OCT. 16, 1894

3 | *The Victorian City 1865–90*

Introduction

Within a decade of the Union Army's three-day victory march down Pennsylvania Avenue celebrating the end of the Civil War, late May 1865, three major administrative changes involved U.S. Army Engineers in the unanticipated tasks of overseeing the construction of Washington's most important late nineteenth century buildings, rebuilding and expanding the city's municipal infrastructure, and reclaiming the Potomac flats. In 1863 the Army Engineers had been reunited when the Topographical Engineers merged with the Corps. Four years later, on March 2, 1867, largely as a result of Congress's approval of Meigs's supervision of the Capitol Extension and the Aqueduct, the Office of Public Buildings and Grounds was transferred from the Interior Department to the War Department. (Another factor was the civilian building commissioner B. B. French's support of Andrew Johnson during congressional impeachment proceedings.) This act meant that the Chief of Engineers became responsible for overseeing construction of some individual government civilian buildings in Washington, in addition to military ones. In 1874 Washington's short-lived territorial government failed, and a temporary board of three civilian commissioners,

Opposite page: Plaster casts of stock sculptures used to decorate the Library of Congress, October 1894

Library of Congress, Prints and Photographs Division, LC-USZ62-120936

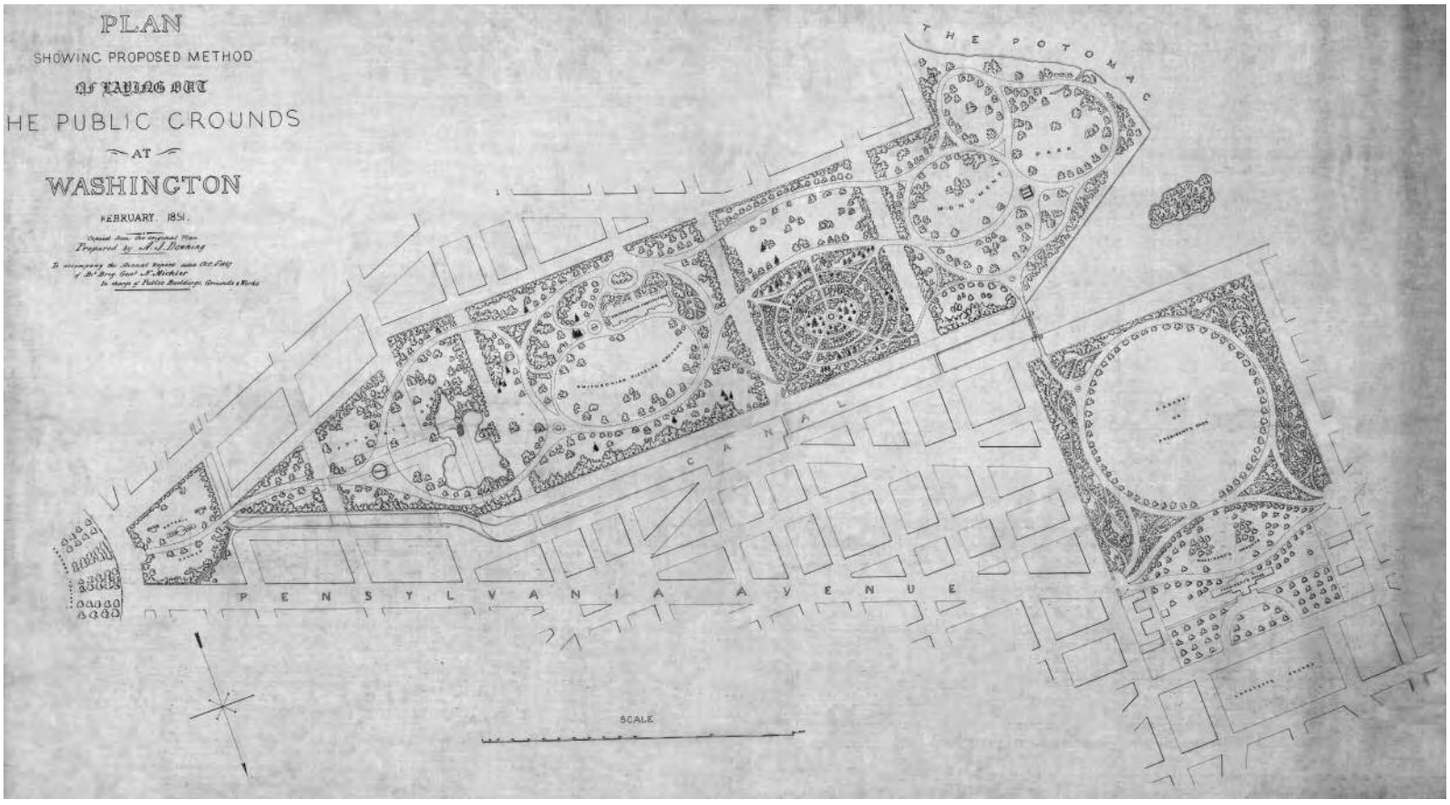
assisted by an Army Engineer in charge of public works, took over running Washington's municipal affairs. The commissioner form of government was made permanent in 1878 and lasted until 1967 with an Army Engineer now one and perhaps the most powerful of the three commissioners. Finally, in 1875, the Washington Engineer District was formed, its initial responsibilities being the management of the Potomac River. The tidal flats adjacent to the west end of the Mall were filled and the Tidal Basin created, the long-term result being Potomac Park, which more than doubled the public grounds of the Mall.[1]

OFFICE OF PUBLIC BUILDINGS AND GROUNDS

The Corps of Engineers returned to peacetime civil projects in 1866 when the Senate ordered a report recommending sites for a major public park and a new Executive Mansion. Major Nathaniel N. Michler (1827–1881) quickly assembled the requested information. The next year, a youthful Major John A. Tardy took charge of Fort Washington and the surveying of the Potomac.[2] Of greater significance, lawmakers that year decided to remove the care of public buildings from a civilian commissioner. They transferred it, along with "the superintendence of the Washington Aqueduct and all the public works and improvements of the government of the United States in the District of Columbia" to the Corps of Engineers. The Office of Public Buildings and Grounds was the result. Chief of Engineers General A. A. Humphreys appointed Michler as the logical man to fill the new post, and for the first time the Corps took a regular and routine hand in running the nation's capital.[3]

The transfer of responsibility for the federal lands and property in the District of Columbia made Michler the chief maintenance man for the federal buildings and the landscape architect of the federal reservations. "Not since L'Enfant had anyone examined the physical city as broadly and with as much care as Michler,"[4] as evidenced by his 1867 report. He carefully made a copy of Andrew Jackson Downing's 1851 picturesque plan for the Mall for the use of his office. The seriousness of his commitment to his job and to Washington's development set a high standard for the Corps' engineers and was rarely dishonored. Like subsequent members of the Corps of Engineers to hold such an important position in Washington, Michler had broad practical experience in many parts of the country before being given administrative responsibilities in Washington.

Moreover, Michler continued the precedent set by L'Enfant, Roberdeau, Totten, and others of the gentleman-engineer tradition, descended from families long in public service



Andrew Jackson Downing's Plan for the Mall, 1851, was copied by Lieutenant Colonel Nathaniel Michler to aid the Office of Public Buildings and Grounds in implementing its five sections, including the Ellipse south of the president's house intended as a military parade ground.
National Archives, Cartographic Branch, RG77, Civil Works File F116-1.

and educated in far more than the arts of war. A Pennsylvania Moravian and the son of a state legislator, Michler excelled at surveys and map-making. He rebuilt the White House conservatories in 1867, doubling their size and even selecting some of the new plants, outlined plans for the development of the Mall, began to beautify parks and squares, and started grading some of the streets and avenues. He lobbied for money to cover "that pestiferous ditch of water styled the 'Washington City canal,'"[5] and managed a workforce of watchmen, doorkeepers, clerks, and gardeners. In 1869 when Congress allowed the Mount Vernon Ladies' Association a $7,000 indemnity for the loss of revenue when the Potomac River was blockaded during the Civil War, Regent Ann Pamela Cunningham specifically asked that Michler be placed in charge of its disbursement for Mount Vernon's restoration. Finally, Michler was responsible for disbursing "one of the most charitable and disinterested appropriations…[,] that for the care of such transient paupers as are in need of medical advice and treatment."[6]

On June 12, 1866, R. D. Mussey, formerly a military secretary to the president, wrote Thaddeus Stevens, chairman of the House Committee on Appropriations, upon learning that Stevens's committee was looking for a new executive mansion with the intention of turning the White House over to the State Department. Mussey, "painfully conscious of the imperfections and deficiencies of the present building,"[7] because of its low-lying situation

near the malarial Potomac River, suggested Meridian Hill as the best locale in the city for a new executive residence. The historic White House might then become entirely offices. On July 18 the Senate directed the Secretary of War to select a "park and site for a Presidential Mansion that shall combine convenience of access and healthfulness, good water and capability of adornment."[8]

Michler's January 29, 1867, report addressed the "park and site" separately, beginning with a lyrical and emotive description of the picturesque beauties of the Rock Creek valley and an impassioned plea that the government purchase large tracts in anticipation of future growth. "There should be a variety of scenery, a happy combination of the beautiful and picturesque—the smooth plateau and the gently undulating glade vying with the ruggedness of the rocky ravine and the fertile valley, the thickly mantled primeval forest contrasting with the green lawn, grand old trees with flowering shrubs."[9] These were the effusions of a mid-nineteenth-century romantic soul and not the stuff of the usual engineer's report to Congress. (Michler's obituary in the *New York Times* noted that his father, Peter Michler, was the "owner of one of the finest estates in that portion [Easton] of Pennsylvania.")[10] Michler's intensity of commitment to secure the best possible location for the executive is complemented by his foresight in thinking about the city's future needs. He compared the extent of European (London's 6,000 acres) and American (Central Park's 840 acres) public parks to land available along Rock Creek ranging from tracts of 1,800 to 2,540 acres. Michler appended to his report "Remarks on the Vegetation of the District of Columbia," by Dr. Arthur Schott, which characterized the habitats and characteristics of trees and shrubs in Washington.

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A pragmatic concern for the safety of a future presidential residence is also evident in Michler's discussion of Rock Creek, as is the flexibility he was allowed to fulfill his special duty: to find suitable sites for both a public park and a presidential mansion. He identified four possible sites and their probable cost for the mansion that would "combine convenience of access and healthfulness, good water and capability of adornment,"[11] as he was directed to do. All were on high ground within four miles of the White House and he rejected two of them because Meridian Hill was "too near the city to afford any retirement and repose for the Chief Magistrate," and Eckington because it was "not sufficiently high to afford any extensive views." W. W. Corcoran's already beautifully landscaped estate, Harewood, "would be a most eligible site for a presidential mansion" near the Soldier's Home off North Capitol Street.[12]

However, Michler favored Moncure Robinson's estate, also adjacent to the Soldier's Home, because it fulfilled all of his criteria as to a beautiful and healthful locale, was three

