Development microfilm file for the years 1957, 1960, 1962, and 1966.<sup>17</sup> A 1964 cleaning project,<sup>18</sup> dome truss inspection in 1981,<sup>19</sup> recaulking in 1983,<sup>20</sup> and exfoliation inspection in 1990<sup>21</sup> were also included. Information on recaulking the Dome, skylights, and roofs in 1982 was limited in regard to material and application. Materials were to be purchased by the contractor as requested by the owner. Later correspondence indicated that Tremco Dymeric, a two-part urethane sealant, was used.<sup>22</sup> The Dome was inspected in 1982 and recaulked in 1983 by Craig Restoration. This repair, which involved an application of polyurethane sealant, was performed to prevent water from penetrating the joints.<sup>23</sup> A limited number of documents exist because the work order records for small remodeling and repair jobs were destroyed in the 1980s.

## Observation Deck

### Projects Prior to 1996

Work on the Observation Deck, since its original construction, has occurred sporadically. Microfilm index cards with the Division of Facilities Development indicate a tile deck replacement was given a work order number in 1966.<sup>24</sup> However, no further information was available. The 1982 specifications for repairs to the Observation Deck referenced a 1972 Observation Deck repair project in which eight drains were installed and quarry tiles were applied to a mortar bed set on a multi-ply bitumen and felt waterproofing membrane. According to the 1982 specifications, the Observation Deck was to be rebuilt with a butyl rubber waterproofing membrane, mortar setting bed, and slurry coat. A 1987 report indicated the presence of many debonded tiles, particularly in the area of the drains.<sup>25</sup> Specifications including the

Sixth & Seventh Level Deck Restoration and Renovation were written in 1994,<sup>26</sup> with construction beginning in fall 1995. This construction was necessary because replacement quarry tiles for the original pavers did not shrink or expand properly, resulting in extensive yearly repairs.

### 1996 Observation Deck Project

The 1996 Observation Deck Project involved the removal of all added materials with a return to the original concrete leveling agent above the terra cotta clay tiles. All cracks in the existing concrete were repaired and the entire surface was ground smooth. Installation included a new roof membrane with drainage mat, insulation, and an asphaltic protection board. A pedestal system, employing adjustable 4" diameter plastic cylinders, holds in place 2' x 2' red granite paver tiles, quarried in Wausau, Wisconsin.

### 1996 Statuary Project

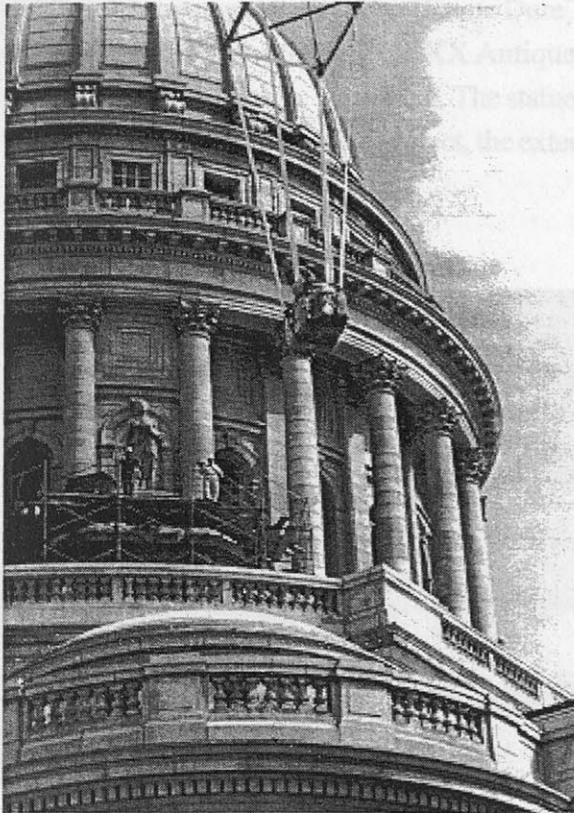
Original roofing materials on the pedestals supporting the Seventh Level statuary included copper sheets that extended underneath the statues. After subsequent roofing projects the copper was covered with a rubber membrane. Due to deterioration of both the copper and the membrane, severe water damage occurred to the interior finishes of the Upper Sixth Level. To correct the continual water leakage, all old roofing materials were removed and a new roofing system installed. This necessitated removal of the statuary groups during the roofing removal and installation process.

The project was undertaken 5-30 August 1996 through the management of J.P. Cullen & Sons, Inc., of Madison, Wisconsin and the Capitol Restoration team. A 25 story-tall, 500-ton crane lowered each statuary group, which consists of nine separate granite pieces, to the Capitol grounds where the statues were crated. The existing copper roof and rubber membrane were removed along with the existing brick and mortar support base and curb, which were badly deteriorated. After installation of a wood form work a new concrete support base and curb was poured using high-strength, non-shrink grout

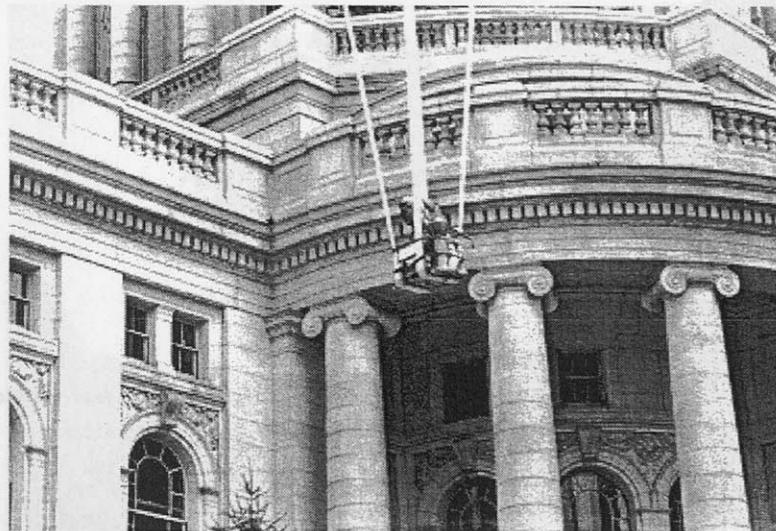


Figure 4-9  
The Observation Deck Project employed adjustable cylinders to hold the paver tiles in place.  
Photo: Joyce Inman Historic Interiors, Inc.

with pea gravel. A turn-coated stainless steel roofing was set in place. Each statuary group was returned section by section to the original locations. The mortar joints were carefully studied before disassembly so the joint width could be replicated. A variety of plastic shims were used to maintain the correct space between the granite pieces when the new mortar was applied.



*Figure 4-10*  
*A scaffold was built to facilitate the removal of the statuary pieces.*  
*Photo: Kahler Slater*



*Figure 4-11*  
*Custom designed, a strapping system secured each statuary piece as it was lowered to the ground.*  
*Photo: Kahler Slater*

## Statue

### Projects Prior to 1990

Eighteen years in the elements necessitated that “Wisconsin” be regilded, and in 1932 the work was done by A.E. Olsen Steeplejack Co. of Janesville for \$444.<sup>27</sup> The process was undertaken again in



*Figure 4-12*  
*Each statuary piece was lowered carefully to the ground during removal. Hoisting each piece to its original location occurred in reverse order.*  
*Photo: Kahler Slater*



*Figure 4-13*  
*The granite pieces from one statuary group are placed on skids ready to be crated.*  
*Photo: Kahler Slater*

1957 by Wallace JaKa of Milwaukee for \$1,100 using 9,500 gold sheets.<sup>28</sup> The *Capital Times* reported that JaKa thrilled the city of Madison for two weeks as he cleaned and regilded the statue using the steeplejack method to secure his body by ropes instead of scaffolding. JaKa washed the statue in acid and scrubbed it down to prepare it for a prime coat of plastic aluminum followed by a size. After applying nineteen boxes of 23 carat gold leaf, at a cost of about \$500, JaKa burnished the surface with cotton. He used silver solder to repair a hole through the thumb and finger on the right hand of the statue.<sup>29</sup>

Other statue maintenance has included replastering and weatherizing the interior of the Lantern in 1980, which included fitting an access door to the statue's interior, by George Parisi, a Capitol mason;<sup>30</sup> examining the statue's interior in 1988;<sup>31</sup> and examining the statue's interior with photographic documentation in February 1990 and again in July 1990.<sup>32</sup> Prior to and following the gilding project, Christopher M. Anderson, Professor of Astronomy from the University of Wisconsin-Madison, photographed the statue's exterior from the roofs of the wings using a 2000 mm astronomy telescope.<sup>33</sup>

### 1990 Regilding and Repair Project

In 1990 Christine Roussel, Inc., of New York and Venus Bronze Works of Detroit, Michigan, completed the regilding and conservation of "Wisconsin." Christine Roussel, Inc., specializing in casting, restoration, conservation and gilding of metals, provided the gilding team of Marc Roussel and Bill Gauthier for the statue's exterior. Venus Bronze Works, Inc., represented by John Dugger, Giorgio Gikas, and Bill Kollias, specialists in casting and conservation of bronze works, cleaned the statue's interior, removed the exterior finishes, and made necessary repairs. Anton Rajer, consultant for the Department of Administration, analyzed the statue during the 1990 gilding project and kept a report that described each area of the statue and the existing gilded and repair conditions. (The complete report may be referenced for further information) In addition, Rajer provided a schematic cross-section of "Wisconsin," indicating that

[t]he first layer appears to be red oxide, then lead white? [sic], remnants of gold, followed by zinc chromate which was added in the 1932 gilding. This in turn was covered by aluminum paint and zinc chromate in 1957.

