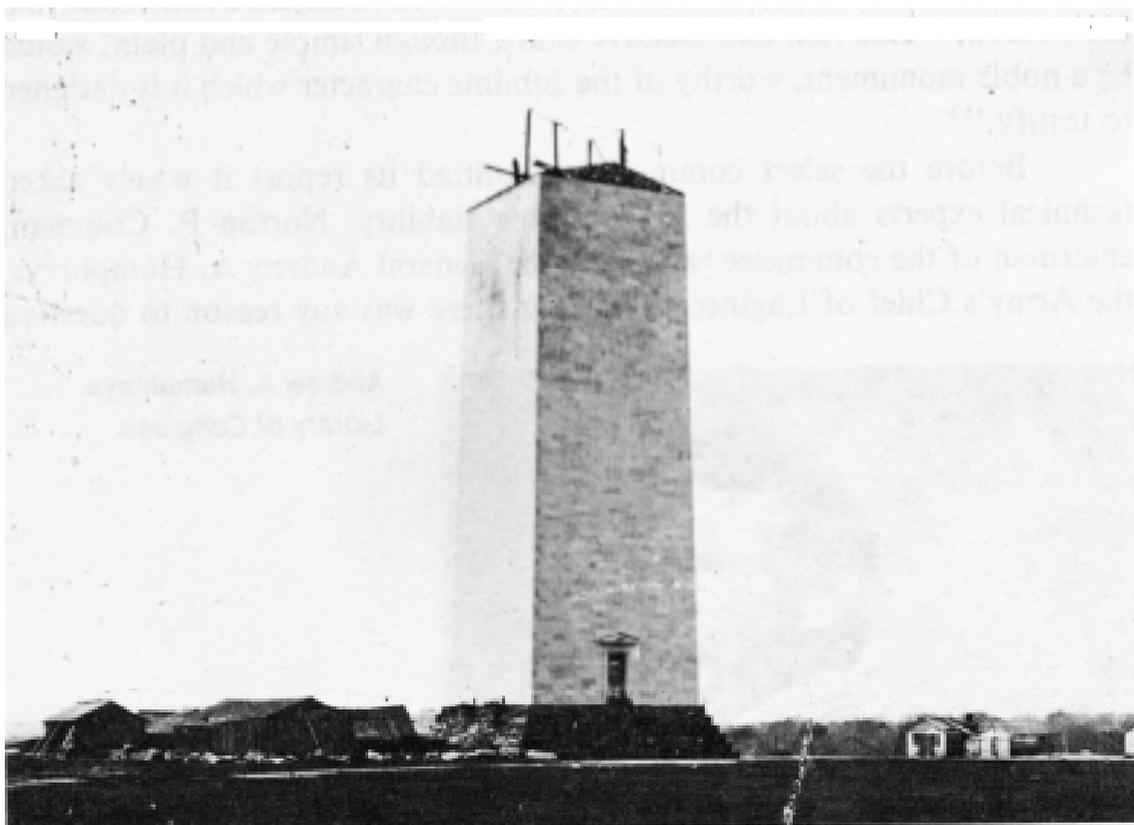


## Chapter IV

### REVIVAL OF INTEREST

#### Marshall's Investigations

Isolated voices occasionally decried the lack of interest in the monument and encouraged the nation to revive its efforts to build a memorial to Washington. *The New York Herald* called the unfinished monument "a disgrace to our people," and urged that it be completed immediately. The newspaper suggested a plan to reward individuals or corporations that contributed \$1,000 to \$5,000 by inscribing their names on a block of stone in the monument. Also, the Society's archives should maintain a list of those contributing \$100 to \$500. Some business organizations generously offered their services and material. One marble company offered to contribute all



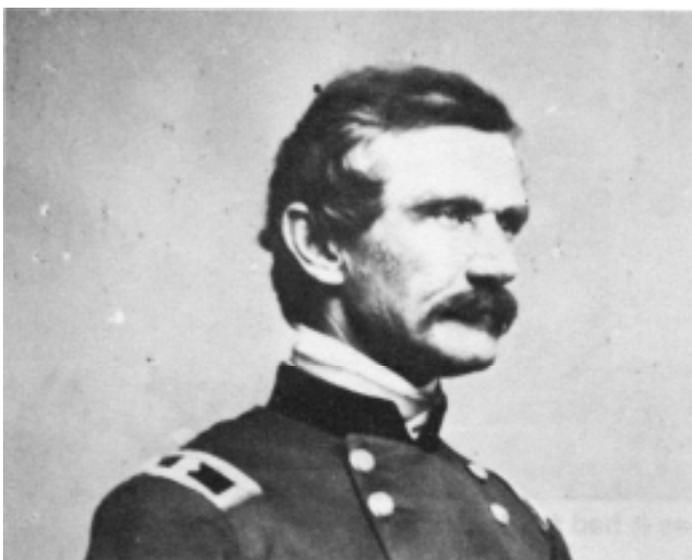
**The monument in 1878, standing as it had for 25 years. Library of Congress (photograph BH823-2).**

the marble necessary to complete the monument if the Society assumed the quarrying and transportation expenses.<sup>1</sup> Many of these proposals were unrealistic, and some even bordered on the ridiculous, but they did indicate a strong sentiment in the country to complete the monument.

In spite of the many postwar social and economic problems, interest in the monument gained momentum because of the country's forthcoming centennial. Speeches about the celebration flooded congressional halls. Newspapers all over the country saw the centennial as an opportunity to promote and hold interest in the monument. The Washington National Monument Society felt that it should seek congressional aid immediately. The Society opposed returning to the old system of relying on contributions, at least until construction continued. In a letter to the chairman of the House Committee for the District of Columbia, the secretary of the Society, John Carroll Brent, appealed to Congress for an appropriation so that work could resume. The House of Representatives received the request and on 27 January 1873 appointed a select committee to confer with the Society on how best to complete the monument in time for the centennial celebration.<sup>2</sup>

In less than a month the committee presented its report, concluding that the time was propitious for congressional action. After reviewing the monument's long history and agreeing on the suitability of the design and site, the committee reaffirmed the Society's belief that the elaborate and costly pantheon surrounding the shaft was not essential to the completion of the obelisk itself and could be added later. The committee concluded that the obelisk, "This rich and massive shaft, though simple and plain, would be a noble monument, worthy of the sublime character which it is designed to testify."<sup>3</sup>

Before the select committee submitted its report it wisely asked technical experts about the foundation's stability. Norton P. Chipman, chairman of the committee, asked Major General Andrew A. Humphreys, the Army's Chief of Engineers, whether there was any reason to question



**Andrew A. Humphreys.**  
*Library of Congress.*

the stability of the monument's foundation. Chipman wondered if the foundation had shifted or settled since Lieutenant Ives had tested it in 1859 and asked Humphreys to have a competent engineer examine the foundation. Chipman also requested estimates of the costs to complete the monument and build a plain but suitable base instead of a pantheon.<sup>4</sup>

Humphreys detailed First Lieutenant William Louis Marshall to this project. A young and bright engineer, Marshall presented his results within a few days. A graduate of the United States Military Academy in 1868, Marshall later distinguished himself in other areas of engineering and in western explorations. He became the Chief of Engineers in 1908. Marshall believed it was "practicable at present to present only the results of a necessarily hasty and superficial inspection of the monument and its foundation course."<sup>5</sup> Although Marshall studied Ives' report, the Society's records did not contain the original experiments and investigations conducted by Mills and his colleagues. This lack of information created a serious problem for engineers and other experts assigned to examine the monument in the 1870s.