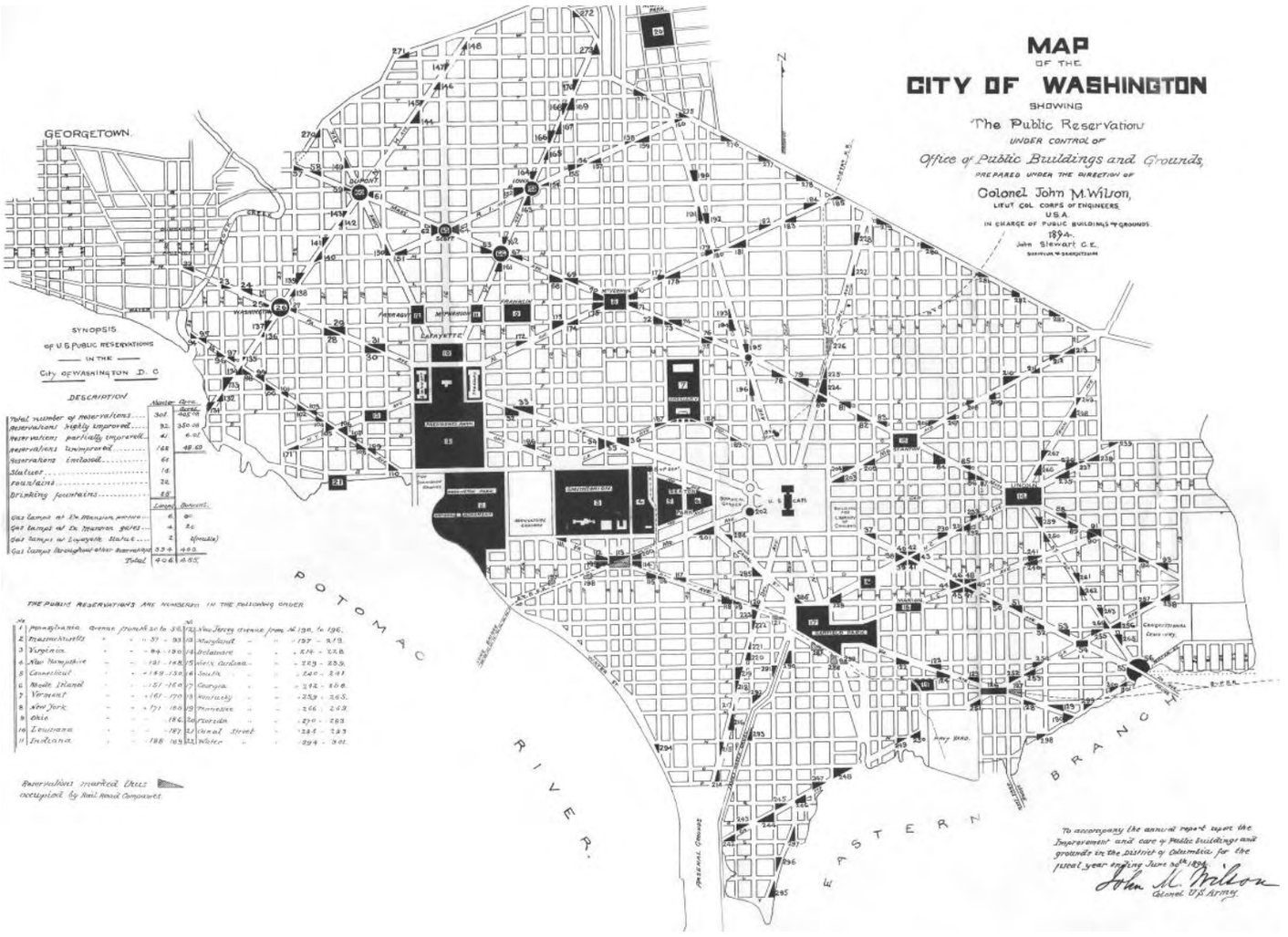
miles from the Capitol, and would be the least expensive to purchase. It is possible that Michler designed a new presidential mansion for this site, but no drawings have been found. Michler's aspirations set a precedent for future Army Engineers who invested a great deal of time and effort in planning for better quarters for the presidents' private, ceremonial, and official lives.

Alongside these civic duties, Michler received additional engineer assignments, including being made chief of the Aqueduct. In 1868 he prepared a report on the Potomac River for the House of Representatives. Comparing his data with surveys from 1792, 1858, 1862, and 1867 (the 1858 report being topographical engineer Woodruff's report, while the studies from the 1860s were made by the U.S. Coast and Geodetic Survey), Michler reported the dramatic increase over time of the tidal flats between the river's Virginia and Washington channels. Michler recommended extensive dredging to preserve navigation in the channels. With the rock causeway of Long Bridge obstructing half the width of the river and exacerbating the accumulation of silt, he stressed the need to modify or remove the bridge.[13]

Colonel Orville E. Babcock turned the Mall into a Victorian pleasure garden, planting trees, shrubs, and flowers during his tenure as the superintendent of Public Buildings and Grounds from 1871 to 1877.
Library of Congress, Prints and Photographs Division, LC-BH83-3715 (detail)

The Office of Public Buildings and Grounds was responsible for the improvement and maintenance of Washington's federal reservations, which included both large public parks and hundreds of small triangular and trapezoidal parcels, by-products of L'Enfant's combining grid and radial systems of streets. Many of these lots had never been improved, and Michler and his successor, Colonel Orville E. Babcock (1835–1884), who was appointed in 1871, set about systematically identifying and improving them citywide. Toward the end of making these "places of sand and mud" into sites that were "green and beautiful,"[14] the office published in 1872 its first location and condition survey of the entire park system. This survey was updated periodically; the 1894 version, which became the official reservation map by act of Congress in 1898, showed 301 reservations covering about 405 acres.[15]

As the street plan of Washington was formally extended beyond L'Enfant's original boundaries at the end of the nineteenth century, even more reservations were added to Office of Public Buildings and Grounds' responsibilities. An 1898 act placed the District of Columbia park system under the "exclusive charge" of the engineers, and specified that they were to take care, as well, of any land the District Commissioners set aside from the street system to be parks.[16] Consequently, as the district improved and modified its road system, additional small reservations were transferred to the Office of Public Buildings and Grounds. By the same token, engineer-controlled reservations also were periodically returned to the District Commissioners when needed "for street purposes."[17]

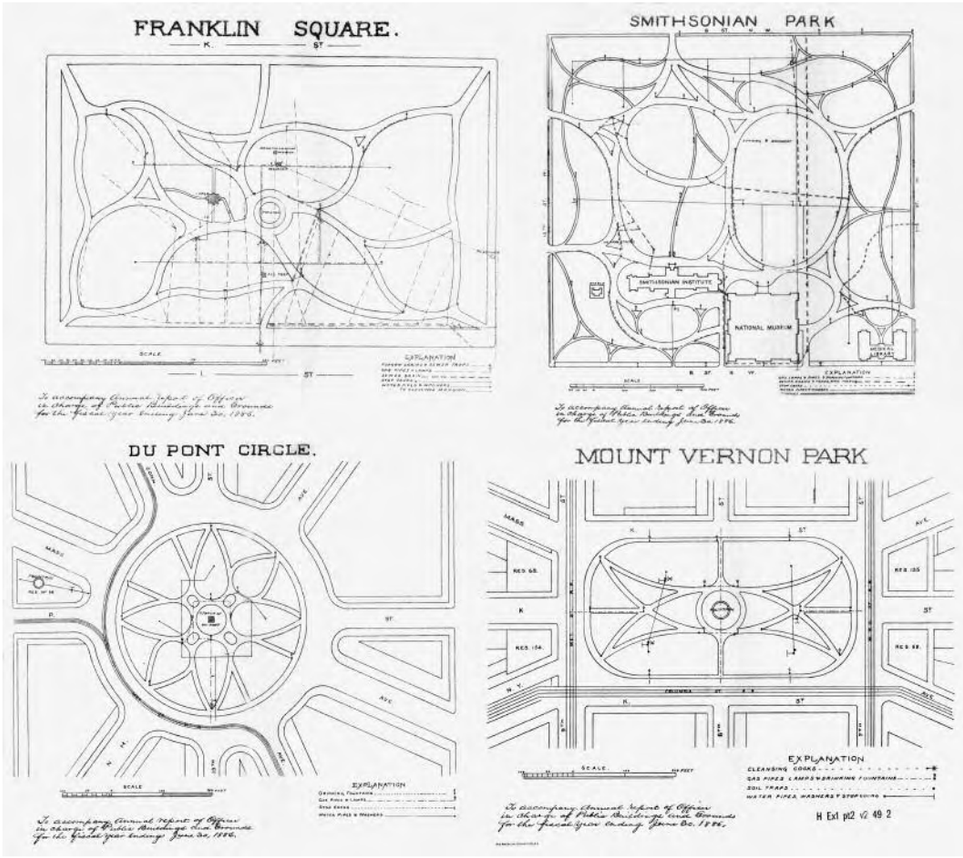


Map of Federal Reservations, 1894. The Office of Public Buildings and Grounds was responsible for these 301 parcels of land, large and small, scattered throughout the city.
Office of History, Corps of Engineers, ARCE 1894

Work on these lands included grading; planting trees, shrubs and flowers; irrigating; and building walks and roads. In Babcock's first year in office, workers in his employ laid forty-six thousand feet of sod, constructed one thousand feet of curbing, ten thousand yards of pavement and walks, and put in four miles of drains.[18] As Theodore Bingham put it when he was in charge in 1899, "the parks in and around Washington should form a systematic and well-considered whole….an emerald setting for the beautiful city within."[19] Consequently, the engineers built watchmen's stations and fountains in some larger parks and purchased benches, lamps, and ornamental vases. In 1874 Mary Clemmer Ames exclaimed: "Seats—thanks to General Babcock—everywhere invite to sit down and rest beneath trees which every summer cast a deeper and more protecting shadow." The office even requested sixteen statues and six vases from the St. Louis Louisiana Purchase Exposition for public decoration during the inaugural of 1905, and these were subsequently installed in Potomac Park and President's Park.[20]

Babcock introduced worm- and insect-eating European sparrows to the parks,[21] and accepted donations of eagles, prairie dogs, deer, and owls.[22] When public funds fell short for feeding the animals, he dipped into his own pocket.[23] The Territorial Government's Board of Public Works praised Babcock for his "cordial co-operation with local authorities, his wise counsel, energy, and ability."[24] The Office of Public Buildings and Grounds encountered periodic difficulties keeping the parcels free from illegal private occupation—dumps, gardens, buildings, and railroad tracks appeared on them—and undertook to mark unimproved reservations with six-inch granite markers and to surround improved lots with post-and-chain fences and, later, concrete copings.[25]

The standing bronze figure of Civil War Naval hero Admiral Samuel F. Dupont was erected under the auspices of Colonel Almon F. Rockwell in 1884 when Pacific Circle was renamed Dupont Circle. The present fountain replaced it in 1921.
Washingtoniana Division, D.C. Public Library



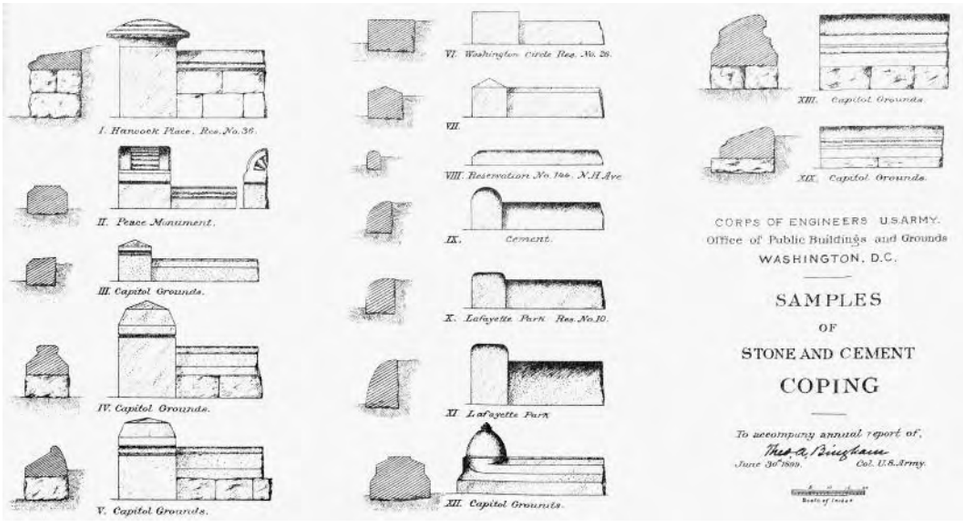
Four designs for parks and squares done by the Office of Public Buildings and Grounds in 1886 to serve Washington's rapidly expanding residential neighborhoods
Office of History, Corps of Engineers, ARCE 1886 (photo illustration)