Numerous areas of degraded surface are noted throughout the statue, such as metal corrosion, paint system failure, and lost gilding. The degradation falls into two categories: pinhole losses and large overall surface loss . . . the zinc chromate priming and gilding done in 1957 was uneven in application. . . . This pattern of degradation was noticeable from the ground and was the primary reason for the . . . regilding effort.<sup>34</sup>

The project began on 24 September 1990 as indicated by the reports from Rajer and Venus Bronze Inc., which included conservation field notes logged by Rajer, meeting notes, schematic diagrams, technical data sheets, specification sheets, photographs, slides, and other pertinent information. The project

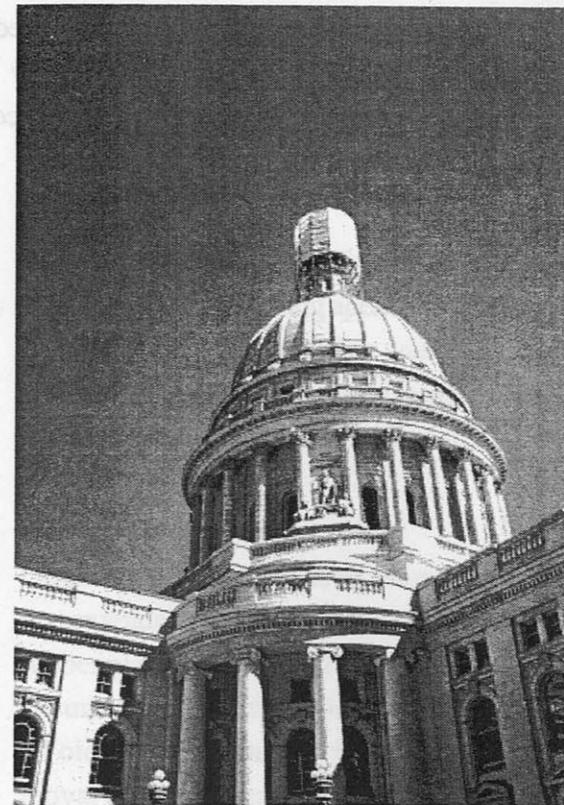


Figure 4-14  
Scaffolding was set in place around the statue to protect the gilding team from the weather's elements.  
Photo: Mike Bath

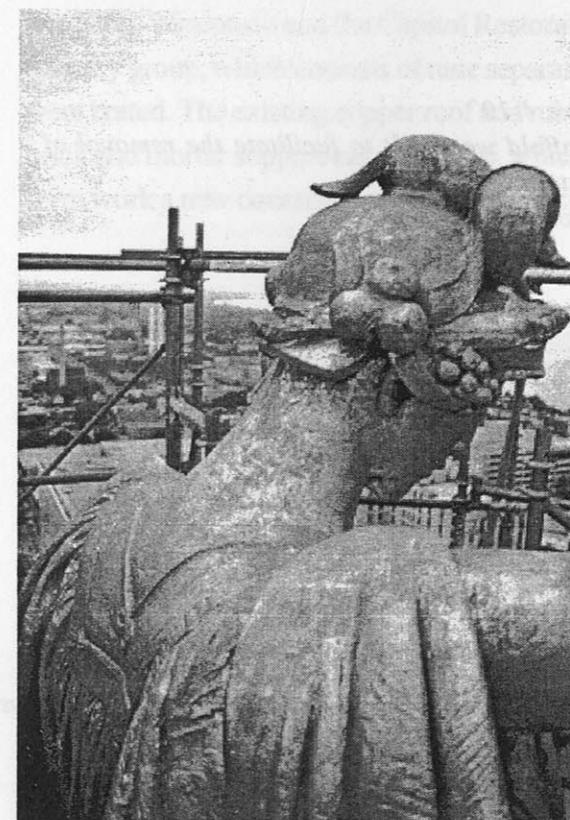


Figure 4-15  
The back side of the statue displays its bare metal condition after all previous coatings were removed.  
Photo: Mike Bath



was considered complete by 30 November 1990, when Safway Scaffolding Company and Joe Daniels Construction Company, Madison, Wisconsin, removed the scaffolding from the Lantern site.

During the regilding project "Wisconsin" was high pressure washed with water and, after numerous tests with solvents, cleaned to remove all old gold, size, zinc chromate, and foreign materials. Holes needing repair were drilled and tapped for new bronze screws, which were then chased. Previous solder fills and structural seams were examined to determine appropriate repair. A red oxide primer was sprayed before "Tiente Dure" zinc chromate was applied as a base for the sizing. Oil size was applied prior to the 3 ° K XX Antique Doublegold loose gold leaf. About 12,275 sheets, approximately 3" x 3" each, were used. The statue was then burnished with a squirrel hair brush. Due to wind storm damage during the project, the extended arm, from shoulder to finger tips, was regilded by



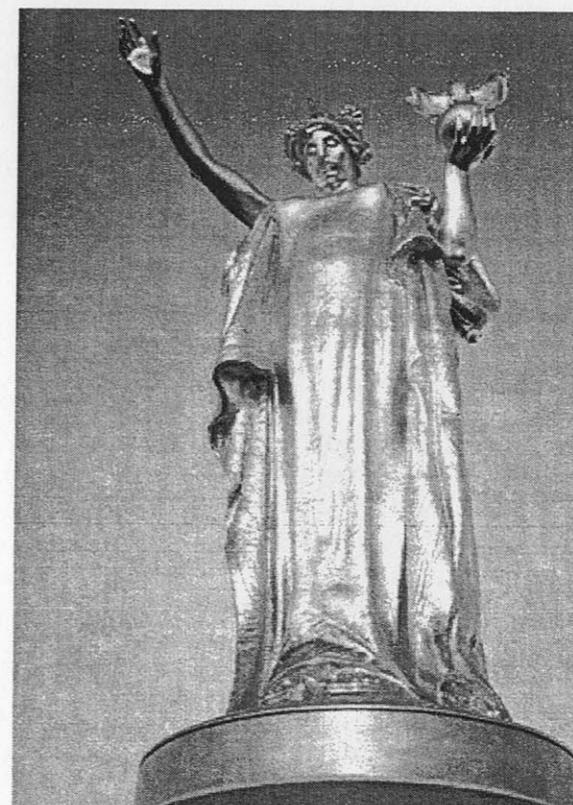
*Figure 4-16*  
Inscribed at the statue's base is the sculptor's name, D.C. French, and the year 1912.  
Photo: Mike Bath



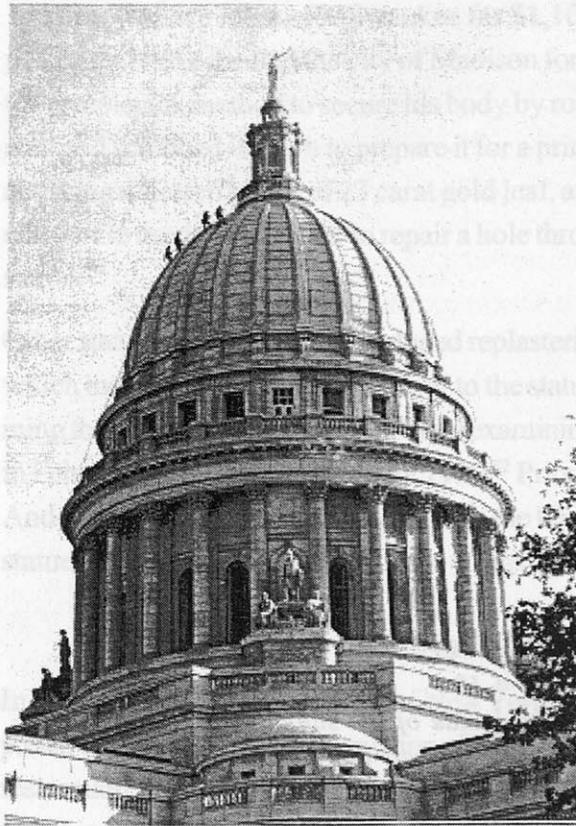
*Figure 4-17*  
A gilder from the project team applied 3 1/2 k XX Antique Doublegold loose gold leaf to the statue.  
Photo: Mike Bath



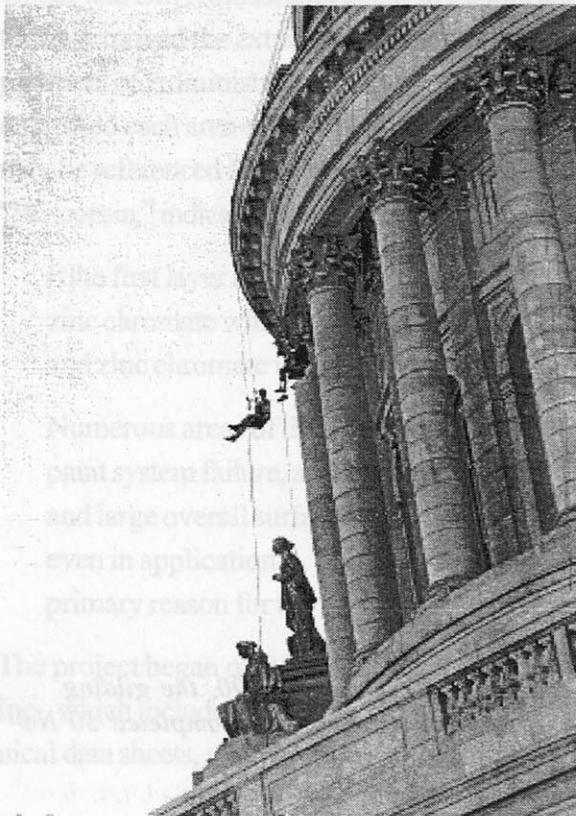
*Figure 4-18*  
The back side of the statue displays its new appearance with all the gilding completed.  
Photo: Mike Bath



*Figure 4-19*  
Beginning 24 September 1990, the gilding project for "Wisconsin" was completed 30 November 1990.  
Photo: Mike Bath



*Figure 4-20*  
*The areas of the Dome and Drum were inspected close-up by rappelling.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*



*Figure 4-21*  
*All areas above the Observation Deck were inspected by the Wiss, Janney, Elstner team in 1993.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*

Mike Bath, Capitol Restoration Painter, before the removal of the scaffold. Investment and foreign materials were removed with a thorough interior cleaning. Benzotriazole, a corrosion inhibitor, was applied.<sup>35</sup> An access panel was placed in the ceiling of the Lantern to seal the statue's interior at the base.

## Inspections and Studies

A review of the records held by the Division of Facilities Development and Wiss, Janney, Elstner's Exterior Survey and Analysis provided information on past inspections and studies of the Capitol's exterior. An inspection of the Dome trusses conducted by John Freeman of the State of Wisconsin in 1981 revealed the trusses were in good condition, although past leakage had occurred through the granite and tile. The gutter at the Dome's base was also in good condition but filled with sand and masonry debris.<sup>36</sup> In 1990 a limited inspection of the exterior granite exfoliation problem was performed by the University of Wisconsin Extension Geologic Survey.<sup>37</sup>

### 1993 Granite Comprehensive Survey Report

Wiss, Janney, Elstner Associates, Inc., of Chicago, Illinois, completed an exterior survey and analysis of the Dome, West Wing, and Northwest Pavilion in summer 1993. The results of this survey were documented in their 7 March 1994 report for the Division of Facilities Development for the State of Wisconsin<sup>38</sup> and are summarized as follows:

#### Inspection Procedures

The Podium Walls were inspected from the Third and Fourth Floor roofs. The areas of the building above the Observation Level, which includes the Dome and Drum, were inspected close-up by rappelling. Survey forms incorporated field notes, sketches, and photographs. The survey forms also included baseline drawings adapted from selected original drawings. Survey findings for the condition of the granite walls include deterioration, building wall movement, exfoliation, mottling, erosion, dirt accumulation, and joint failure. These conditions are shown on the specific elevation drawings, which may be referenced in Appendix D of the Wiss, Janney, Elstner Associates, Inc., Report.