Why the select committee gave Marshall so little time to investigate and report on a problem that they obviously considered a serious one remains a mystery. In any event, Marshall generally agreed with Ives' 1859 report. His examination failed to reveal any significant changes in the condition of the obelisk or its foundation. He objected to the blue gneiss stone in the foundation, which was not sufficiently uniform in texture and strength. He believed that dressed stone offered the greatest resistance to compression and would distribute the weight more uniformly over the bed of the foundation. Finally, he concluded that "all questions as to the stability of the shaft itself have been answered by Lieutenant Ives, in whose conclusion I concur." Marshall confessed that because of insufficient time, he could not estimate the cost of completion of the obelisk. He recommended building a simple, primarily earth terrace with a paved upper surface, "presenting the appearance of a massive obelisk shooting vertically from the solid earth."<sup>6</sup>

The select committee approved Marshall's report. Like Ives, Marshall presented "sufficient [evidence] that there is no ground for fear which has been expressed as to the security of the foundations." The committee recommended a congressional appropriation of \$200,000 to help the Society begin its work, but estimated that it would cost about \$700,000 to complete the shaft and provide a simple terrace. The committee thought that the Society could complete the obelisk in time for the centennial. Finally, the committee recommended that further Congressional appropriations be conditional on a competent engineer's thorough examination of the existing structure to determine if it could be safely built to a height of 600 feet.<sup>7</sup>

Although the committee accepted Marshall's study, others in Congress doubted the foundation's safety. The committee realized that it had

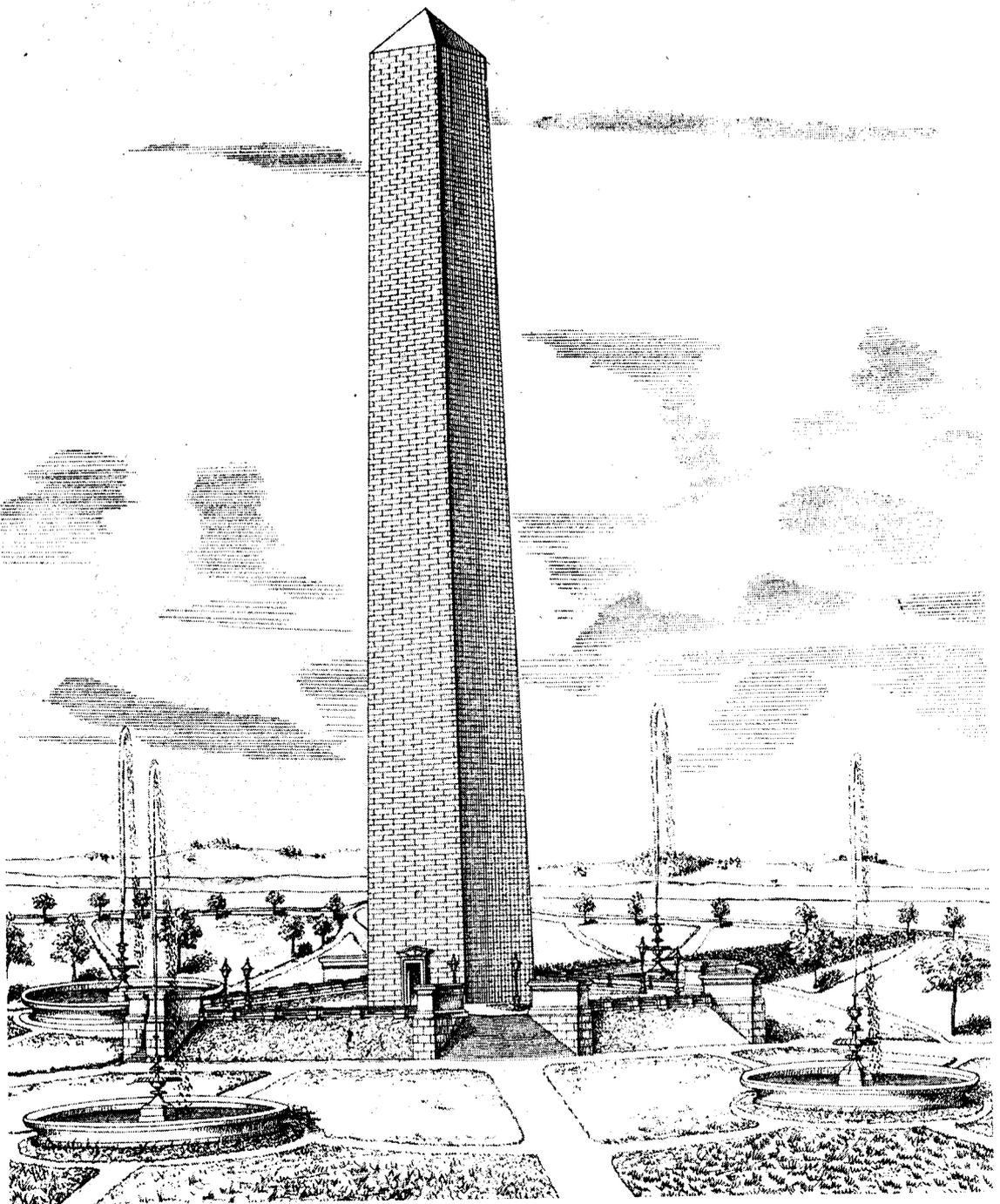
given the Corps of Engineers and Marshall too little time to prepare a thorough and comprehensive study. Because it was anxious to receive an appropriation as soon as possible, it tentatively approved Marshall's report pending further examination.

Congress adjourned before it could act on the proposed bill, but at the next session in January 1874, it reappointed the select committee to consider the monument question.<sup>8</sup> Not entirely satisfied with the Marshall report, the committee sought additional information from the Corps. It couched the new request in the same general terms as the first one, but it also asked for the cost and practicability of completing the shaft with brick in the interior. Furthermore, the committee wanted a precise estimate of the cost to complete a terrace at the base of the obelisk of approximately 4,000 square feet, rising about 17 feet, and containing steps and suitably paved approaches. Once again, it anxiously inquired whether the monument could be completed in time for the centennial.<sup>9</sup>

Marshall received this second task after returning from his western explorations. He now had more time to conduct field investigations, consult with experts, and finish the report. Three months later, on 20 April 1874, Marshall submitted his findings—a much more critical study than his earlier one. Basically, he repeated his earlier conclusion that the foundation was secure. He recommended a maximum height of only 400 feet because the foundation was too small to support a 600-foot structure. A monument of that size would cause “an excessive pressure upon a soil not wholly incompressible.” Marshall was quite sure that “as far as can be discovered in a careful examination of the structure, there are no sufficient grounds for doubting the security of the foundation under the present load.”

To minimize the weight of the shaft on the foundation, he proposed reducing the thickness of the walls from 11.46 to 7.3 feet and using a hard brick filling bonded at 30-foot intervals. He recommended that the Society construct the roof of the obelisk with cast-iron plates supported by wrought-iron beams and rods rather than with cloistered arches of stone. Finally, he proposed that the upper 200 to 250 feet of the shaft be constructed of brick, especially where the walls became thinner.<sup>10</sup>

Although Marshall's report failed to provide a cost estimate or a date for completion, it recommended some things that the select committee had not requested. Some of Marshall's suggestions, such as constructing the top 200 feet with brick and employing cast iron for the roof, were alien to the Mills design, and may have been objected to by Congress, the Society, and architectural circles. Generally the study met with approval because it supported the idea of retaining what was already built. The select committee agreed that a shorter obelisk “would be more graceful, and would be equally satisfactory to the American people.” It suggested a height of 437 feet, to which Marshall agreed. The committee also felt that a terrace would not only be “more harmonious” with the style of the monument than the



The plan for the completion of the Washington Monument recommended by the Select Committee of the House of Representatives. *Library of Congress (photograph USZ62-3968).*

original pantheon, which had elicited such strong criticism, but also more economical. On 1 May 1874, the committee rendered its report to Congress, along with Marshall's study, recommending passage of a joint resolution to provide a sufficient appropriation to complete the monument by 4 July 1876.<sup>11</sup>

As it had done so many times before, Congress failed to act. Time was running out with the centennial only two years away. Convinced that Congress would never come to its aid in time, the Society again appealed for funds.<sup>12</sup> Not expecting to be any more successful than in the past, the Society hoped it might shame Congress into passing an appropriation.