A joint congressional resolution of March 2, 1867, authorized a statue of Lieutenant General Winfield Scott, the first of many of the Union Army's Civil War generals to be so honored. The July 15, 1870, act appropriating funds for the statue directed the Secretary of War to choose a location, contract with the sculptor and architect of the base (both of whom had been chosen by a commission), and oversee all aspects of construction, including disbursing the funds. These duties, which were carried out by the Corps Officer in Charge of Public Buildings and Grounds (Babcock for the Scott statue), became routine for all of the statues destined for Washington's public parks. By 1872, when the Major General John A. Rawlins's statue was approved by Congress, the Officer in Charge of Public Buildings and Grounds (again, Babcock) served on the design jury, along with the Architect of the Capitol and the Librarian of Congress. Thereafter it became the accepted practice for the Secretary of War to be appointed to the commission that chose designs for Washington's public art if some private organization had not already initiated the project and chosen the artists. Some secretaries chose to be directly involved; when they delegated this privilege, the public buildings engineer officers were their logical surrogates because they would manage all the affairs of dealing with both artists and contractors while they oversaw construction. Babcock himself may have designed the base for the Major General James B. McPherson statue for which $25,000 was appropriated in 1875. Most of these sculptures were minor duties for the engineer officers, but their daily lives were generally consumed with overseeing a number of small and medium-sized projects.[26]

Logan Park undergoing improvements, 1913. The District Commissioners transferred the public reservation (260 feet long and 40 feet wide) in the middle of what was then called Pierce Street in Anacostia, to the Office of Public Buildings and Grounds in 1907. At the request of the Anacostia Citizens' Association in 1908, the office named the area Logan Park in honor of Major General John A. Logan.
National Archives no. 42-SPB-12

In 1872 Babcock began a cleanup of the Washington Monument grounds and within a year had transformed them from the cattle pen they had been during the Civil War into a beautiful park. Natural depressions were replaced by ornamental ponds and a fish hatchery called Babcock Lake. Drained, graded, its depressions filled, planted with trees, and surrounded by a broad carriage drive, the area became a respectable setting that invited completion of the monument itself. Babcock added a fountain jet in the middle of the lake on axis with the monument and noted in his report that "during cold weather the lake formed safe and good skating for children, and was much enjoyed by them."[27] Soon after Babcock's work was finished, local columnist George Alfred Townsend was effusive in his praise:

"…every day last fall equestrians and carriages enlivened this old haunted corner by the river side, and a sense of gratitude toward the Engineer was felt by every thoughtful visitor."



Samples of stone and cement coping used by the Office of Public Buildings and Grounds, 1899, as low walls setting off the public reservations under its control
Office of History, Corps of Engineers, ARCE 1899

> *The old grounds around the Washington Monument, which the very goats disdained to frequent and truant school-boys passed through with awe; where the stench of the canal and the river's miasma blended their odors, and half-dismantled houses, sheds, and hulks of boats dozed on the unsightly margin, were now brought into civilization…so that every day last fall equestrians and carriages enlivened this old haunted corner by the river side, and a sense of gratitude toward the Engineer was felt by every thoughtful visitor.*[28]

The Office of Public Buildings and Grounds continually oversaw the labor-intensive maintenance of the federal reservations for almost sixty years. "The employees of this office…are mostly laboring men," Babcock reported in 1872. "The work necessary to improve the public grounds is of such a character that it cannot be done by contract."[29] In addition to designing new improvements, the office's yearly tasks included painting, raking, planting, cutting, gutter cleaning, snow removal, road repair, and record keeping. The engineer officers in charge oversaw the park watchmen and sought to increase their numbers and pay. They even arranged in the summer of 1904 for military band concerts in the public parks, including some performances by "the Engineer Band from Washington Barracks."[30]

Residents facing Lafayette Square demanded a public hearing to review the placement and design of the new "gardener's lodge" in 1914. Vine-covered trellises were to obscure the building's main purpose—public restrooms.
National Archives no. 42-SPB-9

One of the most pleasant duties inherited from the civilian Commissioner of Public Buildings was the care and maintenance of the president's house. Although

Dedication of statue of Major General George B. McClellan at the intersection of Connecticut Avenue and Columbia Road, NW, 1907. The Office of Public Buildings and Grounds frequently orchestrated large public dedication ceremonies.
National Archives no. 77-H-8859-6

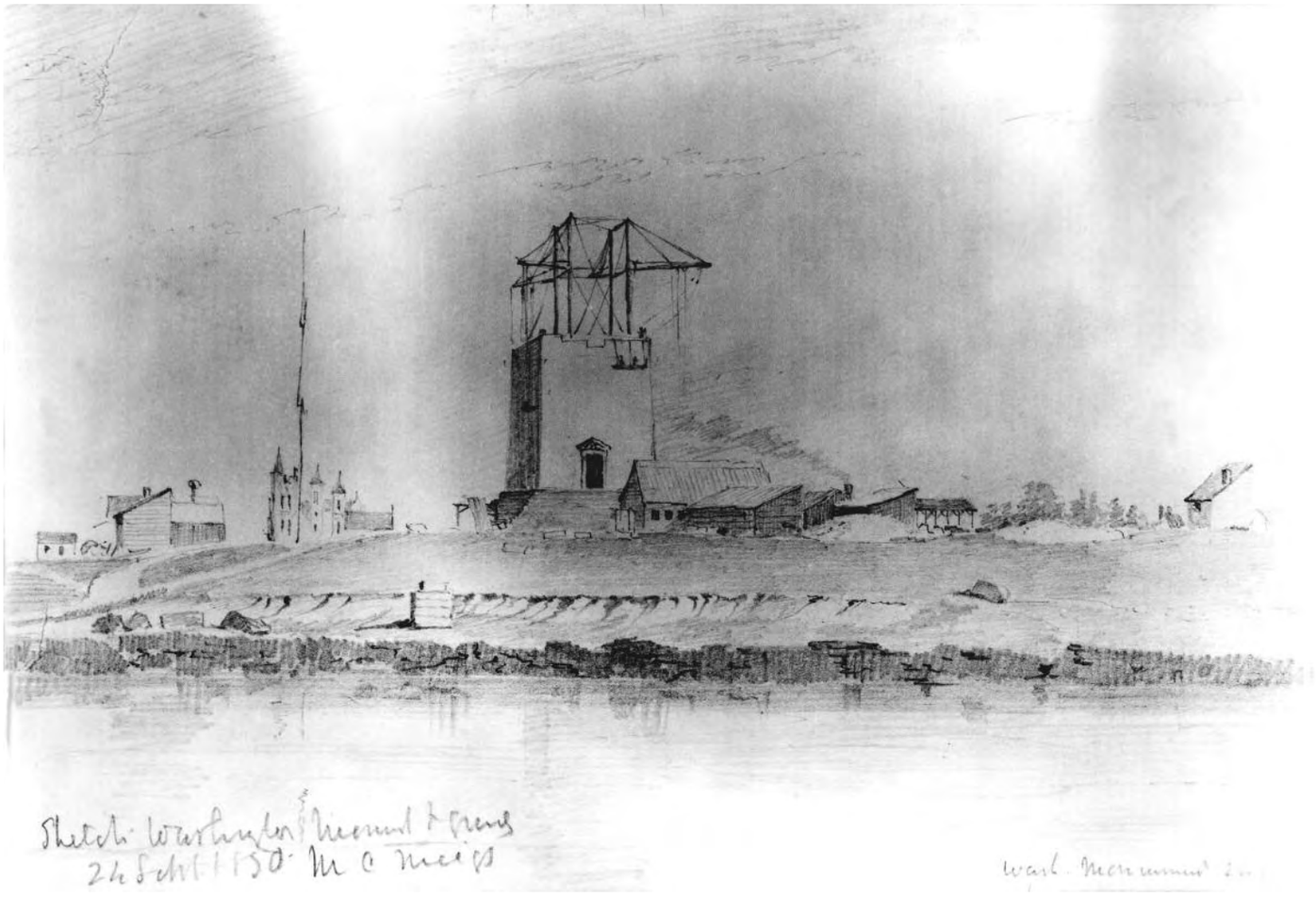
seemingly mundane, these tasks gave the military public buildings' officers in charge control over alterations and redecorations of the house, cabinet room, and presidential offices. Babcock orchestrated the Victorianization of the East Room during the Grant administration. Because the Officers in Charge of Public Buildings and Grounds were de facto the military attaché to the president, they enjoyed broad exposure at a variety of diplomatic and social events. They arranged presidential levees with the power to contribute to the guest list and were frequently themselves dinner guests at the president's house. Other functions they planned included unveiling ceremonies for statues, welcoming official guests, and national parades. All of these duties required coordinating the efforts of several groups of people, the same skills used in supervising a building project.

Babcock, who had been President Grant's secretary until his 1871 appointment to the Office of Public Buildings and Grounds, was one of territorial governor Alexander R. Shepherd's best friends. Shepherd appointed three of the Corps' engineers who were already engaged in the city's public works for the government—Babcock, Meigs, and Humphreys—as well as Boston landscape architect Frederick Law Olmsted, to a panel to advise the city's Board of Public Works.[31] Babcock defended Shepherd and his Board of Public Works before Congress more than once, and when the Territorial Government fell, he was discredited and suspected of defrauding the public in some way because he, like Shepherd, had accomplished a great deal in a very short time. Evidence for such suspicions included Babcock hiring Shepherd (a building contractor by profession), in 1872, to install a copper roof on the White House for nearly $35,000.[32] In 1876 Babcock was accused of planting documents stolen from a safe on one of Shepherd's critics—but was acquitted.[33] Ben Perley Poore mentions Babcock in his *Reminiscences of Sixty Years in the National Metropolis* (1886), recounting the two-week federal trial implicating Babcock in the 1875 Whiskey Ring, a conspiracy to defraud the government of liquor taxes.[34] Babcock was again acquitted, but the Army Engineer who had graduated third in his 1861 class at West Point now had the same kind of shady reputation as some architects and engineers involved in public works in other American cities. Babcock damaged one of the Corps' great boasts, its disinterestedness and probity in handling large government contracts. One of Grant's biographers noted "Babcock seems to have had intimate contacts with most of the corrupt men of a corrupt decade. He fished for gold in every stinking cesspool, and served more than any other man to blacken the record of Grant's Administration."[35]

Street cleaning on Pennsylvania Avenue, NW, 1918, done under the auspices of Engineer Commissioner Charles W. Kutz whose contributions to Washington's civic betterment was considered exemplary by its citizens
National Archives no. 220-PA-16-7

WASHINGTON MONUMENT

One of the greatest achievements of the Office of Public Buildings and Grounds was completion of the Washington Monument. The Washington National Monument Society was founded in 1833 by local Washingtonians—many of them military officers—who were dismayed that the previous year Congress commissioned a statue of Washington to commemorate the centenary of his birth rather than an important monument. Although no design was chosen from among the entries submitted in their 1836 competition, the



Montgomery Meigs's 1850 sketch of the unfinished Washington Monument with Jefferson's 1803 meridian stone shown in its original location near the banks of the Washington City Canal
National Museum of American History, Smithsonian Institution, negative #38876-B

society mounted a nation-wide campaign to raise $1 million to erect the largest monument in the world in recognition of Washington's greatness.

In 1845 the society selected a design proposed by one of its members, architect Robert Mills, for a 600-foot obelisk surrounded by a colonnaded pantheon base 250 feet in diameter and 100 feet high. Soon after the monument's cornerstone was laid on July 4, 1848, many members of the society doubted their ability to raise the money for such a complex design. Their alternate choice was the obelisk supported by a stepped pyramidal base composed of thirteen levels to commemorate the original states. Construction progressed smoothly until 1854 when a controversy arose over including a piece of the Temple of Concordia from the Roman Forum, sent by the Vatican as one of several emblematic stones to be included in its stairwell. The anti-Catholic Know Nothing, or Native American party, strongest in the Baltimore-Washington region, objected to including what they dubbed the "Pope's Stone." Their real objection was to the large number of recent Irish immigrant laborers who, working cheaply, were building the monument. During the night of March 5, 1854, members of the Know Nothings broke into the

Washington Monument grounds, stole the Pope's Stone, and reputedly dumped it in the Potomac River. The following year they attended the monument society's annual meeting and voted in their own officers. After the original society was deposed and members of the Know Nothing Party took over, public support for the monument's completion waned.[36]

"I was unable to detect any appearance of settling or indication of insecurity."