#### Comprehensive Findings

Wiss, Janney, Elstner Associates, Inc., determined the exterior granite on the Capitol is in good condition generally, although some individual units of granite have deteriorated. Surface exfoliation, surface erosion, mottling, dirt accumulation, bird-related distress, organic growth, mortar and sealant joints, and previous repairs were observed throughout the areas inspected. The inspection also revealed the following conditions observed at specific locations: cracks, displacement of the stone units, edge chips, spalls, and imminent spalls.<sup>39</sup>

## General Observations

### Surface Exfoliation

Surface exfoliation is the delamination of portions of the granite's exposed surface from the piece. Exfoliation is the result of aging and exposure of the stone. This results in a roughened surface texture and loss of surface material.<sup>40</sup> Exfoliation of the granite surface was typically associated with mottling in which variations in color and texture were evident. Exfoliation and mottling of the granite surface were most severe in areas vulnerable to water penetration and weather exposure. The vast majority of granite inspected did not exhibit surface exfoliation.<sup>41</sup>

### Surface Erosion

Surface erosion, defined as the weatherization of the stone, includes dissolution and abrasion. Erosion results in a highly roughened surface texture and loss of surface. The vast majority of granite inspected did not exhibit these characteristics. However, erosion was observed predominantly on projecting elements of carved granite, freestanding statuary, and other stone elements with severe exposure to weathering. Localized areas observed to exhibit varying degrees of surface erosion were column capitals, scrolls, and all sculpture. Because erosion is a natural weathering process, the stone is more vulnerable in areas where microfracturing of the granite has been caused by the carving process.<sup>42</sup>

### Mottling

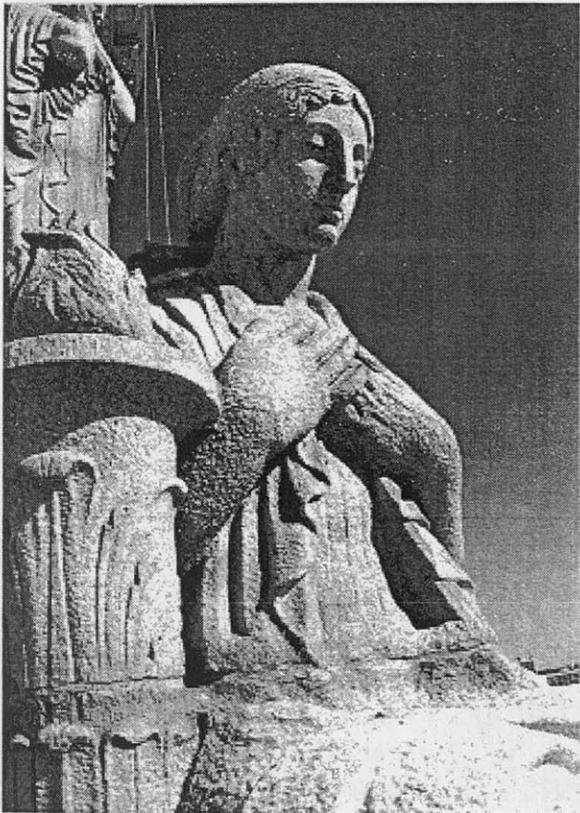
Mottling is defined as blotchy or uneven shades of granite color that become more pronounced over time. The typical granite surface has a bush-hammered texture and light grey color, even though indi-

vidual units vary slightly in color and texture. Localized mottled areas of the granite surface may vary more significantly, with a pronounced difference in appearance. These areas appear blotchy, with an uneven color ranging from grey to yellow, and sometimes an uneven texture accompanies the mottled area. Severe mottling was sometimes associated with exfoliation of the granite surface. Mottling was observed in all areas of the building inspected, with the most severe instances at parapets and balustrades.<sup>43</sup>

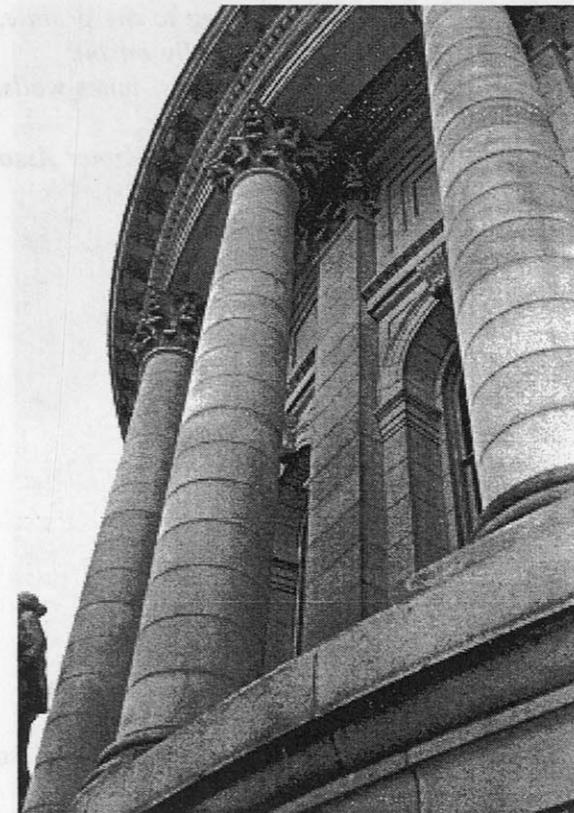
Natural weathering results in an alteration to the surface structure of the granite to highly laminated structures. This texture permits a buildup of dirt deposits. Surface color variations and discoloration becomes noticeable due to the effects of light. Studies indicate that nonaggressive cleaning methods may mitigate the mottled appearance slightly but do not remove it. As a result, Wiss, Janney, and Elstner stated that "because only aggressive methods that damage the stone, such as retooling or refinishing the stone surface, are likely to remove the mottled appearance, cleaning of the facades and dome would not be effective without damage to the substrate. Retooling would not prevent the mottling from recurring in the future."<sup>44</sup>

### Dirt Accumulation

Dirt accumulation occurs primarily from the buildup of particles washed away from the upper granite surfaces and the disposition of airborne particles. Dirt accumulation was most evident on the horizontal



*Figure 4-22*  
A statue in the "Faith" statuary group exhibits a typical example of exfoliation where pieces of the granite have delaminated.  
Photo: Wiss, Janney, Elstner Associates, Inc.



*Figure 4-23*  
Uneven or blotchy shades of the granite color are evident on the Corinthian columns at the Inner Drum.  
Photo: Wiss, Janney, Elstner Associates, Inc.

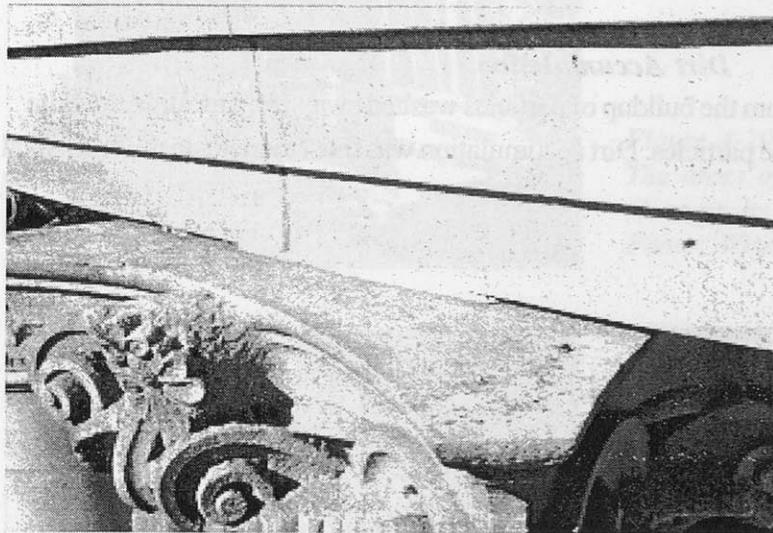
projections of walls, such as sills and cornices, and in sheltered portions of carved stonework. Dirt accumulation is not presently severe and cleaning studies indicate the grey surface dirt can be readily removed by non-aggressive methods.<sup>45</sup>

#### ***Bird-Related Distress***

Bird-related distress, evidenced by discoloration and pitting to the granite, is caused by the acidic nature of bird excrement. This was observed at the Lower Drum's inner walls and soffits where several capitals were observed with bird nests and bird excrement. Bird nests were also found at the base of the Lower Drum.<sup>46</sup>

#### ***Organic Growth***

Organic growth, defined as small green plant growth, was found in some areas on north-facing surfaces of walls, especially in shaded areas. Although not necessarily harmful to the stonework, it can result in additional moisture being held against the stone. This growth was not significant in the Central Portion.<sup>47</sup>



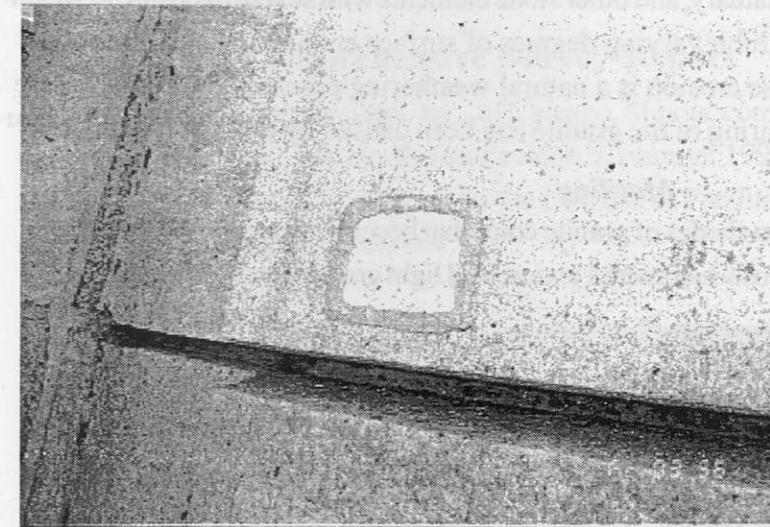
*Figure 4-24*  
*Bird excrement, causing discoloration and pitting to the granite, was found especially on the Lower Drum capitals, inner walls, soffits and at the base.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*