Congressional and public opposition to the monument centered around the foundation and the design. Many, especially in Congress, remained unconvinced that the foundation was safe. The plain obelisk contrasted sharply with Victorian principles of art and design. One newspaper referred to the monument as "a wretched design, a wretched location, and an insecure foundation."<sup>13</sup>

To allay congressional fears about the foundation's safety, Chipman requested Marshall to clarify further his statements on the foundation. Chipman did not believe that Marshall had been clear enough. Although the Engineer had recommended a lower height, he had not satisfied Congress that this shorter structure would still be safe on the existing foundation. Chipman was certain that if this point was clarified, Congress would pass an appropriation at its next session. Marshall quickly replied. Without examining the foundation further, he stated unequivocally that the monument could be built safely to 400 feet. He concluded by saying that "this is simply an individual opinion, and it is well to remark that the pressure will still be about as great as the maximum usually considered proper for such foundations."<sup>14</sup>

Perhaps it was unfair to ask one person to render an opinion of this magnitude, even one with Marshall's ability. Without seeking the committee's advice, the Corps of Engineers transmitted Marshall's report to the Board of Engineers for Fortifications, headquartered in New York City, for an evaluation. The board consisted of Brevet Major Generals John G. Barnard, Zealous B. Tower, and Horatio G. Wright.<sup>15</sup> Without making any field examinations, the board noted that according to Marshall's report the earth upon which the masonry foundation rested was already subject to a pressure of 4.8 tons per square foot of surface and had already settled some. The board reasoned that raising the shaft to 400 or more feet would add 1.8 tons more to each square foot of the earth's surface, thereby increasing the pressure. It concluded that "it is reasonable to infer that some subsidence will ensue from so large an increase." The board felt that five tons was an excessive pressure for soils composed of clay and sand to bear. "We could not...with the information before us, recommend that any *additional* pressure should be thrown on the site of the Washington Monument."<sup>16</sup>

The Board's conclusions disturbed the select committee, which had already accepted Marshall's findings. They also provided the skeptics in Congress and elsewhere with additional ammunition. General Humphreys concurred with the board and recommended that the Society make extensive borings around the foundation to determine the thickness and extent of any subsidence in the substratum. He then opened a Pandora's Box by suggesting consideration of another design that would place less pressure on the existing foundation. Humphreys proposed that "means be taken to obtain from architects...designs for finishing off the present shaft by some suitable terminal, and possibly by addition at the angles of the column."<sup>17</sup> This started an "esthetic argument seldom equaled in gentlemenly virulence, and a series of substitute designs unsurpassed for ambitious vacuity."<sup>18</sup>

### **Congress Passes an Appropriation and Appoints a Joint Commission**

The Board's conclusions further slowed progress in a Congress that already had been procrastinating. The approaching centennial and the news media, which produced a barrage of stinging attacks, most of them directed at Congress, eventually ended the impasse. Although the action came too late to finish the structure in time for the centennial, on 2 August 1876, Congress finally passed a \$200,000 appropriation to resume construction. The act stipulated that the Society would have to convey all rights, property, and easements to the United States, but would continue to solicit funds and act as an adviser in building and maintaining the monument. The act authorized the appointment of a Joint Commission to oversee construction. This commission, later referred to as the Joint Commission on the Construction of the Washington National Monument, was to consist of five members, including the President of the United States, the Supervising Architect of the Treasury Department, the Architect of the Capitol, the Chief of Engineers of the Corps of Engineers, and the First Vice-President of the Washington National Monument Society. The act also provided that before any work began on the monument, experts would examine the foundation to determine whether it was strong enough to sustain the completed structure. If these experts found the foundation inadequate, Congress was to be notified so that it could take appropriate measures.<sup>19</sup>

Congressional opposition to the appropriation stemmed from objections to the foundation, site, or design. The provision to examine the foundation before any work began partially mitigated objections about the foundation's weaknesses. However, the bill did little to satisfy critics of the design and site. During the debates, one senator called the design a "blot upon architecture."<sup>20</sup> Many suggested that they completely demolish the

unfinished monument and build a new one designed in a more Victorian style.

On 30 March 1876, the Society declared that “all idea of surrendering the character of the Monument or allowing the structure, as far as completed, to be taken down, should be positively and emphatically disavowed.”<sup>21</sup> The Society thereby fulfilled an obligation to those who had made their contributions to the monument through the years believing that the structure would be built according to the Mills design, albeit somewhat modified. However courageous the Society’s stand on this issue, it did not stop the criticism.

On 12 September 1876, the Joint Commission on the Construction of the Washington National Monument met to organize in the offices of the Society. William W. Corcoran, First Vice-President of the Society, Edward Clark, Architect of the Capitol, and James G. Hill, Supervising Architect of the Treasury Department, attended the meeting. General Humphreys and the President could not attend. The commission appointed Corcoran president and Hill secretary. After selecting its officers, the commission immediately agreed to request the Secretary of War to appoint a board of engineers to examine the foundation as provided for in the act.<sup>22</sup>



**William W. Corcoran.** *Library of Congress.*

At its second meeting on 22 November the commission appointed General Humphreys disbursing agent. In the meantime, the Society, abiding by the provisions of the act, transferred the land, the unfinished obelisk, and all temporary structures, machinery, and materials to the United States.<sup>23</sup>

## **A Board of Engineers Rejects the Ives and Marshall Reports**

The board of engineers appointed by the Corps of Engineers to examine the stability of the foundation consisted of Lieutenant Colonel John D. Kurtz, Lieutenant Colonel Quincy A. Gilmore, and Lieutenant Colonel James C. Duane.<sup>24</sup> The board immediately dispatched Engineer Second Lieutenant Dan C. Kingman to evaluate the monument's foundation. After reviewing Kingman's report, the board concluded that the stratum of sand and clay upon which the foundation rested was already loaded to the limit of prudence, if not to the limit of safety. The earth was not sufficiently resistant to compression to justify completing the monument to the modified height of 437 feet. Nor would another design correct this weakness in the foundation.

Second, the report stated that the added weight that would be placed at the top of the shaft would probably cause extensive spalling and splitting in the ashler marble at the base.

Third, the board noted that the foundation masonry was not spread sufficiently to safely carry the full weight of the shaft. If the spread of the foundation had been greater, the weight of the shaft would have been distributed over a wider area.

Finally, the board concluded that the soil had been compressed as much as 8 or 9 inches. There was evidence that the shaft was out of plumb, and the foundation courses showed an "increasing departure from horizontality." These imperfections would worsen as the structure rose, possibly not to a dangerous degree, but enough to make them discernible.

After outlining point by point what it objected to in the foundation, the board presented its opinion:

But this structure is to be an exposition to the world of the estimate which is placed upon Washington by his countrymen. It is a great, bare obelisk, plain to severity, a conception perhaps most suitable to symbolize the great character it would commemorate, but for these very reasons, exacting in all its parts, and particularly in its foundations, all the perfection of elements and details that can be given to its material and workmanship. The stones which compose the foundation should be strong and perfect, truly shaped and accurately placed together. There should be no yielding of the parts, and no disturbance of the levels.

Upon such a foundation, a monument could be reared fit to commemorate Washington, and worthy of the nation of whose foundations he was the chief master builder.<sup>25</sup>

The board did not confine itself to a study of the foundation. It found that the ashler marble had been too closely jointed on the exterior. As a result, a number of marble blocks had yielded under the pressure and broken in two transversely. Many other blocks were badly chipped and

spalled along the horizontal joints.<sup>26</sup> Marshall and Ives had pointed out these same defects, but neither had emphasized the seriousness of this condition.

When the Joint Commission received the Engineers' report, it agreed not to take any action other than to have it printed and forwarded to the Society.<sup>27</sup> The Society did not receive the study with enthusiasm. It feared that if the report were taken seriously, all activity on the monument would cease and it would be years before any new interest could be generated. The Society appointed a review committee, which concluded that it "was not so exhaustive and satisfactory, as to relieve the subject from doubt." The committee believed that neither the Society nor the country would abandon the project because of a study that they characterized as containing "palpable" errors and that was at variance with earlier studies prepared by capable men.