The Corps' involvement in the post-Civil War history of the Washington Monument changed character as the monument passed from private to public ownership. During the decade following the war, the two goals of the Washington National Monument Society were raising money for the obelisk's completion, and convincing Congress to accept the structure they believed should have been undertaken by the government in 1832. Several structural reports by Corps engineers were commissioned, some agreeing with the 1859 assessment by Lieutenant Colonel J. C. Ives of the Corps of Topographical Engineers that the original foundations were adequate, and others disagreeing. Ives was unequivocal in his report:

> *To those who are aware of the care which was taken in laying the foundation of the Monument, both in the selection and preparation of the bed, and in the execution of the masonry work, it will be scarcely necessary to enter into any statements in regard to its present condition. The test, to which it has been already subjected, may however be mentioned. If raised to the height of six hundred feet, the weight of the entire shaft, together with the foundation, will be a little more than seventy thousand tons. The weight of the portion now built is more than forty thousand tons. For five years, therefore, while the work has been suspended, the foundation has been bearing about four sevenths of the pressure that it will ultimately be required to sustain, and, in the recent examination, I was unable to detect any appearance of settling or indication of insecurity.*[37]

"The area covered by its foundations is too small for a structure of the proposed dimensions and weight…."

Lieutenant William L. Marshall (1846–1920), however, wrote two contradictory reports that suggested continued questioning of the monument's stability was putting pressure on the engineers to find fault with the original construction. On February 19, 1873, he noted, "all questions as to the stability of the shaft itself have been answered by Lieutenant Ives, in whose conclusion I concur."[38] However, a year later, on April 20, 1874, Marshall reported, "it seems inadvisable to complete the Washington Monument to the full height of 600 feet. The area covered by its foundations is too small for a structure of the proposed dimensions and weight, causing an excessive pressure upon a soil

Although Robert Mills's 1845 design for the Washington Monument, lithographed by his son-in-law Charles Fenderich, called for a pantheon base 100 feet high and 250 feet in diameter, he designed the obelisk's foundations to carry the monument's weight without buttressing.
Library of Congress, Prints and Photographs Division, LC-USZ62-58544

not wholly incompressible."[39] Yet in the same report, Marshall noted "there are no sufficient grounds for doubting the security of the foundation under the present load."[40] He calculated that the monument shaft was already exerting a weight of 4 8/10 tons per square foot.

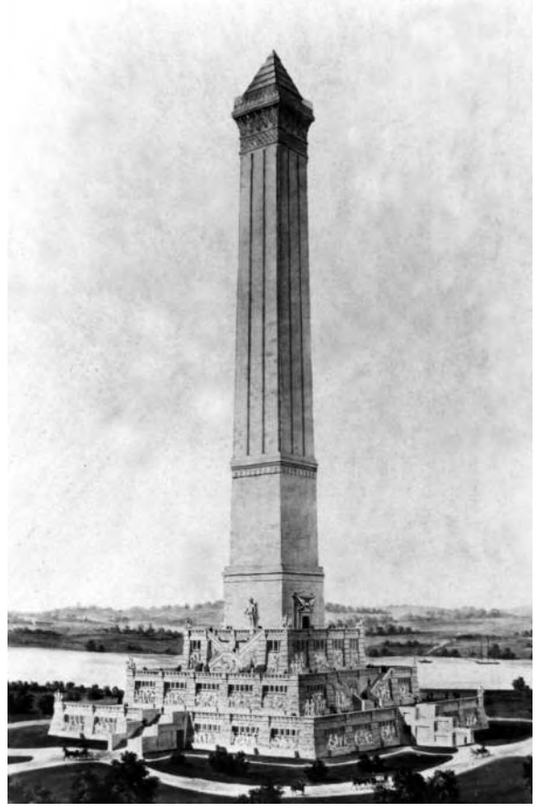
As a compromise, Marshall recommended the monument be raised to only 400 feet; in 1875 the society agreed to reduce the monument's height to 437 feet. Marshall recommended reducing the thickness of future masonry walls by four feet, using brick on inside walls of the future shaft, and roofing the finished obelisk with cast-iron rather than stone vaulting, all to reduce additional weight. Marshall also proposed that a broad terrace be built up to the height of the doors, its stone abutments and fill providing additional support at the monument's base. A commission of three senior engineers stationed in New York, headed by J. G. Barnard, reported to Chief Engineer A. A. Humphreys on August 7, 1874, on Marshall's second report, and concluded "there is a lack of accepted data on this important subject of the weight bearing capacity of soils." They compiled data on the weights of several recent American buildings and concluded, "5 tons is an excessive pressure for soils composed of clay and sand. We could not, therefore, with the information before us, recommend that any additional pressure should be thrown on the site of the Washington Monument."[41]

A joint resolution of July 5, 1876, required Congress to "assume and direct the completion" of the monument, and on August 2nd, Congress appropriated $200,000. This act established a Joint Commission whose members were the president, Supervising Architect of the Treasury, Architect of the Capitol, Chief of Engineers, and the first vice-president of the Washington National Monument Society. The society intended to continue raising funds for the monument's erection but transferred all their property rights to the government. The Joint Commission named Lieutenant Colonel Thomas Lincoln Casey, the new head of the Office of Public Buildings and Grounds, succeeding Babcock in 1877, as construction manager for the project.

The Joint Commission's first goal was to definitively settle the question of the existing foundation's capacity to support an obelisk between 500 and 600 feet tall. In 1877 a board of three engineer officers, Lieutenant Colonel J. D. Kurtz, Lieutenant Colonel Q. A. Gilmore, and Lieutenant Colonel J. C. Duane, submitted a lengthy and detailed report, the results of further investigation by Second Lieutenant Dan C. Kingman. Robert Mills's reports on the original excavations and all previous engineers' reports, both pro and con,

were examined in detail. They concluded that the earth around the monument was not sufficiently resistant to compression and had already been compressed, weight added to the 156-foot-tall shaft would probably cause splitting of the marble at the base, and that Mills's foundations had not been spread sufficiently to buttress the full weight of the finished obelisk. Kingman's report was received critically on technical grounds but also aroused particular concern that it might lead to the existing shaft's demolition.

Shortly after this report was published, Washington architect Henry R. Searle published a pamphlet illustrating and describing his design for completing the monument. He specifically cited the Kurtz report as determining his scheme of erecting three massive terraces ranging from twenty-four to forty feet in width to buttress the shaft. Other designs for the completion of the Washington Monument featuring substantial buttressing were published in art and architectural journals during the 1860s–70s and also may have been influenced by reports made by the Corps' various engineers on the obelisk's stability.[42]



Architect Henry R. Searle's 1877 design to complete the Washington Monument conformed to recommendations made by three Corps engineers regarding buttressing the obelisk's base.
Library of Congress, Prints and Photographs Division, LC-USZ62-4055

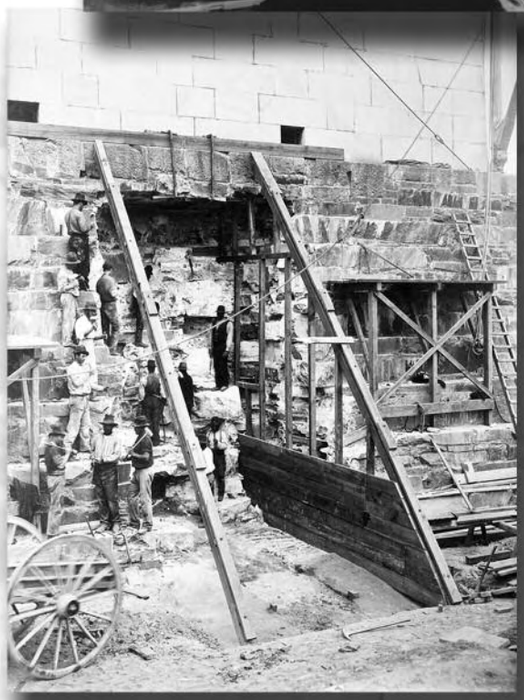
The great disparity among the findings of several of the Corps' engineers suggests there were internal and external political forces at work. Competition between the Army's engineers and Robert Mills had been fierce, was ongoing, and involved other architects who were supervising construction of public buildings in Washington that they had designed. Another possibility was the desire to discredit Ives's report; in 1861 he declined a captaincy in the Union Army and joined the Confederacy where he became a colonel of engineers and one of Jefferson Davis's aides-de-camp.[43] Whether reinforcing the Washington Monument's foundations was necessary, or not, is now of academic interest only. In the 1870s the issue was public confidence in any major undertaking by Congress. The Corps' decision to provide for all foreseeable structural problems the finished monument might encounter protected the government's interests and assured the longevity of the monument itself.

On June 14, 1878, Congress authorized $36,000 to strengthen the monument's foundations, and on July 1st, the Joint Commission ordered Colonel Casey to proceed. Casey chose Captain George B. Davis as his assistant to manage daily operations and administer contracts. Bernard Green (1843–1914), a Harvard-educated civil engineer and civilian employee of the Corps of Engineers, was Casey's partner in devising the system of underpinning the monument and constructing its pyramidion. Casey examined two proposals on how to secure the foundations but found both inadequate. Within a month he "decided to

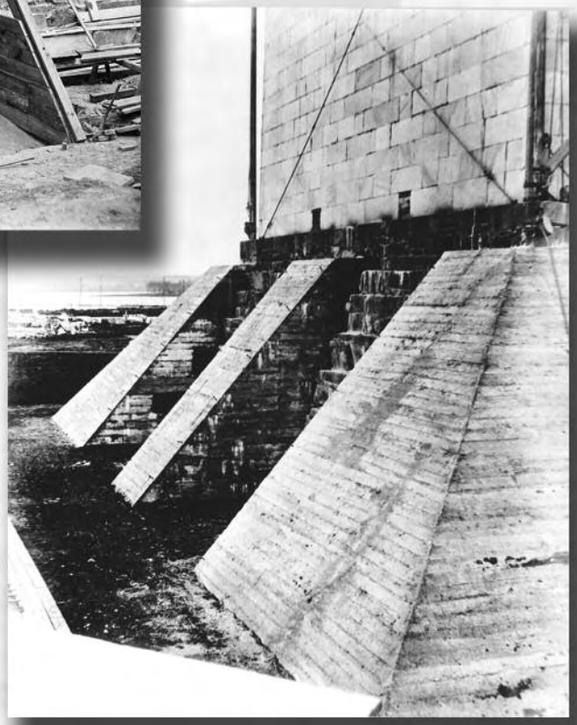
Completion of the Washington Monument

The view of the monument before construction began shows the Department of Agriculture Building (left) on the Mall and the Potomac River and Tiber Creek close behind the incomplete structure. Before the engineers began work on the monument, they struggled with the question of whether the old foundation could support an obelisk that should be 550 feet tall according to ancient Egyptian proportions. Casey ordered the foundation strengthened and completed the monument in 1885 at 555 feet with a tall pyramidion topped by a cast aluminum capstone that served as a lighting rod.

ca. 1879



October 1879



January 1880

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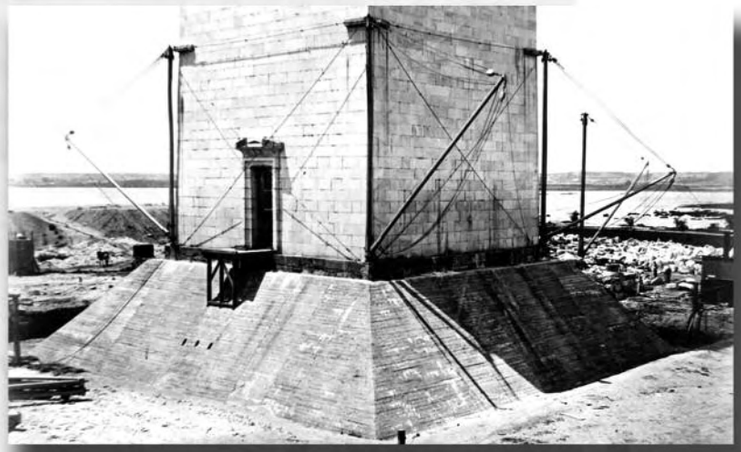
Office of History, Corps of Engineers
Library of Congress, Prints and Photographs Division, LC-USZ62-30612