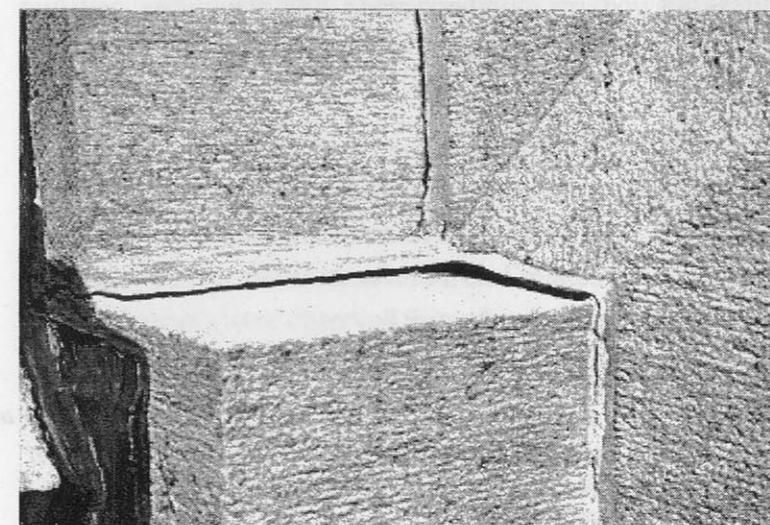
*Figure 4-25*  
*Organic growth, though not significant, was found in some shaded areas.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*

#### ***Mortar and Sealant Joints***

Mortar was originally used between the granite units. During previous repair projects, sealant was used between the granite units, in addition to the mortar, where movement between granite units was anticipated. Conditions observed in the mortar joints included deterioration, loss of bond, cracking, previous repointing, and application of sealant over mortar. The mortar in joints between large granite units throughout areas inspected was found to be in good condition generally, although joints between granite blocks at the Podium Wall cornice and above were observed to have deteriorated. Joints directly above the cornice at the Podium Wall, Lower Drum, and Upper Drum have been covered with sealant, which has deteriorated. The joints between granite units of the statuary at the Lower Drum were also deteriorated.<sup>48</sup>



*Figure 4-26*  
*A representative example of a granite unit indicates the mortar and sealant used at joints for a repair.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*



*Figure 4-27*  
*Deterioration of sealant in the joints includes a loss of bond between the granite units.*  
*Photo: Wiss, Janney, Elstner Associates, Inc.*

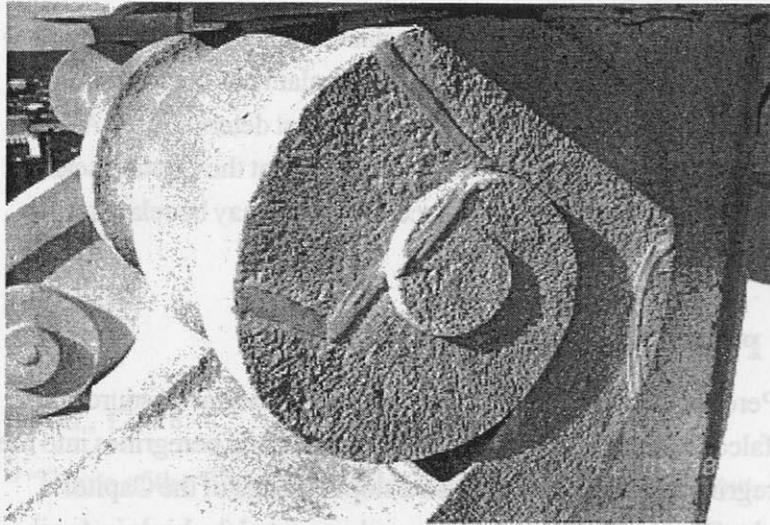
### ***Dutchmen Repair***

A Dutchmen repair involves removing a deteriorated piece of granite by making square cuts in the granite around the deterioration. A precut granite piece that matches the surrounding configuration is inserted into the opening. Dutchmen repairs were observed throughout.

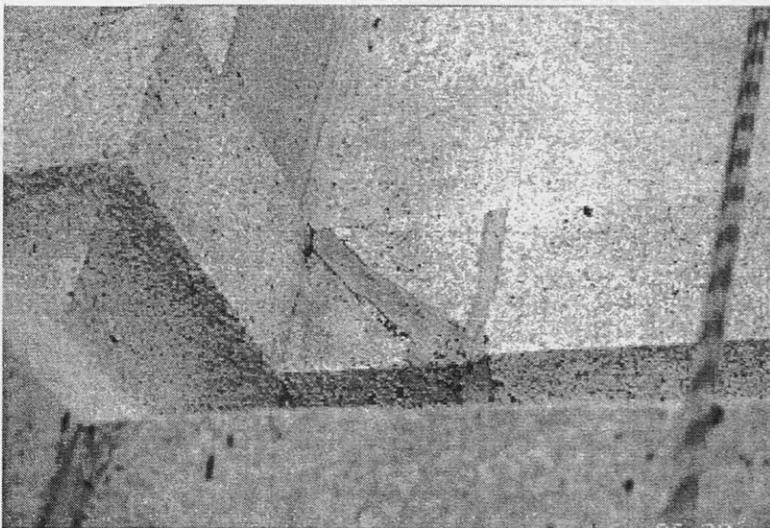
### **Specific Observations**

#### ***Podium Wall***

Vertical cracks were observed in granite units near the base of two of the eight Podium Wall corners. The cracks extend through several units. One crack was caulked with sealant, whereas the other was not sealed. Vertical cracks may be the result of high stress concentrations near the wall corners or unaccommodated wall movement.<sup>49</sup> Previous repairs, including Dutchmen repairs were also noted.



*Figure 4-28*  
Sealant has been applied to scroll work at the base of the Dome where cracking has occurred.  
Photo: Wiss, Janney, Elstner Associates, Inc.



*Figure 4-29*  
Sealant has been used between numerous granite units and in areas where cracking could result in an imminent spall.  
Photo: Wiss, Janney, Elstner Associates, Inc.

### ***Lower and Upper Drum***

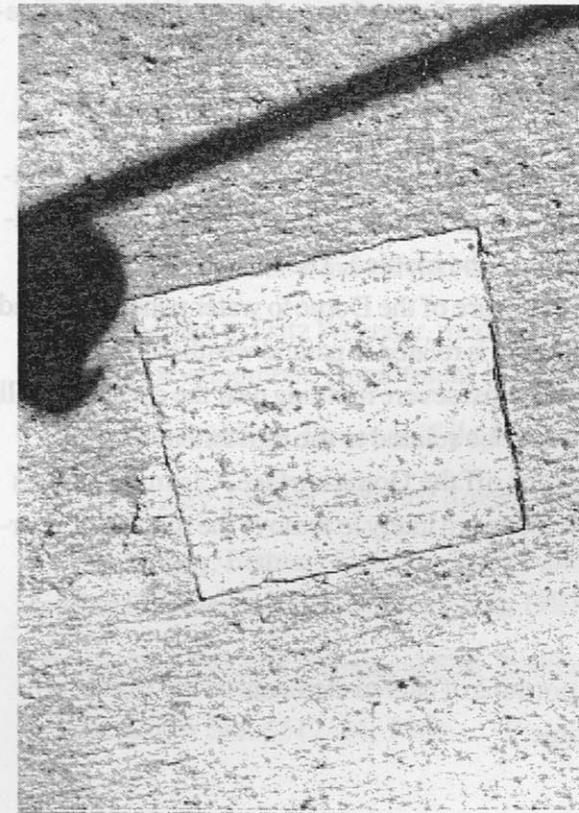
In the Lower Drum and Upper Drum, previous repairs such as mortar replacement, sealant caulking, and Dutchmen repairs were observed, with eleven previous repairs noted on the statues. Surface erosion, consisting of a highly roughened surface texture and loss of surface, and dirt accumulation were also observed on the freestanding statuary.<sup>50</sup>

### ***Dome***

#### ***Dome Cladding Movement***

Twenty-one of the twenty-four decorative scroll units at the base of the Dome were observed to be cracked, indicating movement of the Dome base. Several cracks extend through the full height of the scroll unit, with most scrolls observed to be cracked on both the left and right faces. Approximately half the cracks are covered with sealant; the remaining cracks are not sealed. None of the cracked granite units have loose sections of granite.<sup>51</sup>

The cracking pattern of the granite scrolls indicates unaccommodated differential movement between the steel structure of the Dome and the granite blocks. Movement at the support points of the Dome trusses corresponds to the cracks observed in the scrolls because the thinnest portion of the granite cross-section at the Dome base is within the scroll. Typically, expansion joints were not incorporated in the Dome construction. Because the Dome was built using brick masonry, which is



*Figure 4-30*  
This granite unit features a Dutchmen repair, where a precut granite piece is inserted into a worked opening that had previously deteriorated.  
Photo: Wiss, Janney, Elstner Associates, Inc.

subject to permanent moisture-related and cyclical temperature-related expansion, expansion of the cladding system occurs. Differential movement also occurs between the Dome cladding and the Dome structure due to differences in construction materials. Cracking can result where Dome movement and differential movement are not accommodated by the joints. Cracking of the scrolls may also be related to high stresses caused by the weight of the granite above the scrolls.<sup>52</sup>

#### ***Cracked and Spalled Granite Units***

Of approximately 1,000 granite units cladding the Dome, 26 were observed to be cracked or spalled. Most of the cracks are hairline in width. The spalled units result from a chip or section of the granite, known as a spall, that has fallen away from the larger piece. Of the cracked units, 15 are cracked to the edge of a granite panel and therefore may have portions of granite that can become loose. This condition is also termed as an imminent spall.<sup>53</sup>

Other than the cracks at the scrolls, all cracks observed on the Dome were localized individual cracks within units. Many appear to be related to naturally occurring flaws in the stone. Another cause of this cracking is stress concentrations from loads, such as the granite weight and wind, carried by the Dome cladding.<sup>54</sup>

#### ***Dutchmen and Previous Repairs***

Previous repairs, including granite Dutchmen and reinstallation of cracked portions of the granite units, were observed to have been installed at forty-six locations on the Dome, including the scrolls at the Dome base. Previously installed repairs may become loose in the future. It was observed that no indication of ties to mechanically attach repairs to adjacent panels was externally visible.<sup>55</sup>

#### ***Mottling***

Mottling of the granite was observed over the Dome surface, including infill panels and rib panels. Mottling was observed on almost all Dome panels, but was most evident at the center of infill panels. In addition, granite panels between the scrolls were also observed to be mottled. The extensive mottling of the granite surface on the Dome is related to the overall exposure of the Dome to water penetration and other weather conditions. Laboratory studies indicate mottling is related to natural weathering of the stone. The specific cause of the pattern of mottling, with the most severe mottling near the center of infill panels, has not been determined. The mottling pattern may be related to the movement of water through the granite units or to the way in which water runs off the Dome surface. Cleaning studies indicate only aggressive methods that would damage the stone are likely to remove the mottled appearance.<sup>56</sup>