The committee accused the Board of Engineers of not having given the study their personal attention and of having visited the site on only two or three occasions, each time remaining not more than an hour. It found unclear and contradictory statements in Lieutenant Kingman's field work. It admitted that a few of the marble blocks had cracked transversely, but the foundation remained essentially unchanged since 1853. The committee insisted that the foundation rested on "solid, compact clay" and not on a compressible bed of sand and clay as the Engineers had reported. The board's study contradicted all the facts and information in the Society's possession. The committee accused the board of concerning itself with matters that it was not asked to discuss: the board was to report only on the sufficiency of the foundation, not on the shaft or construction materials.

Finally, the committee charged the engineers with using the wrong stone as a bench mark for measuring the settlement of the structure. As a result, the settlement was registered at almost nine inches. The committee considered this a serious mistake. It concluded its review by saying that any inadequacy in the foundation could be remedied by underpinning and enlarging the area without injuring the existing structure.<sup>28</sup>

The committee's review, which received the Society's approval, belittled the ability of men highly esteemed in their professions. However justified it might have been on some points, the vitriolic tone weakened the report. Still, it is not difficult to understand the Society's reaction. For many years it had endured insults, embarrassments, and failures, many of them unjustified. Its efforts to raise private and public funds, however ineffective, were well intentioned. Much of the failure to complete the monument rested with Congress. Moreover, the Ives and Marshall reports had suggested that any inadequacies in the foundation and the shaft could be remedied. After Congress finally passed the long-awaited appropriation, signaling the resumption of construction, the Board of Engineers dropped its bombshell. Society secretary John Blake explained that organization's

frustrations. He said that no question had ever been raised about the foundation until years ago when some critics decided that the monument's design was not sufficiently ornate and offered other designs in its place. Blake complained that questions about the adequacy of the foundation stemmed from efforts to convince the public that the unfinished shaft should be torn down and another built in its place. He believed that the public was convinced that there was basically nothing seriously wrong with the foundation.<sup>29</sup>

On 31 May 1877, the Society forwarded the committee's reply to President Rutherford B. Hayes, suggesting that the committee and the Board of Engineers meet to reconcile their differences.<sup>30</sup>

The orders appointing the Board of Engineers did not require the board to recommend remedies if it found any defects in the foundation. To correct this omission, General Humphreys reconvened the board in New York City to consider widening the area of the foundation and carrying it down to the gravel bed beneath the compressible stratum of sand and clay. Six weeks later the board submitted its answer, suggesting two alternatives but recommending only one. The first proposed replacing the bed of clay and sand under the foundation with solid masonry. The board rejected this plan because of the delicate nature of the operation. The second plan consisted of circumscribing the existing foundation with a wall sufficiently thick and stable to resist any lateral movement of the soil that might occur with the added weight of the completed monument.<sup>31</sup>

Although the Corps of Engineers sought to make amends for its failure to recommend corrective measures for the foundation, the Society remained adamant and sought professional, scientific, and technical advice from other quarters. In a strongly worded letter to President Hayes, who had become involved in the monument's affairs as a member of the Joint Commission, the Society flatly stated that it neither concurred with the Engineers' findings nor approved of their remedy. Repeating what its three-member committee had already said, the Society accused the Engineers of using the wrong stone for a bench mark. Like Ives and Marshall, it believed that the foundation was safe and noted that during the past 20 years the shaft had stood at its present height without any evidence of "subsidence or of deflection from the vertical that is visible to the naked eye, or can be palpably detected by the use of the most delicate instruments."<sup>32</sup>

The Society blamed the adverse publicity against the foundation on a group of architects who found the Mills design to be "inappropriate" and "heathenish" and who preferred something more ornate. After receiving no public encouragement, the Society argued, this group first vented their objections on the site. Finding no support there, they objected to the foundation.<sup>33</sup>

The board admitted that it used the wrong stone as a bench mark. It said in its defense that the Society had directed them to that stone. In all

other respects, the board held firm to its original findings, advising against additions to the shaft unless the Society added some underpinning of the kind suggested.<sup>34</sup>

By the end of October 1877, the Joint Commission had all of the board's reports as well as the Society's responses. In transmitting this data to Congress, the commission concluded that "it must be assumed that the foundation is insufficient to sustain the weight of the completed structure." Congress agreed. Another joint resolution, passed on 14 June 1878, authorized \$36,000 to strengthen the foundation.<sup>35</sup>

## **Lieutenant Colonel Casey Takes Charge**

Only a few days after Congress passed its appropriation for the foundation, the Joint Commission appointed two Army Engineers to assume charge of the project. Lieutenant Colonel Thomas Lincoln Casey, a career soldier with the Corps of Engineers, was to have complete control over construction. Captain George W. Davis, an engineer in the Infantry was to assist him in day-to-day operations. Casey's immediate superior, General Humphrey's, probably suggested Casey to the commission. Similarly, Casey probably recommended Davis as his assistant.<sup>36</sup>



**Lieutenant Colonel  
Thomas Lincoln Casey.**  
*Library of Congress.*

Casey's background and career made him an excellent choice. He was born in Sackett's Harbor, New York, on 10 May 1831. His father, Brevet Major General Silas Casey, also had a distinguished military career. After graduating first in his class from West Point in 1852 and being commissioned in the Corps of Engineers, Casey's first assignment was to rebuild Fort Delaware. He afterwards returned to teach at West Point for five

years. From November 1859 until 1861, the Army assigned him to Washington Territory supervising the construction of a road and selecting and surveying military reservations on Puget Sound. Soon after the outbreak of the Civil War, he was assigned to build the coastal defenses of Maine. There he made a name for himself by drawing most of the plans and developing his own skilled mechanics. Because of his accomplishments in this area, a private firm asked him to manage its plant. After seven months, he returned to the Army.

Due to his achievements with coastal defenses, in 1865 he was given the rank of brevet lieutenant colonel and was placed in charge of the Portland, Maine, Engineer Office. Beginning in November 1867 and for the next ten years, he headed the division of fortifications in the Office of the Chief of Engineers in Washington. A number of assignments in the capital gained him world-wide recognition. In March 1877, he became Superintending Engineer in Charge of Public Buildings and Grounds. He directed the construction of the State, War, and Navy Building, the Washington Aqueduct, the White House Conservatory, the Army Medical Museum, and other major works. Next to the monument, the State, War, and Navy Building was perhaps his greatest achievement.<sup>37</sup>

Davis' military career was different. Davis was born on 26 July 1839, in Thompson, Connecticut. In 1860 he became a tutor in Georgia, but the Civil War interrupted his teaching. The following year he escaped to the North, where he joined the 1 lth Connecticut Infantry and served in several campaigns. He remained in the Infantry after the war and became a brevet major. He was appointed captain in the Regular Army in 1867. While stationed in the Southwest he was placed in charge of building operations, after which he became Casey's assistant on the monument.

Bernard Richardson Green, a civilian with the Corps of Engineers,



**Bernard Richardson Green.**  
*Library of Congress.*

assisted Casey and Davis. The three men had the highest mutual regard and worked well together. Green and Davis highly praised Casey's work. Davis, who spent much of his time at the monument administering contracts and handling the daily affairs of construction, frequently acted for Casey in the latter's absence, but always deferred a decision that he felt was beyond his authority. Many important and complicated features of the work performed during the construction of the monument were the result of suggestions made by both Davis and Green.

The print on his orders had barely dried when Casey wrote to Corcoran that he was reporting to the Joint Commission for further instructions. He suggested that two rooms in the building occupied by the Office of Public Buildings and Grounds at the corner of 17th and F streets Northwest (the Widener Building) become his office. As the Engineer in Charge of Public Buildings and Grounds, he was working in the building already. He wanted authority to supply the rooms as soon as possible with "such cheap office furniture as may be necessary." He also recommended hiring one clerk at \$100 a month and one draftsman at \$5 a day, the latter to be used only when needed. Finally, he proposed that all papers, plans, documents, and reports relating to the monument "should be placed in my hands" so that he could acquaint himself with all the data on the monument.<sup>38</sup>

At its next meeting the commission voted to allow Casey his office and furniture as well as permit him control over all papers and documents concerning the monument. It also directed him to submit to the commission for confirmation the names of people selected to appointments along with their salaries. Casey immediately hired A. L. Edwards as his clerk and Gustav Friebus as draftsman.<sup>39</sup>

On July 1, the commission instructed him to prepare a plan for strengthening the foundation so that he could raise the monument to at least 525 feet above the existing foundation. The commission also directed him to prepare a monthly progress and status report and a return of officers and hired men. These comprised a progress and status report. The commission also wanted monthly estimates of funds needed. Casey was to procure all materials by contract after advertising and receiving the approval of the commission.<sup>40</sup>

In October 1878, B. F. Navarre was appointed overseer at a salary of \$150 a month. Two months later, the commission created a Building Committee, consisting of three members of the commission, to whom all matters relating to construction were referred. The Supervising Architect of the Treasury Department, the Architect of the Capitol, and the Chief of Engineers were appointed. Casey directed all his reports and queries to and received all his instructions from the Building Committee.<sup>41</sup>

The establishment of a Building Committee created a second layer of management in the administrative structure of the monument. If this added layer created any problems for Casey, it was not apparent. Because the

Building Committee was composed of architects and engineers, one of whom was Casey's superior, there was excellent rapport between him and the committee. It seldom interfered, preferring to give Casey a free hand.