May 1880

September 1882

1885

February 1884

Library of Congress, Prints and Photographs Division, LC-USZ62-15294
Office of History, Corps of Engineers
National Archives no. 121-BF-5
Office of History, Corps of Engineers

underpin and extend the surface of the base of the foundation." A pyramid of Portland concrete covered the original stepped tiers of stone and a concrete bed twelve feet deep that extended eighteen feet under the existing foundation was inserted along with a "leg of concrete under the middle of the foundation."[44] Casey's estimate for this work was $99,102 in comparison to the $36,000 Congress had appropriated, and the increase was authorized on June 27, 1879.[45]

The height of the obelisk and its termination were additional aspects of the Washington Monument's design addressed by Casey during construction. The width of its base was fifty-five feet and Casey's correspondence with George Perkins Marsh, ambassador to Italy, led the engineer to taper the shaft to terminate at 550 feet. This accorded with Marsh's study of the numerous Egyptian obelisks in Rome, which he determined had been designed to be ten times as tall as their width at the base. Moreover, Marsh noted that the angled sides of the Egyptian pyramidions were the same height as the width of the obelisk's base, and eventually Casey's pyramidion was fifty-five feet tall. In 1878, however, he proposed to top the Washington Monument with a twenty-five-foot-tall, iron and glass pyramidion to light the interior of the shaft whose walls were to be decorated with more than 200 memorial stones. It was Green who designed the final pyramidion, its exterior cladding in marble, but iron was used for its interior structure, deck, stairs, and elevator shaft.[46]

In 1880 Casey estimated it would take an additional $677,000 to complete the monument in four years. He was so determined to meet his schedule that the 100-ounce aluminum capstone was set during a raging storm on the day appointed, December 6, 1884. The aluminum capstone was part of the Washington Monument's system of lightning rods but also recalled the gold-topped pyramidions of the Egyptians. Obelisks were sacred to the sun god and caught the first rays of the morning sun. Copper, bronze, or brass, each platinum-plated, were Casey's first choices of material for the capstone, but Philadelphia founder William Frishmuth convinced Casey to use aluminum even though its first successful casting occurred only five years earlier. Frishmuth, the only American supplier of aluminum at the time, argued that the material's "conductivity, color, and non-staining qualities" merited experimenting with casting a pyramidion of the size needed. When completed in 1884, the Washington Monument was the tallest structure in the world, surpassed five years later when the Eiffel Tower was erected in Paris. An 1885 thunderstorm caused a small crack in the aluminum, and copper rods connected to the aluminum were inserted. Subsequent lightning strikes further damaged the aluminum but repairs were possible allowing the original capstone to remain in place.[47]

STATE, WAR AND NAVY BUILDING

Immediately after the close of the Civil War, Montgomery Meigs, now Quartermaster General, was the key figure in promoting a new War Department Building. On April 12, 1866, he sent Secretary of War Edwin Stanton alternate designs for extending the Winder Building, across 17th Street from the War Department, for its short-term use. He noted, "at some future time Congress will doubtless make provision for the erection of a building on 17th Street and Pennsylvania Avenue in style and construction to correspond in some degree with the Treasury Building." Three months later Congress passed the necessary legislation and Meigs was one of six generals charged with obtaining a design. The design competition was announced in the autumn of 1866, Meigs bringing to the October 26 board meeting plans of the Treasury Building and White House grounds, as well as "wood cuts from the London Times of the British Foreign and India Offices and Museum at South Kensington," massive French Second Empire style buildings.[48]

"[A]t some future time Congress will doubtless make provision for the erection of a building on 17th Street and Pennsylvania Avenue in style and construction to correspond in some degree with the Treasury Building."

The information circular sent to 144 respondents addressed the new building's architectural character in general terms. "The Board desires to have the designs of rich architectural effect, but as the building is for use for office purposes, would exclude designs with large porticos, long colonnades and heavy and expensive columns." In February 1867 John Crump of Philadelphia won the competition for his imposing Second Empire style design, a U-shaped building facing Pennsylvania Avenue that allowed for future expansion into a rectangular building enframing a courtyard. Although Crump was not notified that he had won, his design became the basis for the State, War and Navy Building begun in 1871.[49]

Several political factors led to housing the three departments in a single building located on the west side of the president's grounds. The State Department Building was razed in 1866 when the north wing of the Treasury Building on the east side of the White House was begun. In April 1869 Architect of the Capitol Edward Clark, Supervising Architect of the Treasury A. B. Mullett, Officer in Charge of Public Buildings and Grounds Lieutenant Colonel Nathaniel Michler, and the secretaries of State, War, and Navy, were appointed to a special Senate committee to select a site for the State Department and possibly the War Department.[50]

Which department was to occupy the choice location on the president's grounds was one issue; the second was which of the government's architectural and engineering offices was to take the lead. Mullett was immediately given the job of designing the State Department Building by Secretary of State Hamilton Fish. It was a modified version of Crump's 1867 design for the War Department. In April 1870 Fish announced that the

multi-departmental building, a rectangular version of Mullett's State Department, was to be built. While proposals to move the federal capital to a mid-western location were under consideration by Congress, no appropriations for Washington buildings were considered. Soon after Congress placed the city's administration under federal control in February 1871, the first government building to be funded was the State, War and Navy Building. Mullett was placed in charge of its construction from June 21, 1871, until he resigned as Supervising Architect effective January 1, 1875. The south wing housing the State Department was completed in November 1875 under his successor William A. Potter, Mullett having declined to supervise the entire building's completion as a private architect. On January 26, 1875, Fish requested that he "be relieved from further scrutiny and control in the construction of the remaining part of the building."[51]

Mullett's very large, relatively ornate, and extremely expensive building was a major project of the Ulysses S. Grant administration, intended as a symbol of the federal government's stability and resurgence after the Civil War. By 1877, when Grant's presidency

Brigadier General Thomas Lincoln Casey as Chief of Engineers
Office of History, Corps of Engineers, U.S. Army Signal Corps Photo

Born into a military family (the son of Major General Silas Casey), Lieutenant Colonel Thomas Lincoln Casey (1831–1896) graduated first in his class at West Point in 1852, was a professor there for five years, and had ten years experience as head of the Fortification Division of the Corps of Engineers just prior to his appointment to complete the government's major office building. He finished his distinguished career as Chief of Engineers from 1888 to 1895.

His professional credentials as a creative engineer were excellent and his personal character impeccable; during the ten years when Casey supervised construction of the State, War and Navy Building, he acted as his own disbursing officer. Casey's contemporaries measured his successful completion of the building in financial terms. Upon his retirement in 1895, the Washington Star *published a lengthy article recounting the highlights of Casey's entire career. At the State, War and Navy Building, "Gen. Casey put on the roof of the east wing and built the north, west and center wings entire. The total cost of the building was $10,038,482. The south and east wing and approaches cost $6,016,226 [sic], and the north and west wings and approaches and the center wing $3,992,236 [sic]. In other words, Gen. Casey did three-fourths of the work for about $2,000,000 less than the other fourth had cost." In his final report, Casey noted that $10,124,500 had been appropriated between 1871 and 1886, and that he was returning to the Treasury $86,017.58.*[52]

ended amidst charges of widespread corruption, the State, War and Navy Building (along with Mullett's similar Second Empire-style government courthouses, post offices, and customs houses erected throughout the country) became highly visible evidence of political patronage and graft in awarding contracts to loyal Republicans. In addition, Mullett's role on the Territorial Government's Board of Public Works in expending $4 million on public improvements, particularly street grading and paving on 17th Street to benefit his building and the contractor, Territorial Governor Alexander Shepherd, was investigated by Congress. Multiple other allegations of patronage contracts and suspicions of even greater corruption forced Mullett to resign in October 1874.

"Babcock's appointment counted as a reassertion of authority by Grant's inner circle."

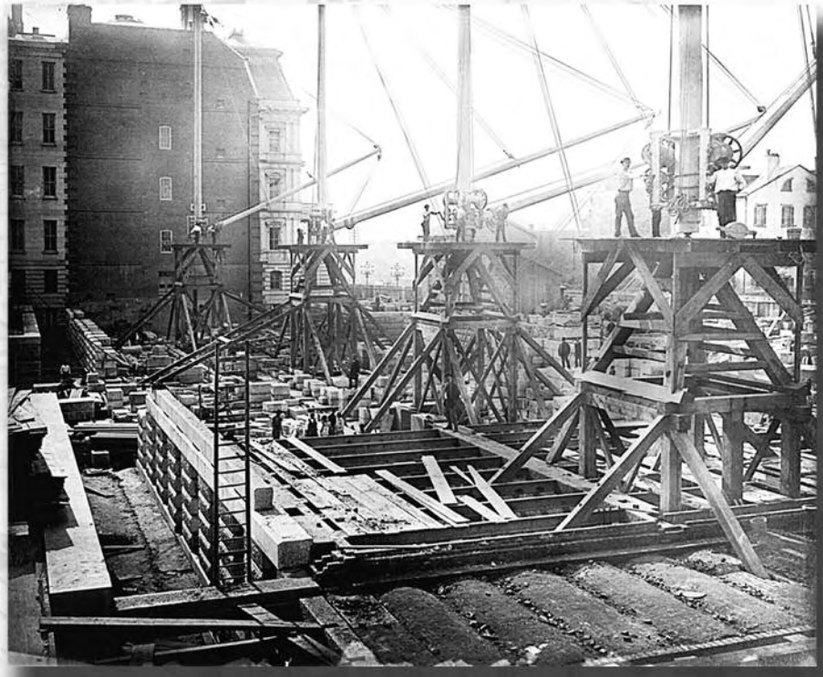
After Fish's January 1875 removal from duties associated with the State, War and Navy Building, Grant specifically appointed (rather than leaving the choice to the Chief of Engineers) Orville Babcock, his former secretary and now Officer in Charge of Public Buildings and Grounds, to superintend the completion of the east, or Navy Wing, whose foundations had been laid in 1872. "If Mullett's resignation had been conceived as a gesture to placate reformers, Babcock's appointment counted as a reassertion of authority by Grant's inner circle." Babcock held his position as Officer in Charge of Public Buildings until the end of Grant's presidency, but was forced to resign the partly ceremonial White House post enjoyed by the commissioners of public buildings shortly after his acquittal in February 1876 for participation in a Whiskey Ring. None of the drawings produced by the office during Babcock's superintendence have his authorizing signature, making it difficult to assess his contributions to the development of the State, War and Navy Building. When he was relieved in March 1877, the "masonry of the [east] wing had been carried to the level of the fourth-story window sills in front and to the top of the courtyard walls in the rear."[53]

Lieutenant Colonel Thomas Lincoln Casey, appointed to replace Babcock on March 3, 1877, was the antithesis of his predecessor. Casey's efficiency, well established before he took over superintendence of State, War and Navy, was integral to his ability to devise "new methods for novel challenges which he encountered in building fortifications, especially on tidal sites." He was able to cut costs dramatically on three quarters of the State, War and Navy Building by changing the way the government conducted its construction business. By hiring its own employees and contracting only for materials and specialty services such as heating systems, plumbing, and elevators, Casey was able to implement different ways for work teams to function most effectively. One example was the elaborate doors at State, War and Navy. "The Government bought mahogany, white pine, maple for

Construction of the State, War and Navy Building

After the Supervising Architect of the Treasury Department completed the south wing of the State, War and Navy Building, Colonel Orville Babcock, Officer in Charge of Public Buildings and Grounds, continued the east wing until he was relieved in 1877. His successor, Lieutenant Colonel Thomas Lincoln Casey, completed the rest of the building, including the middle wing, in 1888. Shown is the construction of the west, or War Department, wing.