#### ***Dirt Accumulation***

Localized dirt accumulation was observed in sheltered portions of carved elements on the Dome, although overall dirt accumulation is not severe on the Dome.<sup>57</sup>

#### ***Mortar and Sealant Joints***

The joints of the Dome are covered with sealant, which has deteriorated and is in poor condition. The sealant was typically observed to be cracked, alligatored, split, and debonded. Evidence of water previously entering through the Dome joints was found inside at two locations. The condition of mortar joints between the granite panels of the Dome could not be observed due to sealant placement over the mortar joints. Often the granite immediately adjacent to the sealant joints exhibits a dark-colored stain. Joints between Dutchmen repairs and the adjacent granite units were usually found intact and filled with mortar.<sup>58</sup>

The top horizontal edge of granite infill panels was typically found to be sloped to allow water to drain from the exposed surfaces between panels. In a few areas the slope was inadequate or toward the inside, not allowing the water to drain completely off the wall. Usually this condition coincided with deterioration of the sealant. An interior inspection of the Dome did not reveal any correlation between water infiltration and the improperly sloped granite.<sup>59</sup>

Joints between granite panels of the Dome have been covered with sealant as the mortar within the joints has deteriorated. Based on the interior inspection of the Dome, the sealant has been effective in preventing significant water infiltration, except for two localized areas of sealant deterioration. As sealants of this type have a service life of seven to ten years, observations indicate that the existing sealant has completed its useful life. Some staining of granite surfaces adjacent to joints may be related to the use of primers during previous sealant installations.<sup>60</sup>

#### ***Peregrine Falcons Recovery Program at the Lantern***

Through the efforts of the Wisconsin Peregrine Society and the Department of Natural Resources, the State of Wisconsin began a peregrine falcon recovery program in 1987 by releasing peregrines into the Wisconsin landscape. In 1991 two peregrines attempted nesting on a sloping ledge of the Capitol Dome. Ken Vind, State Carpenter for the Capitol Buildings and Grounds, assisted the birds in April 1992 by building them a nesting box that was placed on the walkway adjacent to the Lantern's balustrade facing King Street. The male peregrine returned yearly and in 1995 three young males were hatched and fledged. In 1996 two male peregrines returned.

Throughout the Capitol restoration and renovation project, the Capitol Building and Grounds Staff and private contractors have worked closely with "peregrine personnel" to ensure an inhabitable environment. At critical junctures construction workers have been able to complete their work in such a way that the spring arrival of the birds has not been jeopardized.<sup>61</sup>

## Notes

<sup>1</sup> Eldon Hauck, *American Capitols* (Jefferson, N.C.: McFarland, 1991); Willis J. Ehlert, *America's Heritage: Capitols of the United States* (Madison, Wis.: State House Publishing, 1993); Jean Daniel and Price Daniel, *Executive Mansions and Capitols of America* (Waukesha, Wis.: Country Beautiful, 1969); tour guides, telephone interviews by Jessica Powers, 1996.

<sup>2</sup> "Dome of the Wisconsin State Capitol," *Engineering News* 70, no. 9 (28 August 1913), 390.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> Wiss, Janney, Elstner Associates, Inc., *Exterior Survey and Analysis of the Wisconsin State Capitol: Dome, West Wing, and Northwest Pavilion*, No. 930782 (Madison, Wis.: Division of Facilities Development, 7 March 1994), 12.

<sup>6</sup> Ibid., 12.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid., 18.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid., 12, 18.

<sup>13</sup> "Dome of the Wisconsin State Capitol," *Engineering News*, 393.



*Figure 4-31*  
The box on the Lantern's balustrade has encouraged peregrine nesting at the Capitol's lofty height.  
Photo: Department of Administration

<sup>14</sup> Ibid., 393-394.

<sup>15</sup> C. A. Holst, ed., *The Wisconsin Capitol, Official Guide and History*, 4th ed. (Madison, Wis.: Lathrop and Cook, 1921), 23; Anton Rajer, *Wisconsin Statue Conservation and Regilding Project*, Report for Division of Facilities Development, Department of Administration, 1990.

<sup>16</sup> Ibid.

<sup>17</sup> Wiss, Janney, Elstner, *Exterior Survey and Analysis*; "Repointing Granite Dome," Work Order No. 5070 (Madison, Wis.: Bureau of Engineering, Division of Facilities Development Microfilm Files, October 1957, work completed 9 October 1958), records destroyed; Work Order No. 5312, 1962, records destroyed; Work Order No. 6202-22, (1962), records destroyed; "1966 Tuck Pointing," Project No. 6512-27, February 1966. Specifications for repointing the exterior granite indicated the contractor was to "cut out mortar from weathered or otherwise defective joints and repoint defective joints, and to caulk wash joints and other joints designated by the Owner." The specifications called for every joint "with over 1/8 in. erosion, and every joint which shows a visible crack shall be ground or dug out to the full width of the joint and to a depth of 3/4 in. or more to solid mortar. Any joint which is to be tuck pointed shall be raked out the full distance between transverse joints." The joint was to be finished in a slightly concave shape at the surface of the stone. "Wash joints" and other designated joints were to be ground or dug out to a depth of 1/4" and caulked with sealant supplied by the owner. Polyethylene foam was to be used "for new backing, when required."

<sup>18</sup> "Cleaning the Exterior of the State Capitol," Project No. 6410-22, October, 1964. Specifications for cleaning the exterior of the Capitol were written in October 1964, but no exact cleaning method was specified. A memo dated 12 April 1965, prepared by John Short, Bureau of Purchases and Services, and distributed to parking permit holders, gave the only clue to the possible method. This memo stated: "The acid content of the cleaning solution is sufficient to cause damage and [it] is impossible to control wind carried spray."

<sup>19</sup> John Freeman to Fritz Wegener, memo, 2 February 1981, No. 8012-04 (Madison, Wis.: Division of Facilities Development, Department of Administration).

<sup>20</sup> Project No. 7912-03, Structural File, Roofing File, General File, Masonry File, 1982.

<sup>21</sup> Wiss, Janney, Elstner, *Exterior Survey and Analysis*, 7.

<sup>22</sup> Wiss, Janney, Elstner, *Exterior Survey and Analysis*, 7; Project No. 7912-03.5, Structural File, Roofing File, General File, Masonry File, 1982.

<sup>23</sup> Project No. 7912-03, Structural File, Roofing File, General File, Masonry File, 1982.

<sup>24</sup> Work Order No. 6512-24, 1966.

<sup>25</sup> Report prepared on 13 May 1987 by Al Isberner indicated presence of many debonded tiles.

<sup>26</sup> Project No. 91926.5, Microfilm No. 5516, 22 August 1995.

<sup>27</sup> "Miss Forward's Getting All Dolled Up," *The Capitol Times*, 11 July 1957.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Mike Bath, interview by Joyce Rae Inman, 21 February 1996.

<sup>31</sup> Anton Rajer, *Wisconsin Statue Conservation and Regilding Project*, 1990.

<sup>32</sup> Ibid.

<sup>33</sup> Mike Bath, interview by Joyce Rae Inman, 21 February 1996; Christopher M. Anderson, telephone interview by Joyce Rae Inman, 2 May 1996.

<sup>34</sup> Anton Rajer, *Wisconsin Statue Conservation*, 2.

<sup>35</sup> Mike Bath, interview by Joyce Rae Inman, Wisconsin State Capitol, 21 February 1996.

<sup>36</sup> John Freeman to Fritz Wegener, memo, 2 February 1981.

<sup>37</sup> Wiss, Janney, Elstner, *Exterior Survey and Analysis*, 7.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid., 21.

<sup>40</sup> Ibid., 28.

<sup>41</sup> Ibid., 28, 30.

<sup>42</sup> Ibid., 30, 40.

<sup>43</sup> Ibid., 30.

<sup>44</sup> Ibid., 32.

<sup>45</sup> Ibid.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid., 36.

<sup>48</sup> Ibid., 36-41.

<sup>49</sup> Ibid., 25.

<sup>50</sup> Ibid., 40.

<sup>51</sup> Ibid., 44.

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid., 44, 45.

<sup>56</sup> Ibid., 45.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid., 47.

<sup>61</sup> Sumner Matteson, telephone interview by Joyce Rae Inman, 21 May 1996; Ron Seely, "Peregrine Falcon Back in Town," *Wisconsin State Journal*, 12 May 1994; Ron Seely, "Falcons Aloft," *Wisconsin State Journal*, 26 July 1955; Ron Seely, "Fight of the Falcons," *Wisconsin State Journal*, 19 July 1995; Ron Seely, "New Rite of Spring: Peregrin Falcons Return to State Capitol," *Wisconsin State Journal*, 4 May 1996.

### Peregrine Falcon Recovery Program at the Lantern

Through the efforts of the Wisconsin Peregrine Society and the Department of Natural Resources, the State of Wisconsin began a peregrine falcon recovery program in 1981 in response to a sharp decline in Wisconsin peregrine falcon numbers. The Wisconsin Peregrine Society, a non-profit organization, was formed in 1981 to assist in the recovery of the Wisconsin peregrine falcon. In April 1992, the Wisconsin Department of Natural Resources, Bureau of Parks and Recreation, assisted in the recovery of the Wisconsin peregrine falcon by building a nest box on the lantern at the State Capitol Building. The nest box was placed on the walkway adjacent to the Lantern's balcony facing the Wisconsin State Capitol Building.