Although Casey and the Building Committee were compatible, his relations with Corcoran, chairman of the Joint Commission, were less satisfactory, especially during the early period. The fact that Corcoran was both an officer of the Society and chairman of the commission complicated matters. Although Casey was subordinate to the commission, he had no direct connection with the Society other than when the latter advised the commission on some matter. Corcoran, an officer of both groups, sometimes confused his responsibilities and exercised unnecessary authority over Casey. The colonel resented these intrusions, which made him less tolerant of the Society.

The strained relationship at the beginning resulted from a misunderstanding over the Society's use of a room occupied by Casey and his clerk, who also happened to be an officer of the Society. Both the clerk and watchman of the monument were former employees of the Society. In July 1878, Corcoran managed to obtain employment for them with the understanding that the Society would continue to pay them. Casey understood, and rightly so, that these individuals would be under his supervision. When the secretary of the Society attempted to use his clerk for Society business during regular work hours, Casey objected, stating that if the Society needed his help, it would have to be given after the regular work-day. The commission had neglected to inform Casey that it had arranged with the Society for the latter's use of the room for some of its business.<sup>42</sup> The fault seemed to rest with the commission for granting the Society office room without Casey's knowledge, especially when this space was in a building rented by the War Department for the Engineer in Charge of Public Buildings and Grounds and was space for which Casey was entirely responsible.

The Society found Casey's conduct in this matter offensive and asked the commission to look into the matter. The commission appointed a special committee, consisting of Humphreys and Clark, to examine the Society's allegations. Humphreys and Clark quickly dismissed the charges on the grounds that there had been a misunderstanding and that no disciplinary action should be taken against Casey. Moreover, the committee pointed out that Casey's services were "very valuable" to the commission.<sup>43</sup>

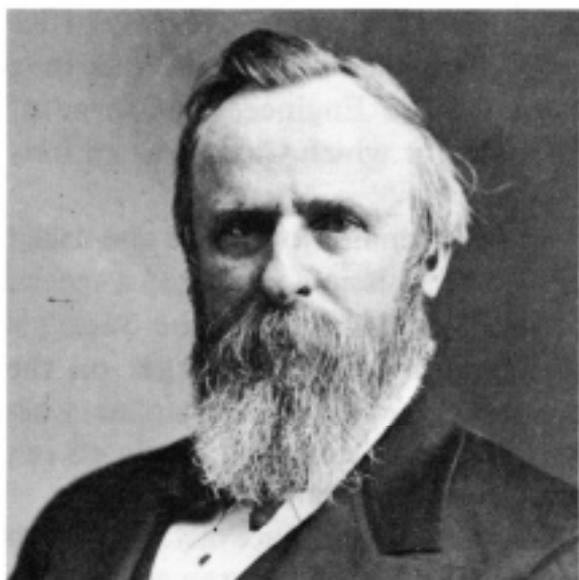
Although this incident was dropped, Casey's conduct disturbed both Corcoran and the Society on other occasions. Because Corcoran chaired the Joint Commission, his accusations could have had serious repercussions. In December 1878 Corcoran addressed a strongly worded letter to the commission outlining some of Casey's abuses in the hiring and firing of employees. He accused Casey of appointing and dismissing employees without the commission's authority and of disregarding a resolution passed earlier requiring

him to make all appointments and dismissals above the rank of laborer and mechanic subject to the commission's approval. "The matter," said Corcoran, "is brought to the notice of the Commission that it may determine whether its orders are to be respected." The commission took no action against Casey other than to remind him of the resolution.<sup>44</sup>

## Casey's Modifications to the Monument

One of the most serious problems that faced Casey, as it had others before him, was the absence of many of the principals who had been involved in the first stages of construction and the loss of early records and drawings. This prevented continuity and understanding of what had gone on before. Many of the records were lost in the 1850s during the struggle with the Know-Nothings. What were left to Casey were the later records that involved the Corps, writings in technical journals, and what one or two living principals remembered. In planning his next moves Casey had to rely mostly upon his sound judgment and deduction.

Casey confronted other serious problems, all stemming from the differences of opinion in Congress and in the Society concerning the adequacy of the foundation and the design. President Hayes took a personal interest in the monument and regularly attended the Joint Commission's meetings. He had much to do with the commission's decisions. Hayes recalled that Congress, the Society, and professional circles had two major objections.



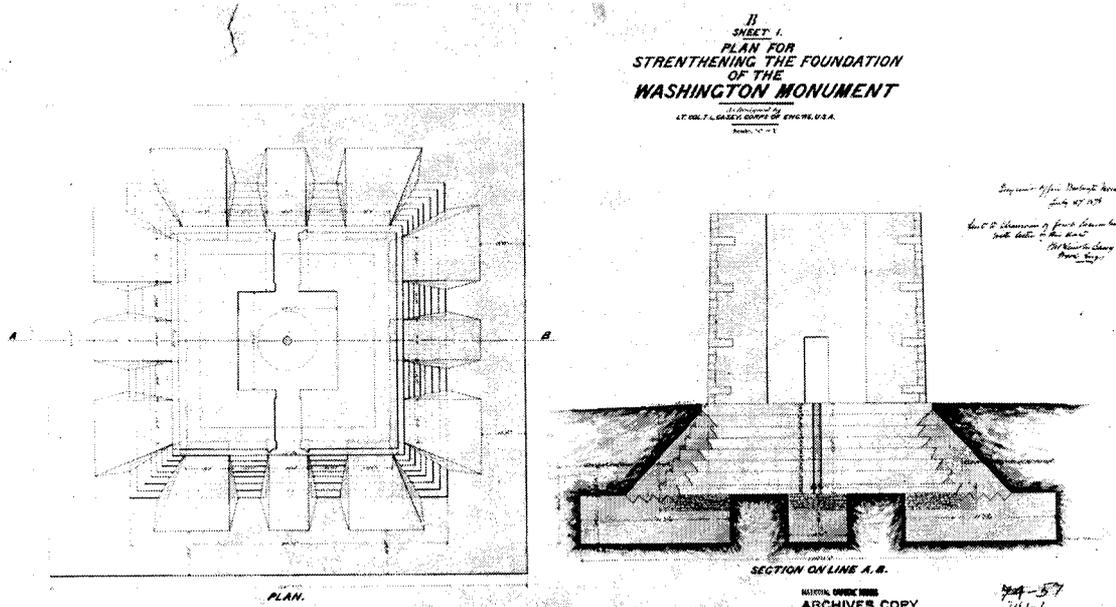
**Rutherford B. Hayes.**  
*Library of Congress.*

First, the foundation would not sustain an "average warehouse" and to strengthen it would be a mistake. Second, if the shaft were completed, it would be a disgrace to the nation--merely a tall and awkward smokestack at best. The shaft, these critics said, should be torn down and an arch or ornate structure filled with statues and allegorical figures built in its place.<sup>45</sup>

Shortly after Congress passed its appropriation and created the Joint Commission in 1876, the Society and the commission received several plans for strengthening the foundation and a new monument design. These plans found adherents particularly among those disturbed by the Mills design and those who, with greater justification, objected to the inadequate foundation. The recent scientific evidence supported critics of the foundation. Many of these were convinced that no amount of improvement could strengthen the foundation.