1884



October 1884

Office of History, Corps of Engineers
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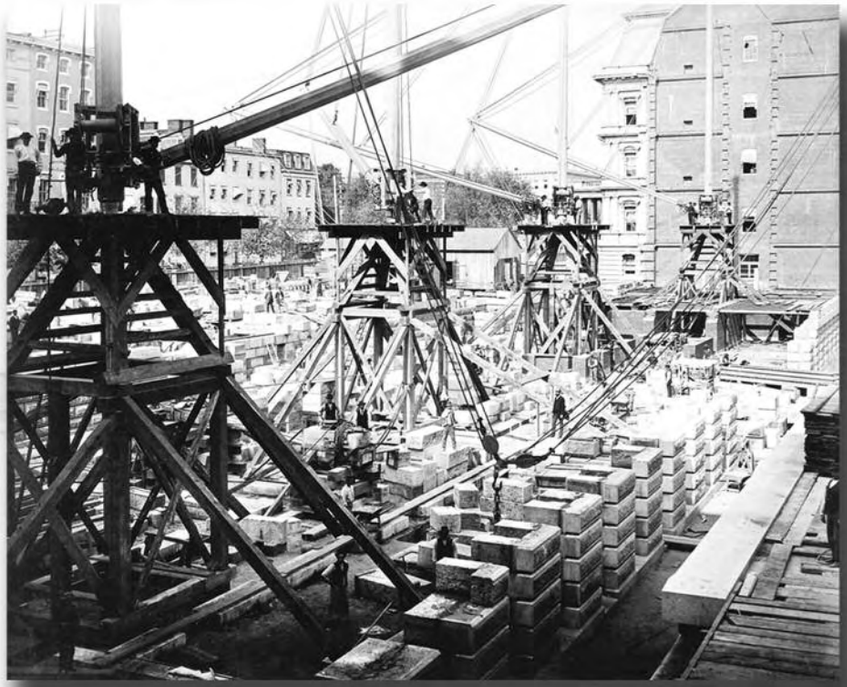

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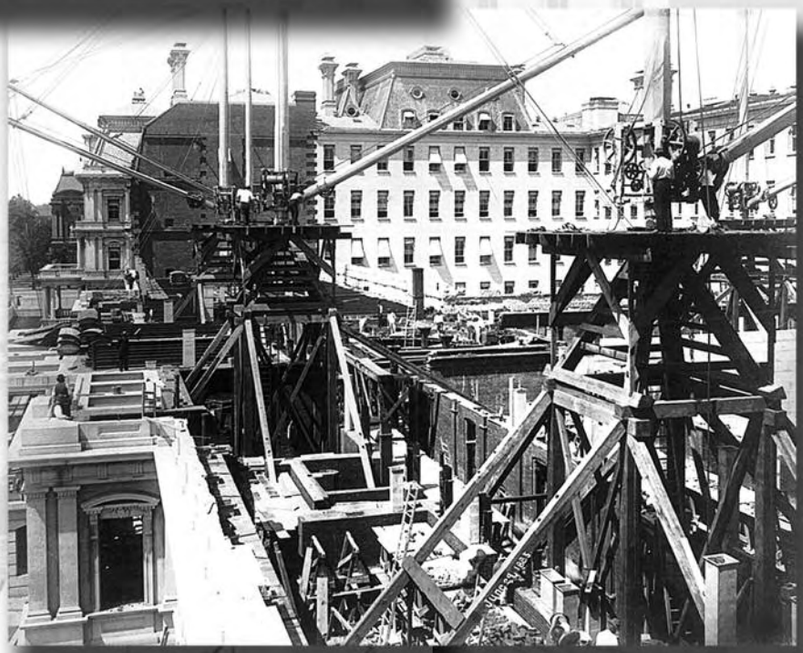

June 1885

February 1886

Office of History, Corps of Engineers
Library of Congress, Prints and Photographs Division, LC-USZ62-56747
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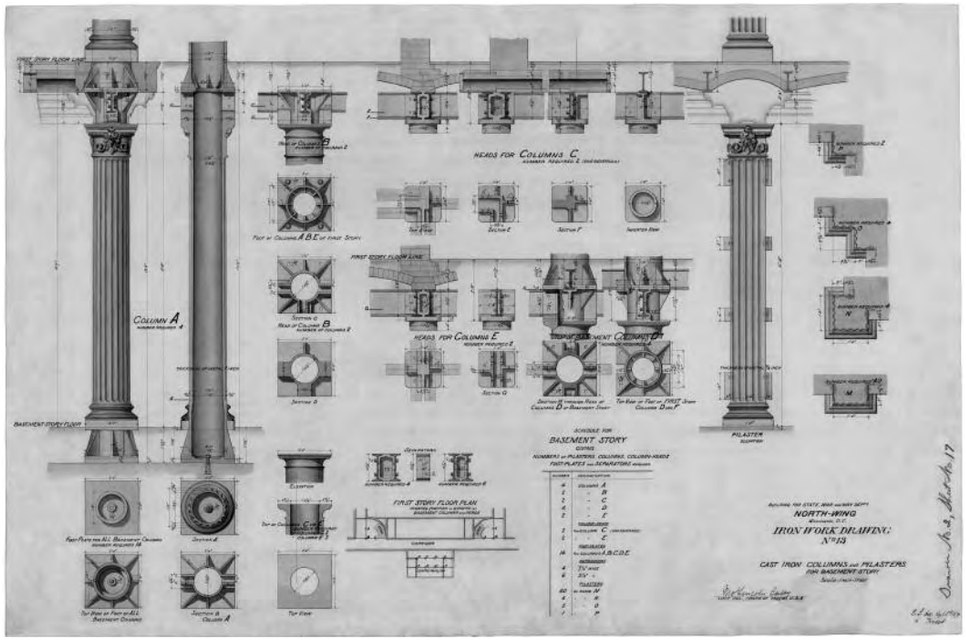


Cast-iron columns and pilasters for the basement story of the north wing of the State, War and Navy Building, 1879. Thomas Lincoln Casey signed the drawings.
National Archives, Cartographic Branch, RG121, Folder 47, Drawing 13.

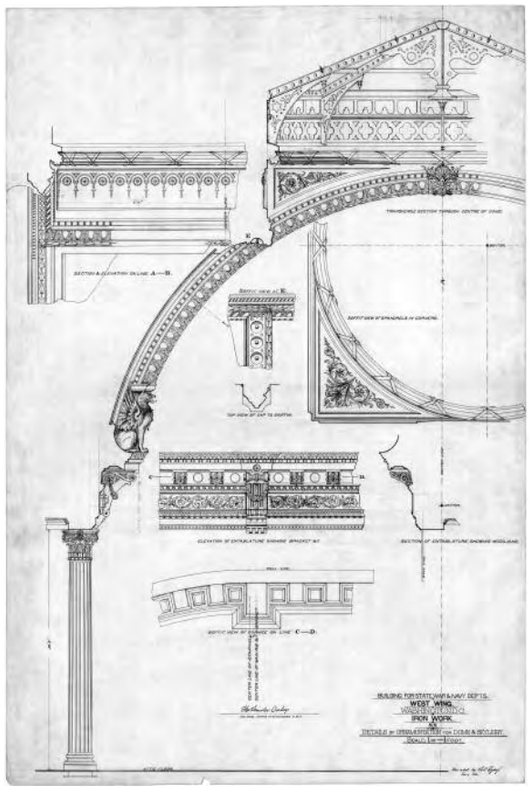
dowels, zinc sheets, and hardware, and craftsmen made the doors on the site. The veneering, paneling, and doweling demanded skills of high order. The same workmen also cut and joined the mahogany handrails for the staircases, fabricated the window sashes, and built the screen doors."[54]

Casey's close associate on this project, as well as on the completion of the Washington Monument and the Library of Congress, was the civil engineer Bernard Green. Both respected the integrity of Mullett's design by removing two courses of granite and the coping at the top of the walls on the east front (done under Babcock's direction) in order to match the height of Mullett's south wing. Casey wished the entire building to appear as a seamless construct, rather than one done piece-meal, as it indeed was. Also at stake was Casey's own professional pride. Both Casey and Green worked closely with the Venetian-born and Austrian-trained engineer and designer Richard von Ezdorf (1848–1926), who had been hired as a draftsman by the Office of the Supervising Architect of the Treasury on July 14, 1873. Ezdorf worked with Mullett on interior designs and structure, especially relating to cast-iron, for the south wing. In 1876 Ezdorf was transferred to the War Department specifically to work with Babcock to maintain continuity of design in the east wing's interiors and details.[55]

"[T]he version chosen by Casey contained no figures, but instead drew on the Roman cuirass, Phyrigian helmet and battle standards of the official seal of the United States Army, and surmounted the group with an American eagle."

Ezdorf's greatest achievements were his three cast-iron libraries, designed as multi-tiered balconies overlooking central, sky-lit wells with shallow book stacks located behind the balconies. This horizontal layering of open spaces connected to quasi-open spaces was based on Thomas U. Walter's cast-iron Library of Congress built behind the Capitol's west

front balcony between 1851 and 1853, the first room to be built with a cast-iron ceiling. Walter used cast-iron because it was fireproof, inexpensive, and rapidly assembled; because he designed its decorative parts to imitate carved stone or wood classical details, the mass of iron was physically and visually heavy. Ezdorf embraced in part the modern French Neo-Grec (New Greek to distinguish from the Greek Revival of the early nineteenth century) attitude toward the use of iron that emerged in the 1860s. This French theory, in part, held that decorative cast-iron should reflect visually its structural facts as well as the mass production methods by which it was made, rather than imitate naturalistic ornament hithertofore carved in wood or stone. Often, the resulting ornaments looked mechanistic and even included elements like gears and ball bearings. Thus Ezdorf's cast-iron libraries used iron more sparingly than Walter's massive, hollow shells that appeared to be solid. His State Department library's balconies, designed under Mullett and finished under Babcock, give the appearance of a filigree cage composed of multiple linear elements set in front of cast-iron walls. Ezdorf's War Department library, designed for the west wing's central pavilion in 1884 under Casey, was a filigree cage, its fragmented walls and pierced balconies calculated to use a minimum of materials.