## ORIGINAL EXTERIOR DRAWINGS

## DRAWINGS

518-2008: Elevation and Section of Superstructure Cancelled

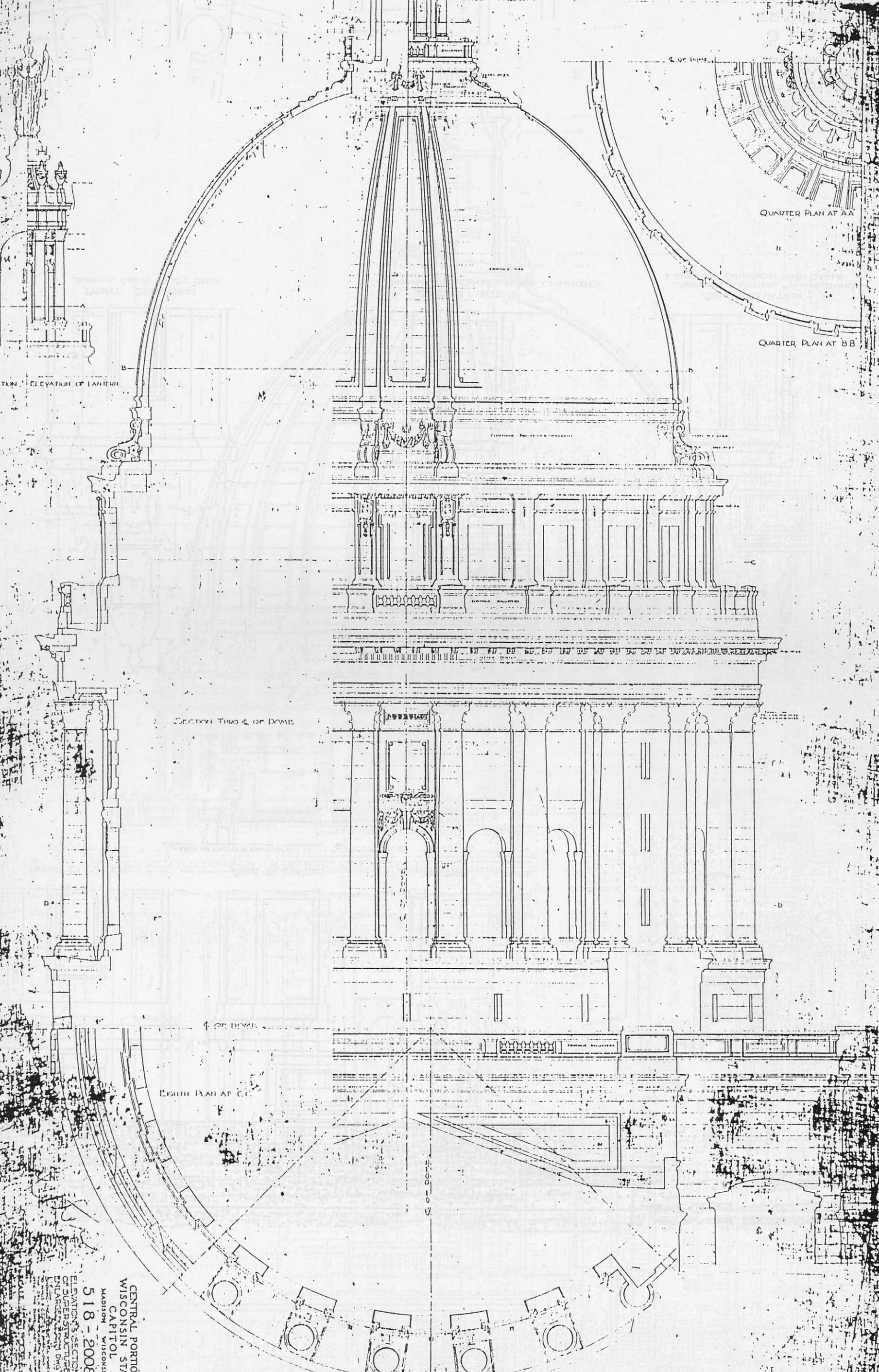
518-2010: Granite Work for Four Groups of Statuary on Pedestals at Base of Dome Replacing Tourelles

518-2014: Elevation and Section of Superstructure Structural Showing Balustrade of Podium Wall,  
the Drum with Peristyle, Base and Attic, the Dome and Lantern

518-2019: Elevation and Sections Superstructure of Dome from Grade +84'-5-1/2" to +175'-4" Structural

518-2020: Elevation and Sections Dome and Lantern from Grade 174'-5" to 267'-2" Structural

518-2078: Columns and Pilasters—First Floor of Rotunda Revising Drawings



QUARTER PLAN AT AA

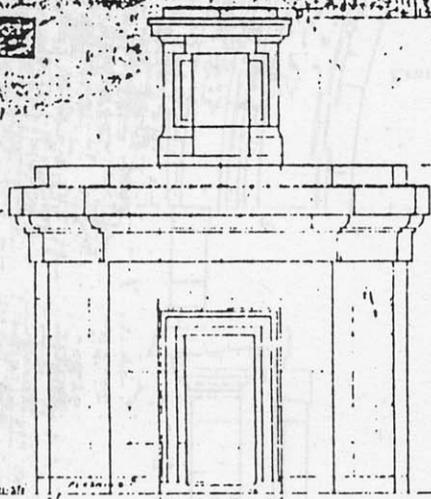
QUARTER PLAN AT BB

SECTION THIRD OF DOME

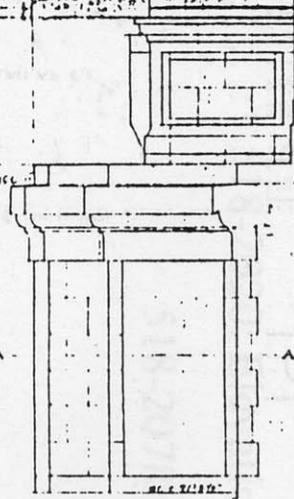
EIGHTH PLAN AT CC

SECTION ELEVATION OF LANIERN

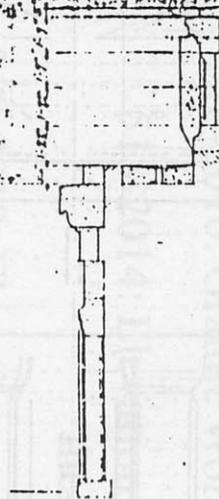
CENTRAL PORTION  
 WISCONSIN STATE  
 CAPITOL  
 MADISON WISCONSIN  
 518-2008  
 ELEVATION & SECTION  
 OF SUPERSTRUCTURE  
 BY ARCHT. FRANKLIN D. SMITH  
 1887