Fred E. Stuart of Washington prepared a plan to strengthen the foundation that gained much attention. It consisted of a series of brick arches laid in cement around the existing foundation. By the time Casey arrived on duty, Stuart had died, but his brother continued promoting the idea. Casey concluded that the plan contains “no feature which gives increased spread to the base of the foundation.” The same amount of pressure as before would be placed on the bed of the foundation. Casey could not understand how the vertical arches and piers could materially increase the resistance of the soil under the monument to any lateral displacement.<sup>46</sup>

Meanwhile, Casey had received instructions to proceed with his own planning. In less than one month he solved the foundation problem. His plan considered the 525-foot obelisk, required by the commission. After carefully measuring and estimating the weight of the existing shaft, Casey concluded that the foundation could not hold the completed structure. Thus far, his findings coincided with those of the Board of Engineers. After reviewing the two proposals for securing the foundation, Casey decided to underpin and extend the surface of the base of the foundation. He began with a mass of Portland cement concrete, 126.5 feet square. The bottom



Casey's plans for strengthening the foundation with underpinning and buttressing. National Archives (Record Group 79, file 74.1-1).

surface would be at the water level, or 12.33 feet below the bottom of the foundation. This mass would extend 18 feet under the outer edge of the foundation and 5 feet under the outer face of the shaft at its lowest joint.

The outer edges of this mass, 23.25 feet without the base, would be the foundation's edges. The mass would be 41.25 feet wide. The outer edges of this foundation would enclose 16,002 square feet. Three large buttresses on each side of the structure—12 in all—would lock the old foundation into the new and distribute the pressure more uniformly over the new mass. The buttresses would be carried from the upper surface of the new foundation up and under the outer portions of the shaft. A leg of concrete under the middle of the foundation would support it. If necessary two cross-walls of masonry under the center of the foundation would be built instead of the isolated mass.

The bed of the foundation, when the earth of the terrace reached the bottom of the shaft, would be subjected to the following pressure:

Weight of foundations . . . . .	21,160 tons.
Weight of shaft . . . . .	43,671 tons.
Weight of earth on top foundation . . . . .	14,269 tons.
Weight of earth within foundation . . . . .	<u>1,278 tons.</u>
Total . . . . .	80,378 tons.

giving a mean pressure per square foot upon the bed of 5,022 tons.

Casey also noted in his report that wind might bring more pressure to bear on some parts of the monument's surface than others, although "the actual load on the foundation, or the bed of the foundation, is not increased." At the projected shaft and foundation, the maximum pressure per square foot on any part of the bed of the foundation would not exceed 5,398 tons, even with a wind pressure of about 55 pounds to the square foot. This pressure was only 0.371 of a ton greater than the pressure exerted by the old foundation:

[considering] that the earth under the foundation will contain some 35 volumes less of clay, in excess of the voids in the sand, than the earth under the present foundation, and that the new bed of the foundation will be 35 feet 8 inches beneath the surface, while the present bed is but 7 feet 8 inches, it seems safe to recommend this foundation for the proposed shaft of 525 feet in height.

Casey was aware that any undertaking of this magnitude and difficulty required the utmost caution and skill. He noted that to undermine a structure that weighed nearly 32,000 tons and replace much of it with masonry "is evidently a delicate operation." The work could succeed "by introducing the masonry in thin, vertical layers," not more than four feet wide, by first tunneling under the structure with four-foot wide drifts that

were high enough and long enough. Dowel stones set in the faces of the layers as the work progressed, and panel depressions in the alternate layers into which the intermediate layers would be molded would connect the layers. Casey planned to build the layers with strong Portland cement concrete except, possibly, for a short distance just under the old foundation, where rubble masonry would be forced in and wedged up under the stones of that structure.

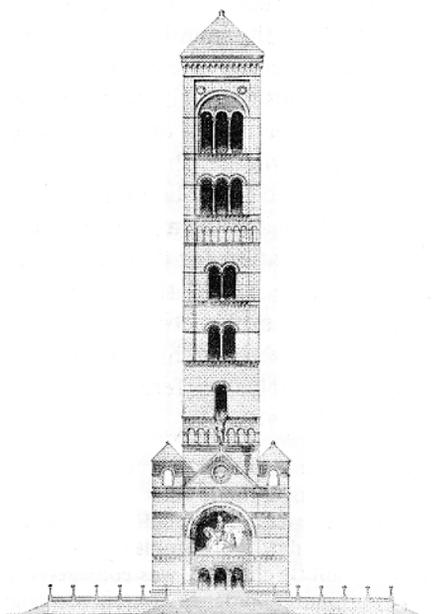
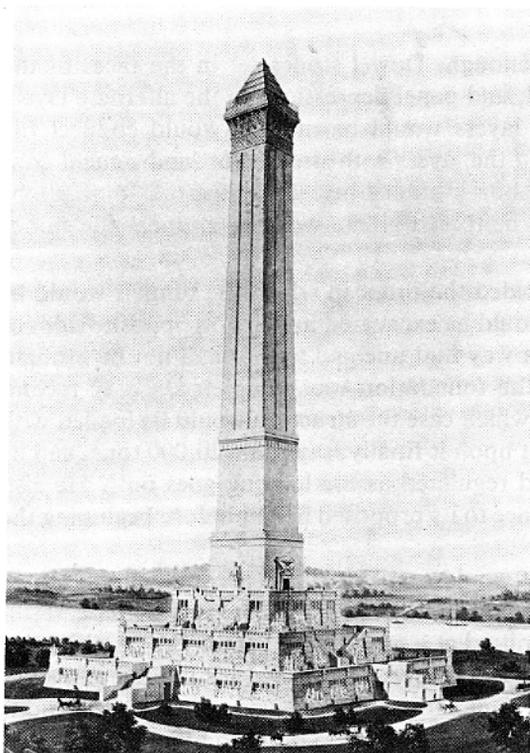
Casey had not yet decided the order in which the tunnels would be run, "other than that they should be excavated in pairs on opposite sides of the monument, and in such a way that unequal strain shall not be brought upon the structure." After the foundation was completed, Casey recommended "a trial pressure, in which case the structure would be loaded with as much weight as is to be put upon it finally, say some 20,000 tons, and its effects carefully watched and regulated as the loading goes on". He also suggested embanking the terrace to its proposed height before beginning the shaft.<sup>47</sup>

Casey estimated that it would cost \$99,102 to accomplish this work, a sum far greater than the \$36,000 appropriated by Congress. After carefully weighing all the plans submitted at a meeting on September 25, the commission approved Casey's plan. However, it rejected his request for additional money to complete the foundation. He received specific instructions not to exceed the \$36,000 limit. The commission directed him to begin work on October 1.<sup>48</sup>

Although the solution to the foundation was finally decided, attacks against Mills' design continued unabated in Congress and in the Society. The plan for the pantheon at the base of the obelisk—dropped long ago—had never been entirely rejected. However, as time passed and it became obvious that enough money would never be procured, the question of building a pantheon or anything resembling it became purely academic. Most people, whether they liked the Mills design or not, were certain that a pantheon would never be built simply because of the costs. Those opposed to the Mills design at any cost felt that without the pantheon there was greater justification for directing their displeasure at a plain obelisk. Many men of culture agreed that "this form of monument is the refuge of incompetency in architecture."<sup>49</sup>

The modern architectural critic Ada Louise Huxtable described the basic philosophical differences that lay behind the continuing criticism of the Mills design:

The Victorian architect based his judgments on a very conscious set of esthetic rules. If he condemned all that was simple, symmetrical, and unadorned, he admired all that was intricate, irregular, and complex. The varied, picturesque outline, with its subtle changes, was considered more 'artful' than regularity. A plain shape or unrelieved surface was 'monotonous' and





Some of the Victorian designs for the completion of the monument. From the left, they are by H. R. Searle, John Frazer, M. P. Hapwood, and Paul Schutze. *Library of Congress* (photographs USZ62-4055, USZ62-25575, USZ62-25577, and USZ62-25578, respective/y).