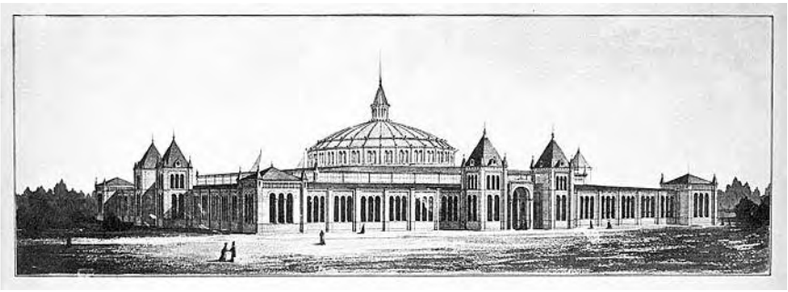


Details of the iron work ornamentation on the dome and skylight of the west wing of the State, War and Navy Building designed by Richard von Ezdorf under Casey's supervision
National Archives, Cartographic Branch, RG121, Folder 63, Drawing 88

In many cases alternate designs by Ezdorf survive and Casey's choice between them reflects his own contributions to the State, War and Navy Building's aesthetic development. One of Ezdorf's two designs for the cast-iron ornament in the north wing's pediment "featured undraped allegorical figures of War (male) and Peace (female) flanking a laurel wreath, emblematic of victory." However, "the version chosen by Casey contained no figures, but instead drew on the Roman cuirass, Phyrigian helmet and battle standards of the official seal of the United States Army, and surmounted the group with an American eagle."[56] Modest allegorical sculpture in each wing's pediments identified its occupants and Casey chose the least expensive alternatives as well as those that were more comprehensible to most Americans. Casey also independently hired other architects or designers to undertake special projects. On January 15, 1887, Casey wrote Secretary of War William Endicott: "I have the honor to request authority to employ the personal services of Stephen D. Hatch as architect; for the purposes of making under my directions, designs for the finish of certain rooms in the west wing of this building." Hatch, a New York architect, designed very elaborate decorations for the Secretary of War's suite, the most ornate of any of the offices in the building.[57]

U.S. NATIONAL MUSEUM

Montgomery Meigs, the Army's most distinguished prewar builder, completed a number of significant projects in Washington after the Civil War. Two trips to Europe in 1867–68 and 1876, during which he studied ancient, Renaissance, and contemporary architecture and engineering projects of all kinds, particularly in Italy, influenced his postwar work. The first was for the Smithsonian Institution. The United States National Museum (now the Arts and Industries Building, Smithsonian Institution) had emerged in the 1850s when government-owned collections were transferred to the Smithsonian and federal money was appropriated for their care. These collections crowded the institution's Mall building, and, when a flood of donations of objects arrived in the wake of the 1876 Centennial Exposition, Smithsonian Regents petitioned Congress to fund a separate museum building. A February 5, 1877, memorial to Congress stated, "Careful inquiries have been instituted to ascertain the smallest sum which would be adequate to [erect a building], and the plan of a convenient structure has been made by General Meigs…."[58]



Preliminary drawing by Adolf Cluss and General Montgomery C. Meigs of the proposed United States National Museum, February 1877
Smithsonian Institution Archives, Record Unit 95, Box 32, Folder 2, image #1307

The House Committee on Public Buildings and Grounds noted the constraints on the museum project. "To erect an edifice of the necessary magnitude, in the style of architecture heretofore adopted by the Government for its use in Washington, would involve expenditure of many millions of dollars, and it could not be completed and available for occupation in a shorter period than from five to eight years. Nevertheless on a simple plan originally suggested by General Meigs, a building somewhat similar in character to those erected for the National Exposition…perfectly fireproof, amply lighted, and properly adapted for all its objects, can be constructed for about $250,000, and can be ready for occupation within ten months, or at most a year." Meigs's experience with iron used in constructing the Capitol, General Post Office, and Patent Office Extensions in the 1850s led him to study alternative uses of iron in fireproof construction.[59]

Congress appropriated exactly that amount and approved the building site in 1879. The Regents established a National Museum Building Commission, chaired by regent General W. T. Sherman. "The committee at the outset invited Gen. M.C. Meigs…to act in the capacity of consulting engineer to the commission, and also selected Messrs. Cluss & Schulze, whose plans for the new building were those approved by Congress, as superintending architects."[60] Ground was broken in April 1879, on the single-floor brick and iron

structure, to be set without a basement on concrete foundations. The U.S. National Museum was substantially finished by the end of 1880, and its final cost, including additional appropriations to cover buildings systems and marble flooring, came to $315,400, the least expensive, permanent government building constructed in Washington up to that time, according to the final report.[61]

A major factor in the museum's low construction cost was Meigs's suggestion of a "tent" roof, an exposed iron truss that had been used in industrial and manufacturing buildings since it was introduced in 1835. Meigs had concealed iron roof trusses above the drop ceilings that spanned the House and Senate chambers in the Capitol Extension in 1855. Just four years earlier, at London's Crystal Palace, Joseph Paxton used exposed iron trusses for the exhibition hall's entire structure. It established a precedent for using iron to roof temporary exhibition buildings, a technology soon used for permanent exhibition halls that required large interconnected spaces. At the National Museum, many different roof heights and shapes, as well as numerous monitors, had to be accommodated; the underside of the roof and the upper walls, and perhaps the trusses themselves, were painted a light sky blue to appear nearly invisible and heighten the effect of open, airy spaces. The trusses themselves were not decorated in any way to mask their industrial character and their simple bolted joints were left exposed.

Adolf Cluss's 1885 design for the Army Medical Museum, located on the Mall's south side at 7th Street, SW, was built by Colonel Thomas Lincoln Casey using inexpensive brick, terra cotta, and iron materials. The building, on the site now occupied by the Hirshhorn Museum, was razed in 1969. (Photographed ca. 1940s)
Library of Congress, Prints and Photographs Division, LC-A7-4130-Lot 11661-9 (G)

ARMY MEDICAL MUSEUM, RAZED 1969

The museum, library, and historical records of the Surgeon General's Office were housed in Ford's Theater from 1866 until the Army Medical Museum was built on the south side of the Mall at the corner of B (now Independence Avenue) and 7th Streets, SW, between 1885 and 1887. Secretary of War Robert T. Lincoln, son of President Abraham Lincoln who had been assassinated at Ford's Theater in 1865, sent a special message to Congress on January 19, 1882, urging construction of a building. These records and objects (that included the bullet that killed Lincoln) were in "imminent danger of destruction" if they remained in the decaying theater. Two recent museum fires in Washington—at the Smithsonian Institution in 1865 and the museum in the Patent Office in 1877—were given as reasons to erect a building to house the Surgeon General's collection. Although Congress appropriated $200,000 on February 28, 1883, for a "plain, fire-proof [building] with a large amount of floor space," opponents felt that the library could be merged with

Montgomery C. Meigs began his Washington career in the 1840s as a lieutenant and ended it in the 1880s as a major general. His most prominent post-Civil War project was the Pension Building, designed to be fireproof, inexpensive, and provide a humane, naturally air conditioned environment for its office workers—mainly Union Army veterans.
Library of Congress, Prints and Photographs Division, LC-BH83-137 (detail)

the Library of Congress and the museum artifacts displayed either at the Pension Building or the State, War and Navy Building, both then under construction.[62]

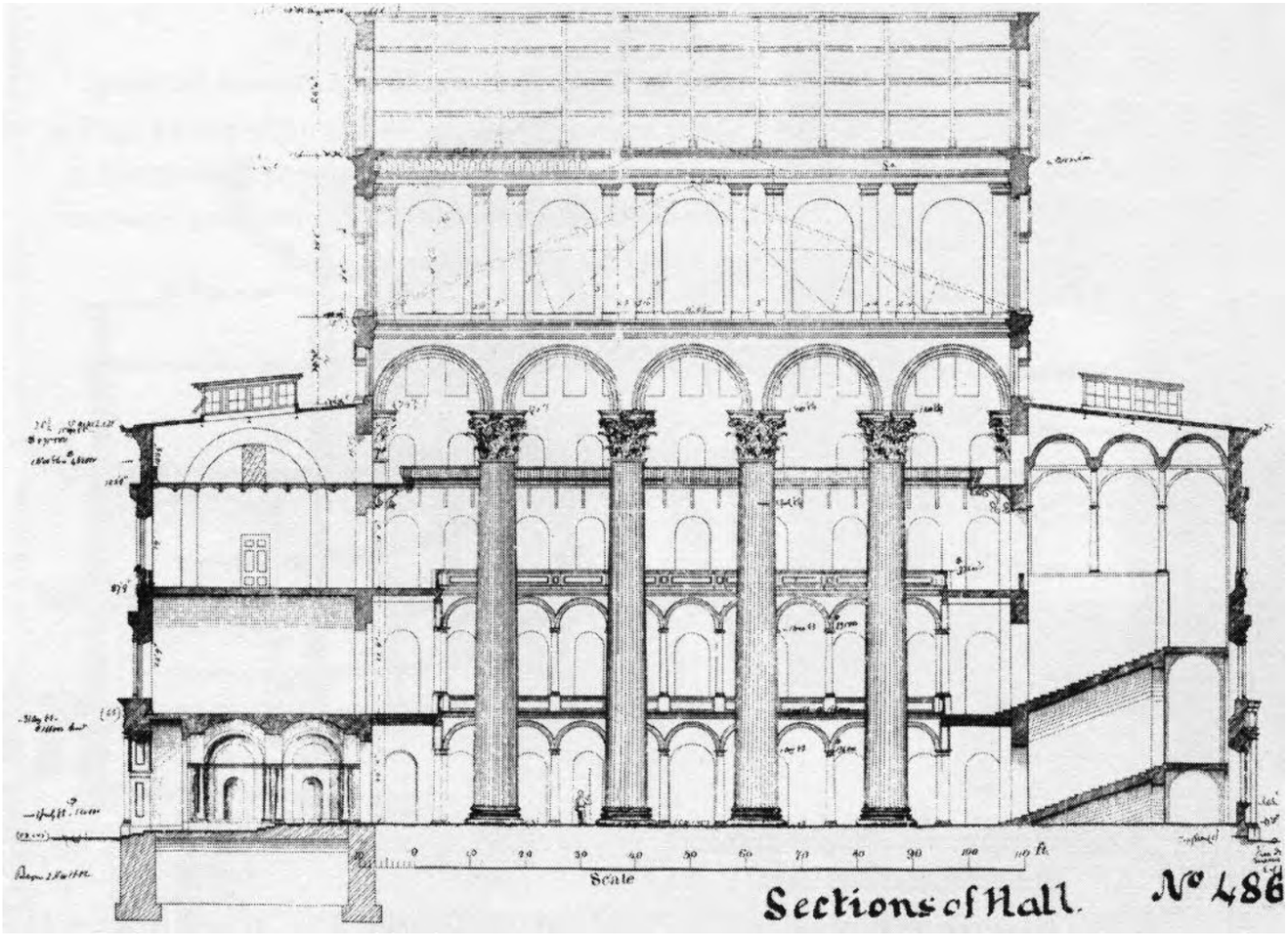
President Chester Arthur signed the legislation on March 2, 1885, to place the metal and brick museum on the site selected by a commission composed of the Secretary of War, the Architect of the Capitol, and the Secretary of the Smithsonian, with the War Department overseeing construction. On April 14, 1885, Colonel Casey was put in charge of its construction. Adolf Cluss had earlier designed the Medical Museum to complement his nearby National Museum Building and was able to comply with the government's mandate for an inexpensive and fireproof building by using mass produced bricks and decorative molded terra-cotta panels for exterior walls and easily maintained glazed bricks for interior walls. The Army Medical Museum employed metal roofs with monitor lights supported with iron trusses that covered the two forty-seven-foot-tall exhibition wings—an inexpensive and fireproof system similar to what Cluss and Meigs had employed in the National Museum and Meigs was to use at the Pension Building. On November 9, 1887, Colonel John Wilson, now in charge of the Office of Public Buildings and Grounds, transferred the museum to the Surgeon General's Office after only a three-month delay in its completion.[63]

PENSION BUILDING

Based on his role in making the National Museum building a success by keeping construction costs low, in 1881 the Senate Appropriations Committee appointed Meigs to design and construct a building to centralize the operations of the post-Civil War Pension Bureau's 1,500 clerks. The building's second mandate, possibly suggested by Meigs himself, was a large hall for Washington's great social and state occasions, particularly inaugural balls. The Pension Bureau was under the Interior Department, but from the outset it was determined that Meigs would be both the architect and the superintendent of construction. Thus the legislation was co-sponsored with the War Department, and construction supervision was specifically placed under the Quartermaster General's Office, rather than the Chief of Engineers. Meigs retired from active service in 1882, the year the Pension Building was begun, and he devoted all of his formidable energy for the next five years to produce "a building the like of which is not to be seen anywhere else in the country."[64]

"…a building the like of which is not to be seen anywhere else in the country."