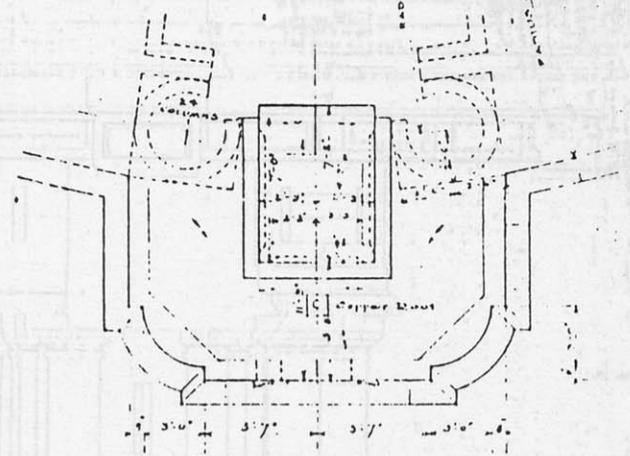
FRONT ELEVATION



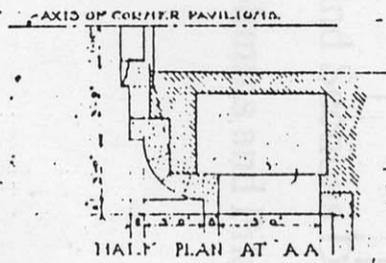
SIDE ELEVATION



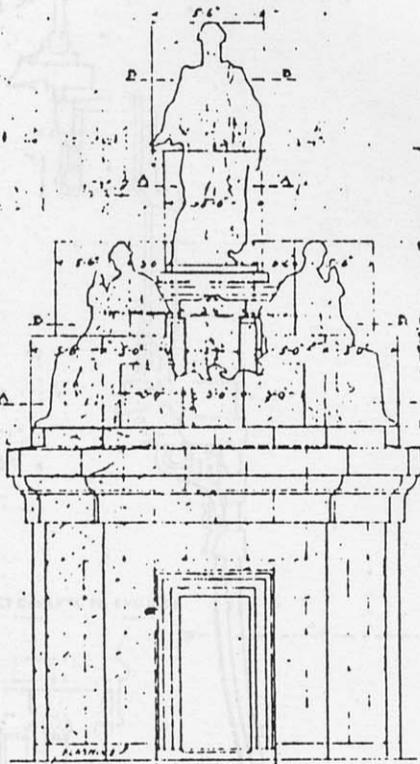
SECTION



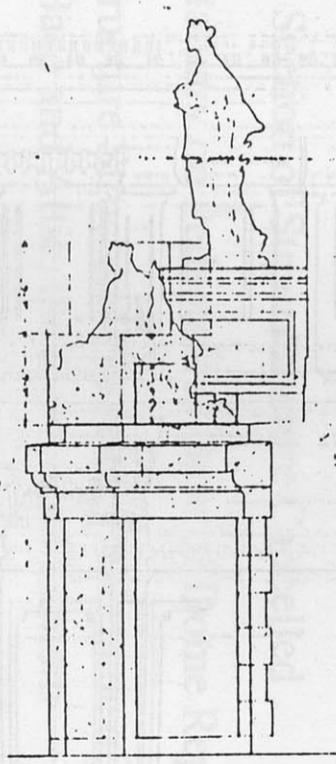
PLAN



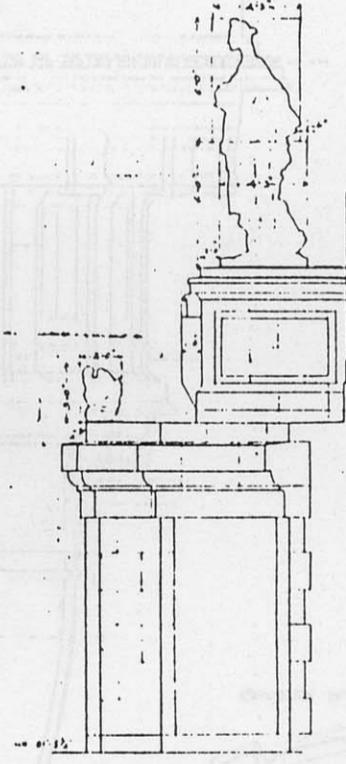
HALF PLAN AT A-A



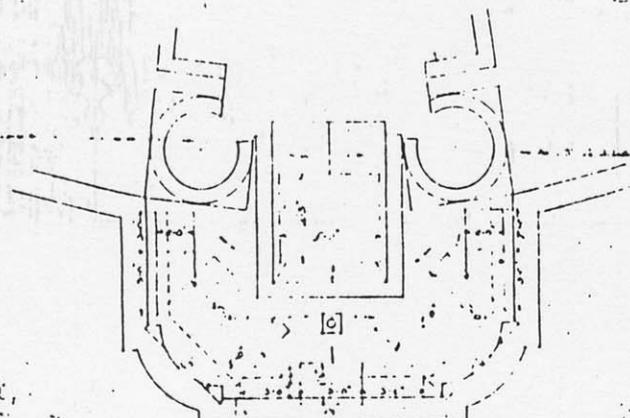
FRONT ELEVATION  
SHOWING GROUP OF STATUARY



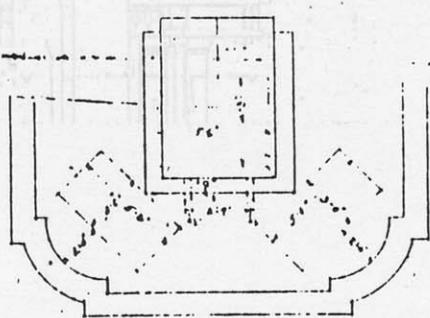
SIDE ELEVATION  
SHOWING THE FIGURES & SIDE ORNAMENTS



SIDE ELEVATION  
SHOWING CENTRAL FIGURE, SHIELD  
& CENTRAL ORNAMENT WITH EAGLE



PLAN ON LINE A-A  
SHOWING STONES FOR GROUP OF STATUARY



PLAN ON LINE B-B  
SHOWING STONES FOR GROUP OF STATUARY

CENTRAL PORTION  
WISCONSIN STATE  
CAPITOL  
MADISON WISCONSIN

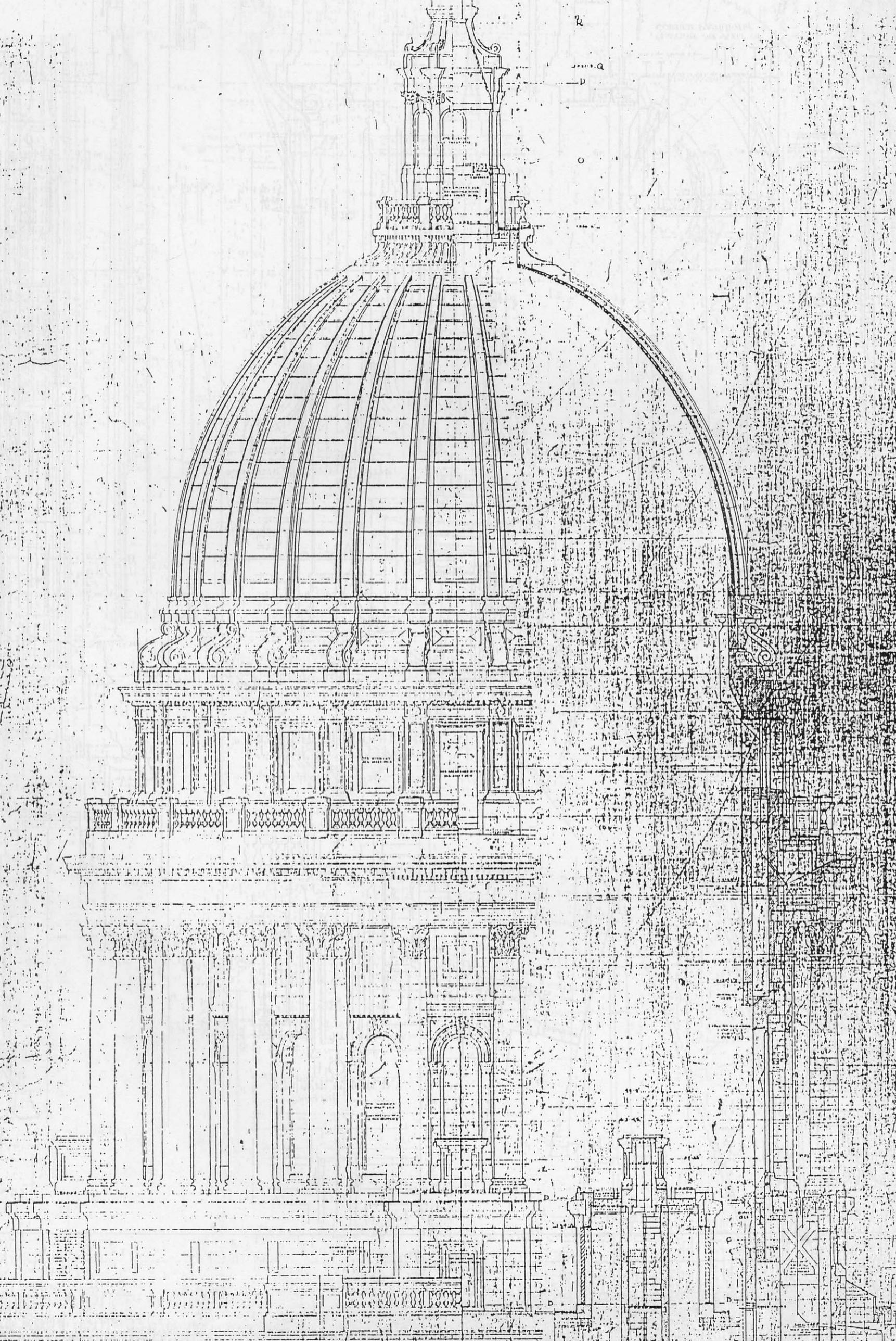
518-2010  
GRANITE WORK

FOR  
FOUR GROUPS OF  
STATUARY ON PEDESTALS  
AT BASE OF DOME  
REPLACING TOURNELLES  
TYPICAL GROUP SUBJECT  
TO ADJUSTMENT

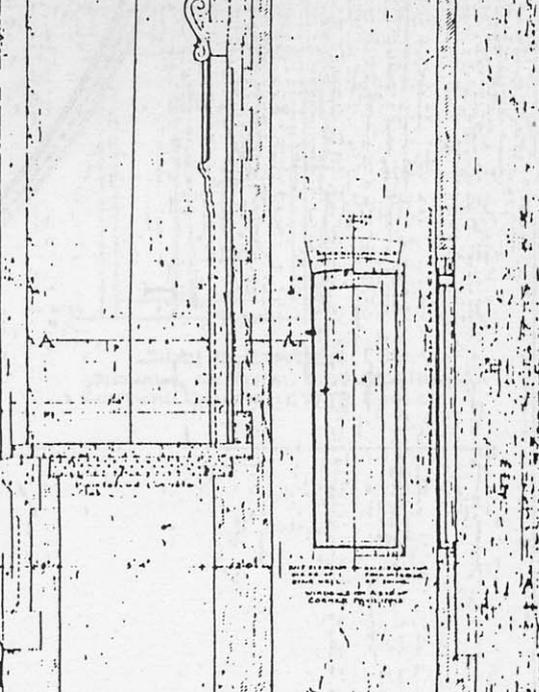
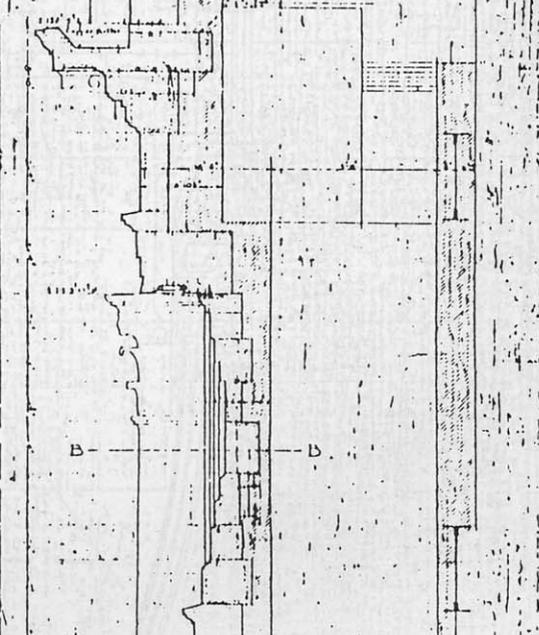
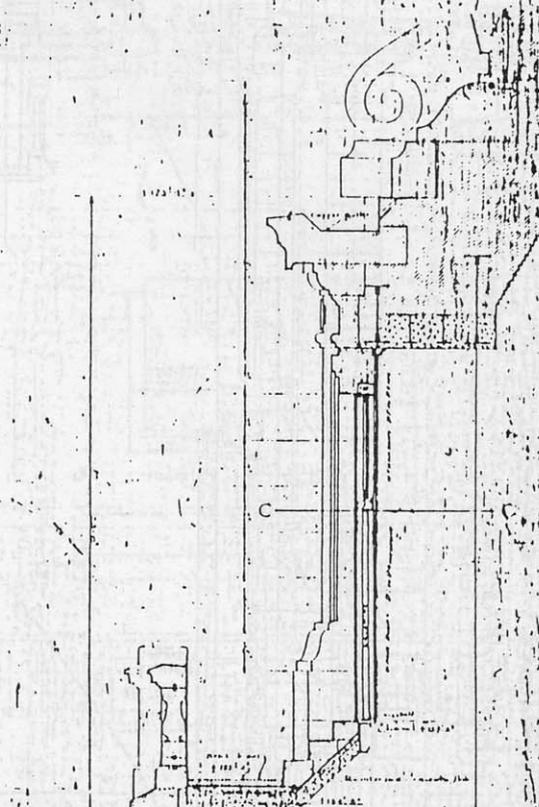
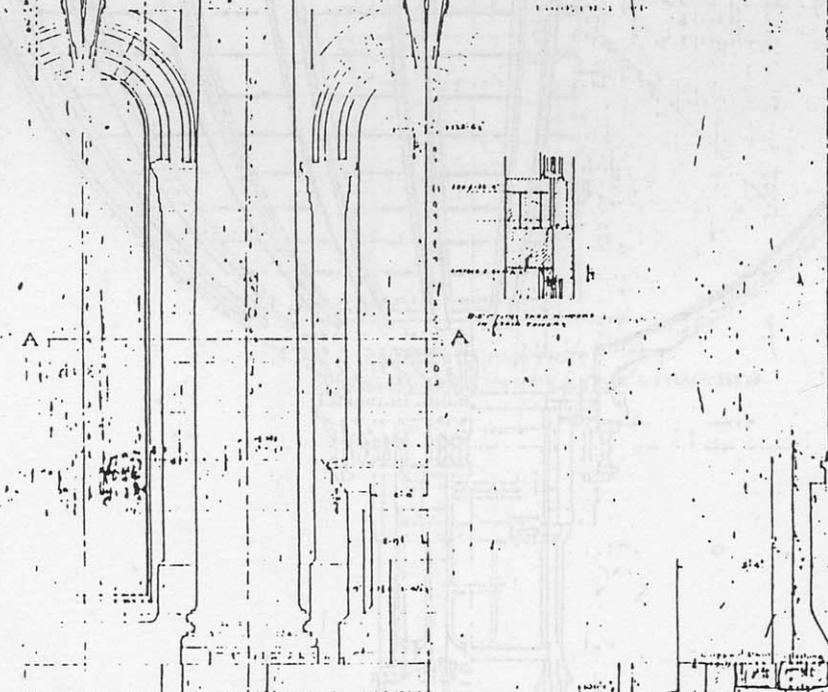
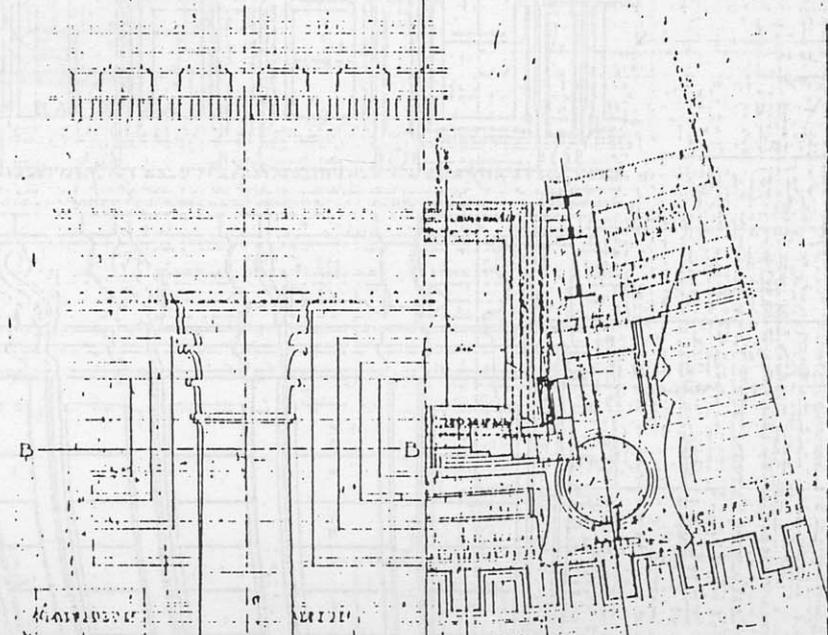
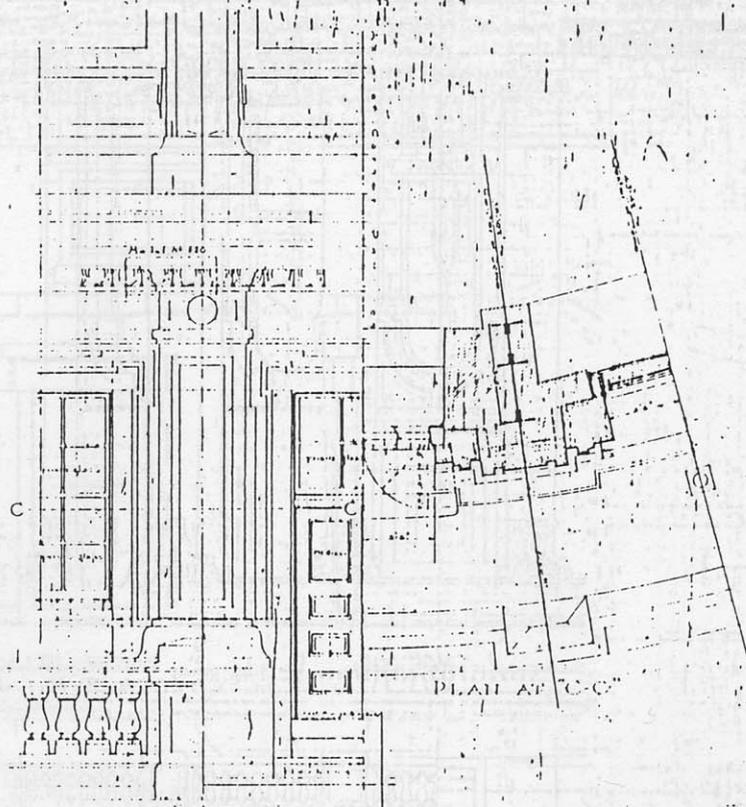
SCALE 1/4" = 1'-0"