'unimaginative'; infinite and multitudinous variations of form, scale, and ornamentation, preferably of an exotic nature, were the work of creativity. The degree of controlled complication dictated the degree of esthetic success.<sup>50</sup>

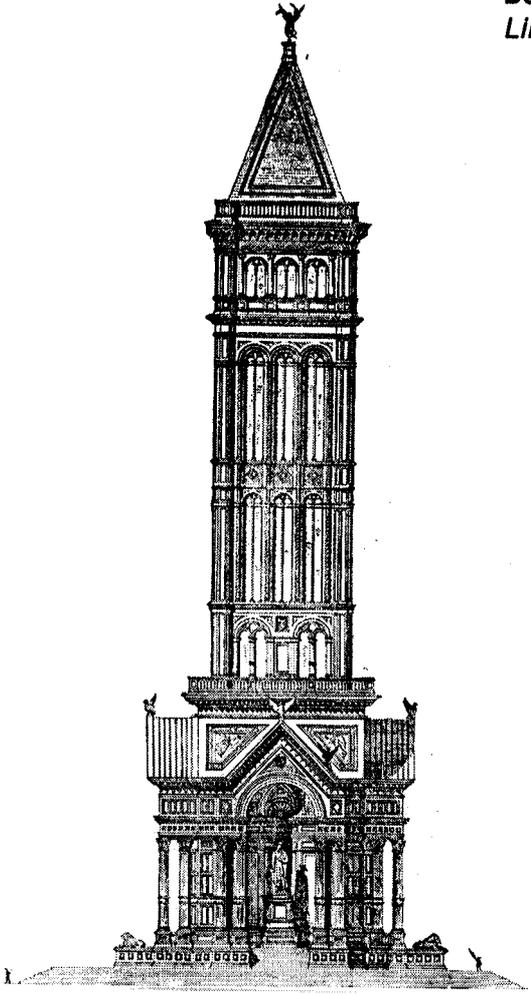
Henry van Brunt, a prominent architectural critic of the school of Victorian architects, looked askance at the Mills design. "No person," said he, "interested in our reputation as a civilized people can contemplate this completion without pain." He argued that neither the old design with the pantheon nor the new design without it were adequate for a monument of this nature. He proposed that before the commission commit itself to completing the shaft, it invite architects nationwide to submit designs. He concluded that such an invitation would encourage art in the United States and bring credit to it in "the world of art."<sup>51</sup>

Around the same time that the commission and Congress were listening to Casey's ideas on the foundation, they were also receiving designs from architects and artists all over the country. The commission had not advertised for them, but the furor created by the Mills design prompted architects and artists to send in their ideas in hopes that the commission would consider them. Certainly Congress gave this impression and even encouraged it. Besides, General Humphreys had earlier suggested considering new designs. Most of these designs reflected the Victorian style.

A design drawn by the American sculptor William Wetmore Story, who had his studio in Italy, received special attention. Story proposed to encase the monument with a marble "envelope. . . profusely enriched, after the manner of the Florentine Gothic of the Campanile of Giotto," and to extend the structure to a height twice the size of the existing stump. He proposed crowning the monument with a pyramid of marble surmounted by a small figure of Fame about 350 feet from the ground.<sup>52</sup>

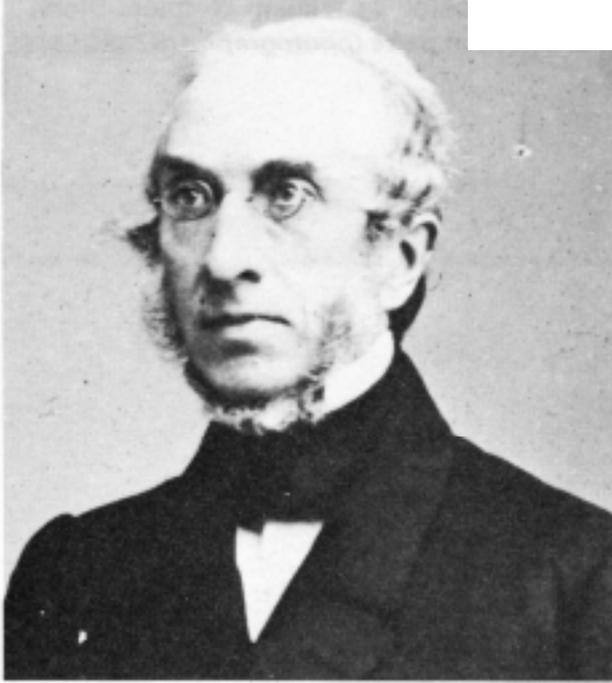
Story had many friends in Congress who were receptive to his ideas. His plan was especially palatable because he would not raze the partially completed structure. Moreover, some believed, his plan did not require underpinning for the foundation. Many who objected to the Mills design readily accepted Story's. After reviewing the plan, the Joint Committee on Public Buildings and Grounds in Congress asked the Society to study it and render an opinion. At a meeting in December 1878, while Casey was making arrangements to begin work on the foundation, the Society concluded that the Story design was "vastly superior in artistic taste and beauty" to any of the other plans. Because the stump would remain, the Society could justify its about-face by saying that none of the public's past contributions to the monument would be sacrificed. It agreed that the Story plan would "harmonize conflicting opinions and give general satisfaction to the country." The Society recommended the Story plan and appointed a committee of five to confer with committees of Congress on the further prosecution of the work.<sup>53</sup>

**Design suggested by William Wetmore Story.**  
*Library of Congress (photograph USZ62-25576).*



The Society, acting in an advisory capacity to the Joint Commission, had every right to an opinion on this matter although it was ready to compromise on the design. Confused by the Society's sudden turnabout on the question of design, the commission transmitted the Society's resolution to Congress, asking for instructions on how to proceed.<sup>54</sup> Congress debated the problem of design and the Story plan for more than one year. In the meantime, the commission wisely agreed to continue work on the foundation while Congress debated the issue.<sup>55</sup>

Although the Society as a whole had demonstrated that it was ready to accept the Story plan, not all influential members agreed. Robert C. Winthrop, who as Speaker of the House of Representatives in 1848 gave the major oration at the laying of the monument cornerstone, did not. Although not entirely sympathetic to the Mills design, Winthrop felt that the plan should not be altered because a "whole generation of men, women, and children had contributed, in larger or smaller sums, to this particular monument. . . ." To tear it down to "improve" the design was "abhorrent." His first wish was to complete the monument as a simple obelisk, but if the safety of the foundation demanded, Story's idea of turning it into an ornamental Lombard Tower was perhaps the best solution.<sup>56</sup>



**Robert C. Winthrop.**  
*Library of Congress.*

It was one thing to approve the Story concept on an aesthetic basis and another to accept it on practical grounds. When the Building Committee forwarded the design to Casey for his opinion, his reply disappointed many. Casey concluded that, contrary to standing opinion, Story's design would require removal of 41.5 feet of the existing stump to rebuild it with the windows represented in the lower portions of the shaft just above the loggia. Moreover, if Casey followed the Story design without underpinning the existing foundation, the structure would bring pressure on the foundation far too great to sustain the soil underneath. Even if the underpinning ordered by the commission was finished, the total weight imposed by the buttresses and steps of the loggia would still be too great for the improved foundation. Casey concluded that whether the monument was a plain obelisk or Story's ornate design, the foundation would require an underpinning equal to or greater than the one ordered by the Joint Commission.<sup>57</sup>

Casey found this the appropriate time to repeat his request for the \$99,102 to complete the foundation. The Joint Commission in turn asked Congress to provide the larger sums so that Casey could restore the foundation in the manner he had suggested. On 27 June 1879, Congress granted Casey's request in a joint resolution that increased the original authorization by \$64,000.<sup>58</sup>

When Casey outlined his plan for modifying the foundation to the commission, he also presented his general ideas on the construction of the obelisk: These ideas were obviously not intended to be final because work on the shaft was still a long way off, but Casey felt that in modifying the foundation, he needed to consider the kind of superstructure necessary for such a foundation. Besides, he had already been told by the commission that the shaft would rise to 525 feet:

To carry the monument to the required height . . . , it is proposed to construct it of masonry to a height of 500 feet, and to crown the shaft with a pyramidal roof of iron, which shall be 25 feet in height. This roof can be covered with hammered glass over some portions, to give light to the well of the monument. The masonry still to be built will be 343 feet 8 inches in height. The walls of the shell will be 8.66 feet in thickness at the bottom; will be vertical on the inside; have a batter of one-quarter of an inch to the foot on the outside; and will be 18 inches in thickness at the top.

For convenience in reference, the new portion of the shaft has been divided into two parts: the lower 172 feet being called the II Division; and the remaining 171 feet 8 inches the I Division. The masonry of the II division will consist of a white marble facing of headers and stretchers, the headers running entirely through the wall, and the stretchers having a bed of at least 2 feet. The quantity of marble to be used in this division will be sufficient to coat the face of the wall 4 feet in thickness. The backing will be of coursed rubble of blue gneiss; the beds and builds of the stones to be dressed to parallel surfaces. All the courses of marble to have 2 feet rise. The walls of the I Division will be built entirely of marble, carefully cut and bonded. Iron cramps and dogs, will be used throughout the construction, and stiffening beams of iron will be let into this masonry at such distances apart as future consideration may show to be necessary. It will be observed that the well for this new portion has not been carried up square but the corners slightly rounded, thus giving additional strength and stiffness in the angles where the faces meet.

The weight of the iron roof will be about thirty tons. The weight of the II Division 13,630 tons, and of the I Division 5,996. The total weight of the finished monument, allowing 220 tons for the stairways, &c., will be 43,671 tons.<sup>59</sup>

Casey had described this plan in July 1878. Although he was especially busy at that time with the foundation, his mind never ceased to consider the obelisk itself.

Meanwhile, George Perkins Marsh, the American Ambassador to Italy, entered the picture. Marsh had extensively studied Egyptian obelisks and was considered an authority on the subject. Writing from Rome in February 1879, Ambassador Marsh described his interest in the monument to Senator George F. Edmunds of Vermont. Edmunds referred Marsh's letter to Casey. Casey wisely listened to Marsh's advice on the construction of the obelisks. They soon became friends, and their acquaintance became the turning point in the completion of the monument.<sup>60</sup>

In his studies Marsh had noted that an obelisk consisted of a naked shaft, with or without inscription. The height was 10 times the width of the base. So, if the base was 50 feet on each side, the height of the shaft had to have been slightly convex, but it was too late to incorporate this feature in the Washington Monument. Marsh believed that the dimensions of the



shaft should be reduced as it rose, the top varying from two-thirds to three-quarters of the length of the base.

A major find of Marsh's studies was that the form of the pyramidion was always constant. Its base was exactly the same dimension as the top of the shaft and these were joined together without any break (except for one angle), ledge, or molding. He set the height of the pyramidion at equal to the length of a side of the base of the shaft, and therefore greater than the side of its own base.

Marsh opposed the substitution of a low-hipped roof for an acute pyramidion and adding windows in the face of either the pyramidion or the shaft. He called these elements "strocities" in the Bunker Hill Monument. However, if the public demanded a window, Marsh felt that it should be the exact size and shape of the ashlar stones of the monument. A close-fitting shutter, the same color as the stone, should be attached to the window.<sup>61</sup>

While Casey and Marsh settled technical design problems, Casey developed another idea to improve the quality of materials. He suggested to the commission that it use coursed granite for the interior walls of the shaft instead of blue gneiss rubble. He believed that granite would provide a much stronger and durable wall and would be cheaper. The commission quickly approved the idea.<sup>62</sup>

With a sure understanding of Marsh's theories, Casey began to put together his plan for completing the superstructure. On 19 April 1880, while work on the foundation' was nearing completion, he wrote to Winthrop outlining his design, which had already received the commission's sanction. Casey set the height of the obelisk at 550 feet, with marble facing and granite backing. One hundred and fifty-six feet of the monument had already been completed. Because the base of the shaft was 55 feet on each side, the top would have to be 34.5 feet on each side. The top was to be crowned with a 50-foot pyramidion made of iron and glass. So far, the dimensions conformed to Marsh's theories. Casey then described how he had planned and was strengthening the foundation. He noted that the

\$200,000 appropriated by Congress would be exhausted by August 1880, and that it would take \$677,000 to complete the monument in four working seasons.<sup>63</sup>

Winthrop leaned toward retaining the existing design. Largely through Casey's efforts, Winthrop was finally convinced that the Society should throw its full weight behind Casey's plan. Spearheading a drive within the Society, Winthrop obtained its approval for Casey's plan. In a letter to Congress, he precisely answered one by one all the criticisms of the modified plan. He argued that the monument:

was not undertaken to illustrate the fine arts of any period, but to commemorate the foremost man of all the ages. . . . a simple, sublime shaft, on a very spot selected by Washington himself for a monument of the American Revolution, and rising nearer to the skies than any known monument on earth, will be no unworthy memorial, or inappropriate emblem, of his own exalted character and pre-eminent services.<sup>64</sup>

Former President Hayes, who had delivered the memorable address at the laying of the cornerstone 32 years earlier, was asked to exhort Congress to accept Casey's modified plan. Congress needed little persuasion. It accepted the plan, finally ending the debate over the design. Although criticism continued, Mills' design was vindicated thanks to Casey's modified plan. This victory owed much to Winthrop.<sup>65</sup>

Soon after leaving office, Hayes described his role and that of others in reconciling the serious differences. He wrote that:

For some months I made it a study—a hobby. General Casey skillfully prepared a plan to strengthen the foundation. Mr. Spofford furnished the height of other tall structures. Mr. Clark, architect of the Capitol, gave constant and indispensable aid to the work. Mr. Corcoran and others earnestly supported the project of going forward, and gradually all opposition was overcome. We decided that the monument should overtop all other structures, and fixed its height, therefore, at 550 feet. On some of the details we consulted our Minister to Italy, Mr. George P. Marsh. Singularly and fortunately he discovered that there was a rule which determined the height of an obelisk by reference to the dimension of its base; and that by the rule our monument should be 550 feet high. . . . General Casey is entitled to special and honorable mention. He solved the difficult problem presented by the defective foundation. To him the nation is indebted for the successful completion of its most admirable and illustrious memorial structure.<sup>66</sup>

One of Casey's contemporaries left an interesting account that is not supported by the records. During the debates on whether the existing shaft should be torn down and another design put up in its place, that writer said that the question was referred to a board consisting of General Montgomery

C. Meigs (Quartermaster General of the Army), General Horatio G. Wright (Chief of Engineers succeeding Humphreys), and Colonel William P. Craighill (also of the Corps of Engineers). The board met with President Hayes at the White House. No records were kept of the proceeding and no other persons except Casey were present. The board decided "unanimously that the existing masonry was sufficient and the remaining four hundred feet of the monument was built upon it."<sup>67</sup>

Although meetings in which the advice of various experts was sought were common, this account must remain unsubstantiated. Even though President Hayes and General Wright were members of the Joint Commission, it is difficult to believe that they would have acted without the concurrence of the whole commission. Moreover, even though Hayes took an active part at meetings of the commission, he gave equal credit for the monument's completion to individual members of the commission, including Corcoran, Clark, and Hill, who were not present at the alleged meeting.

The years 1876-1880 were trying ones for the monument project. Disagreements and criticisms, sometimes bordering on hostility, ran rampant in Congress, the Society, and artistic circles. The Joint Commission, a congressionally appointed body responsible to Congress alone, was in a difficult position. Delegated by law to achieve the best possible design while being economical, the commission was responsible to a body that was in itself divided over the design. It therefore had to maneuver carefully and diplomatically to avoid accusations of partisanship. In Casey the commission was fortunate to have an honest and first-rate engineer in whom it had the utmost faith and confidence. Casey must receive the credit for finding a solution to ensure the foundation's safety and achieve the Mills design.

Casey fortunately had the assistance of Ambassador Marsh, who provided the technical theory needed to formulate the modified design; Winthrop and President Hayes, who lent their moral support in Congress and elsewhere; and his colleagues Davis and later Green who helped in the arduous task of the day-to-day affairs of construction.