FINISHED MARCH 26/07 REV. DATE 11/07  
BY ENGR. R. H. H. J. C.  
ISSUED AS WORKING DRAWING

THE CONTRACTOR SHALL VERIFY ALL  
FIGURED DIMENSIONS AND TAKE ALL  
MEASUREMENTS AT THE BUILDING.  
THIS DRAWING IS TO BE RETURNED TO  
GEO. B. POST & SONS  
ARCHITECTS



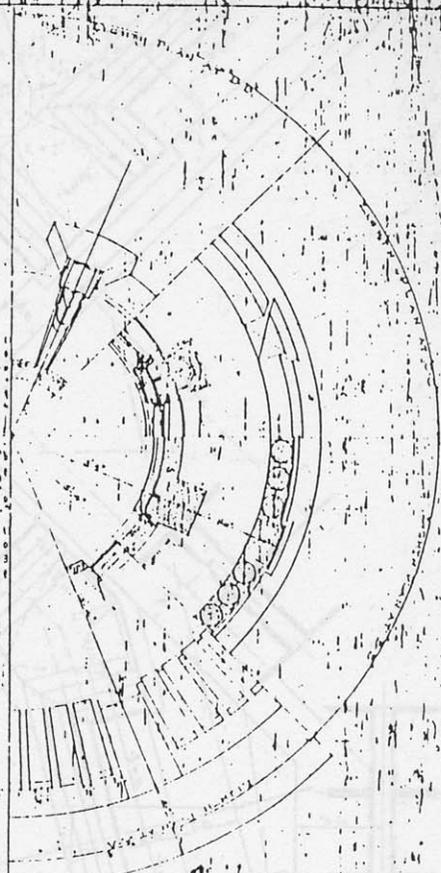
PROPERTY OF B. F. ...  
DRAWN BY ...  
CHECKED BY ...  
DATE ...  
518-20  
ELEVATION OF SUPERSTUR ...  
CAPITOL ...  
MADISON, WISCONSIN  
CENTRAL FOR ...  
WISCONSIN ...



SECTION ON CENTER LINE OF WINDOW

SECTION ON AXLE OF CORNER PANTHER

PLAN OF FORMER WALL EAST

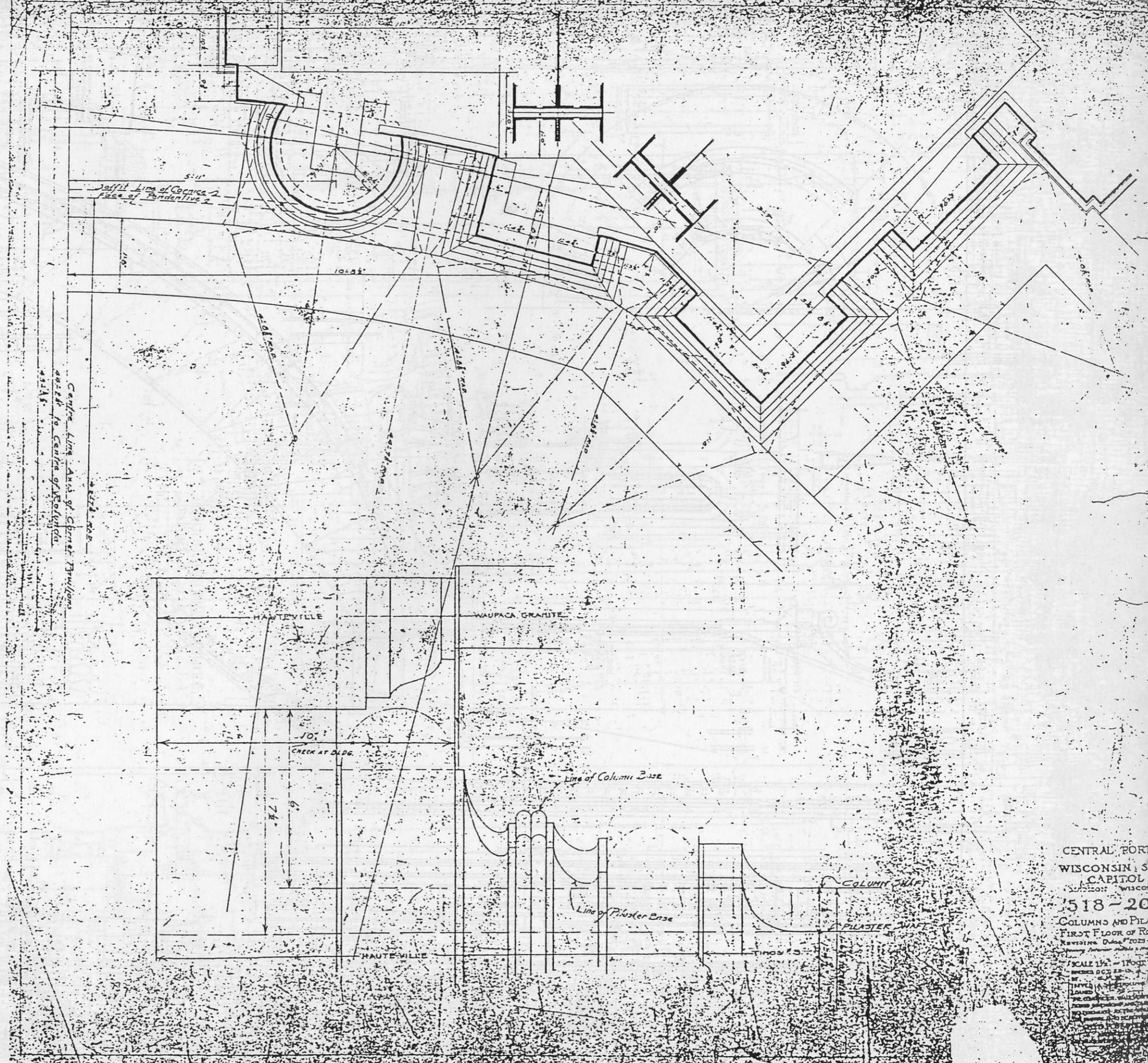


See Section on page 10  
No. 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000

DETAIL JOINTING OF THE  
MASONRY AT THE CORNER  
OF THE WALL

DETAIL JOINTING OF THE  
MASONRY AT THE CORNER  
OF THE WALL

*Handwritten signature or initials*



CENTRAL PORT  
 WISCONSIN STATE  
 CAPITOL  
 SECTION: WISCONSIN  
 518-20  
 COLUMNS AND PILASTERS  
 FIRST FLOOR OF ROTUNDA  
 REVISED DATE: 1923  
 SCALE 1/4" = 1 FOOT  
 DRAWN BY: [illegible]  
 CHECKED BY: [illegible]  
 APPROVED BY: [illegible]