The Pension Building often is judged as Meigs's masterpiece; it was the only monumental architectural work over which he had total control and he put into it his



Montgomery Meigs, "Section of Hall," April 16, 1886. This drawing created mid-way through the Pension Building's construction shows its fourth floor and skylights added during construction as well as the final configuration of the roofs. The fluted finish for the massive columns in the courtyard was not carried out.
National Archives, RG 15

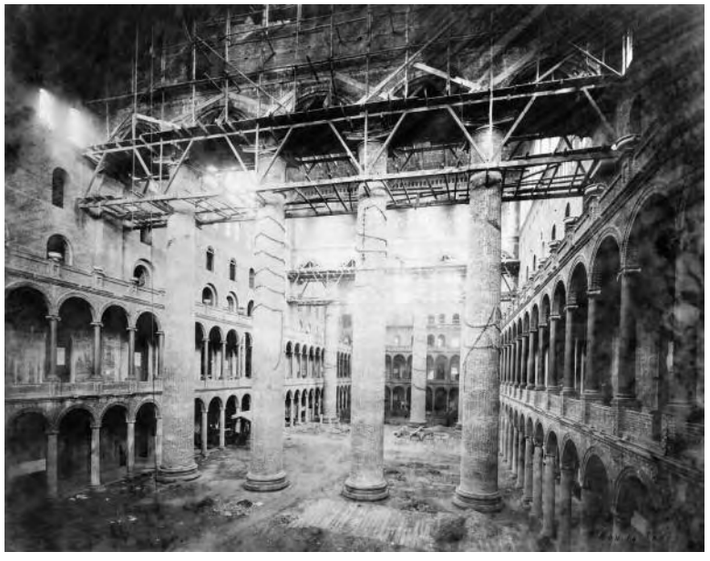
considerable accumulated knowledge of architecture and engineering. The Pension Building is unique among Victorian buildings but partakes of many late Victorian architectural characteristics: synthesizing several historical models to create something new; combining traditional building methods with new ones born of modern technology; and, symbolizing by its form and its symbolic decoration nineteenth-century positivism that promoted the idea of progress driven by technological and scientific advances. The engineering aspects of the Pension Building are inventive, ingenious, and imaginative, as Meigs considered all the pragmatic issues involving its construction, especially its ventilation, because one major goal was a humane physical environment for the bureau's employees.

While in Rome on February 16, 1868, Meigs sketched an idea for the War Department Building, a solid three-and-a-half-story Roman palazzo. Fifteen years later he executed a very similar design for the Pension Building. Rome's brown brick Palazzo Farnese (ca. 1515–46), the largest of the Renaissance urban palaces, provided Meigs

Pension Building under construction showing holes for shallow domes on the third floor, November 1883
Library of Congress, Prints and Photographs Division, LC-USZ62-59413

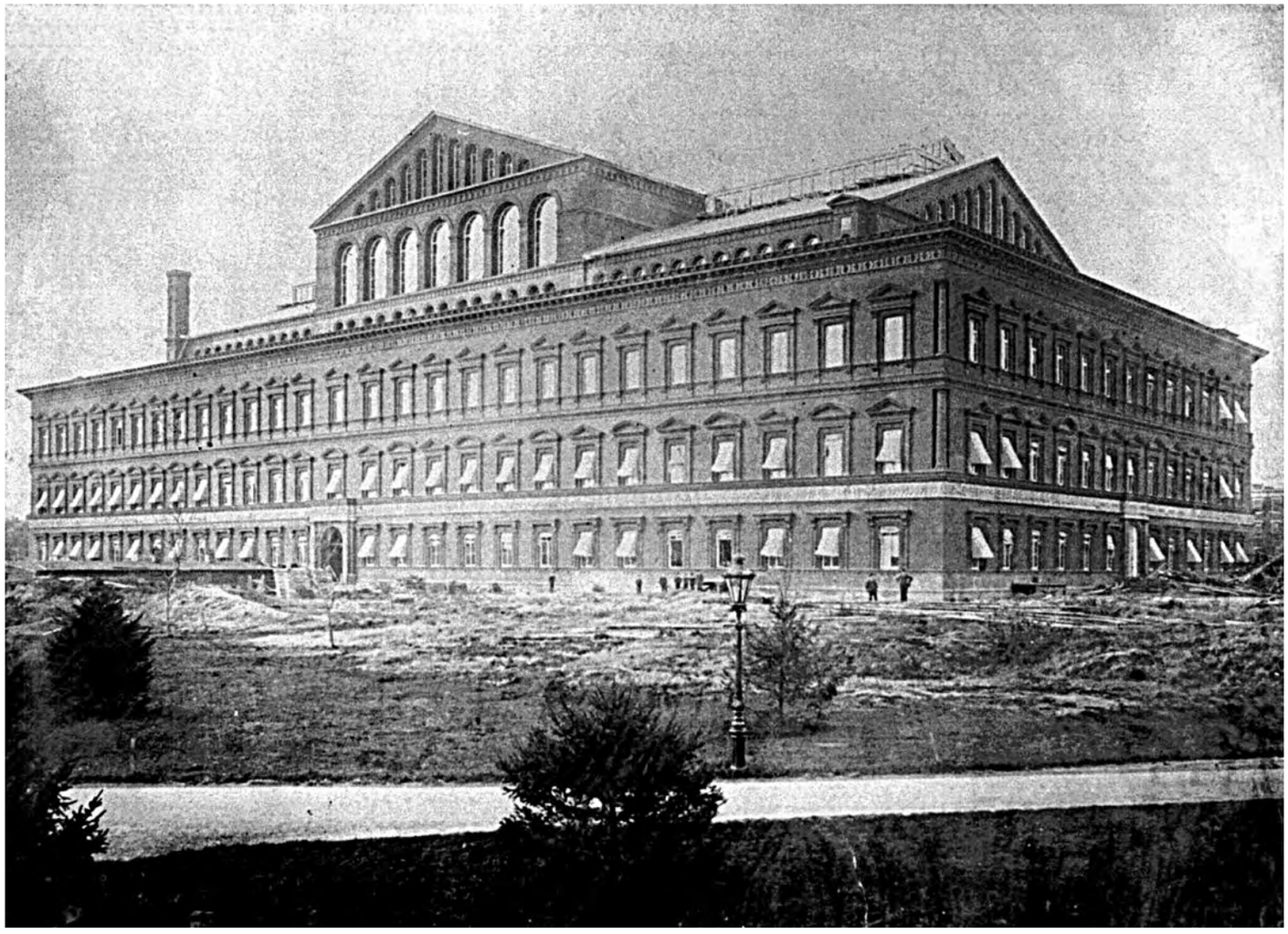
with the Pension Building's form of a hollow rectangle with offices ranged around its exterior, and internal circulation around arcaded loggias that lined the inside of the rectangle. Some of the Farnese's details, including staircases constructed with shallow risers and deep treads to allow the bureau's clerks, who were disabled war veterans, to easily traverse, demonstrate how Meigs, the Victorian, selectively chose from history any element that served his purpose.[65]

Two additional Roman buildings provided Meigs with historical design models, the courtyard loggia of the Cancelleria palace, and the massive ancient Roman columns incorporated into the Renaissance church Santa Maria degli Angeli—appropriate sizes to serve as the prototype for the seventy-five-foot-tall columns needed to support the Pension Building's roof. Meigs doubled the size of the Farnese palace and used 15.5 million bricks to build the Pension Building, the largest brick building in the world, he claimed, when it was finished. Brick and terra cotta—the Pension Building's decorative details were in terra cotta—were the only truly fireproof materials in Meigs's opinion. Ancient and much of Renaissance Rome had been built of brick and Meigs consciously designed and built the Pension Building to stand for a millennium and then be as impressive as a fallen ruin dominating its entire Washington block.



Pension Building under construction showing the massive brick central columns and the rows of columns on the first and second floors, November 1885
Library of Congress, Prints and Photographs Division, LC-USZ62-51277

As the architect of the Pension Building, Meigs was committed to giving it an important artistic character within the confines of his limited budget. Brick allowed him to erect a massive building cheaply, but to make it appear monolithic, he colored the mortar the same color as the brick. He hired the Bohemian-born sculptor Caspar Buberl to model in clay a 1,200-foot-frieze based on subjects he chose, a continuous parade depicting the infantry, cavalry, artillery, naval, quartermaster, and medical corps that comprised the men in whose service the building was erected. No such frieze existed on the Palazzo Farnese; rather Meigs and Buberl turned to ancient and modern monuments for their inspiration. The Parthenon in Athens is often cited as their model because Meigs and Buberl corresponded on the "pedestrian figures



Exterior of Pension Building under construction, November 1885. The city block occupied by the Pension Building was not one designated for public buildings on the L'Enfant plan.
Library of Congress, Prints and Photographs Division, LC-USZ62-56363

followed by the youths of Athens on horseback" that were familiar from the Parthenon's Panathenaic Procession. But this procession depicted a recurring religious event; Meigs's and Buberl's buff-colored terra cotta frieze depicted a victorious marching army in the uniforms of their time—not unlike the frieze on Paris's Arc de Triomphe, completed in 1836 to celebrate the feats of Napoleon's armies. Soldiers stand like sentinels at attention on the corners of each nineteenth-century structure as the entire panoply of their respective modern armies pass in review. Again, Meigs and Buberl were participating in the eclecticism of their age by fusing together ancient (Athen's Parthenon) and modern (Paris's Arc de Triomphe) in the frieze's sculptures.[66]

As the Pension Building's engineer, Meigs was equally creative in the way he used brick, incorporated heating and ventilating, and roofed the 116-foot by 316-foot courtyard. The solid bearing walls—four feet wide at their foundation—were tied into the cross walls that supported the vaults of each twenty-five-foot by thirty-seven-foot office. Meigs chose brick domes on pendentives for office ceilings and structural supports for the floors above

them. This elegant design, rare in the United States, required the use of "more expensive experienced bricklayers and careful supervision."[67]

Meigs's system of heating and ventilating the Pension Building was integral to his entire design because it required the exterior walls, offices, courtyard, and roof to function in concert. Airshafts under each window (observable as the three stretcher bricks missing under each window) passed through an L-shaped conduit that opened at the base of each of the two windows per office. Steam radiators under each window warmed this air during cold weather. During warm weather, air was drawn through the offices, which had tall arched openings rather than doors, by suction artificially created in the courtyard via windows in its three-part roof. Meigs redesigned the roof three times in order to perfect this system (and to add a fourth floor for document storage). The building's maintenance engineers could open different sized windows, including monitors in the higher, central section, either with pulleys reached from the top balcony or from the exterior. Meigs spent months determining the number of degrees the temperature would drop in offices on each side of the building depending on the time of day and the direction of the prevailing wind. He calculated that the courtyard's air could be completely exchanged once every two minutes under optimum conditions. After one year in the new building, the Pension Bureau reported that employee absenteeism was down 8,622 days. Yet there were problems with the system because after two years, employees petitioned that it be shut down as their offices were wind tunnels filled with flying papers. They also found that their offices were too cold during the winter months and so the arches were filled and doors installed.[68]

"The sum for which it is to be built, amounting only to five dollars for every square foot of ground covered, is very small for a fire-proof building, but the lesson to be learned from it will be none the less useful, as showing the dignity which can be given to simple materials in the hands of one who knows how to use them."

The immense size of the enclosed courtyard and the powerful effect of its eight plaster-coated Corinthian columns that divide it into thirds was made possible by the iron and steel trusses that support the hollow clay tile roofs. These columns were later painted to resemble veined marble. The columns in the first-floor arcade are terra cotta covered with cement while those on the second floor are hollow cast-iron. The only wood used in the building (other than for window frames and sashes) was behind the cornice because Meigs could find no other economical way of attaching terra cotta heads of lions to the cornice. The wood soon rotted and the lions' heads were removed. Meigs wanted to install trees and shrubs in the courtyard for oxygen/carbon dioxide exchange, but settled for hanging plants from urns on the top balcony for reasons of economy.[69]

In 1881 Congress appropriated $250,000 for the Pension Building's site, an entire city block. The Pension Building was first occupied in 1885 and completed in 1887 at a cost of $866,614.04, which, according to Meigs, was $4.69½ per square foot and 10¾ cents

per cubic foot of space. The final cost of the State, War and Navy Building—seventeen years in construction—was about $10 million. In the previous generation, the Smithsonian Institution's medieval revival architecture (and its Seneca Creek brownstone) cost 17¼ cents per cubic foot compared to the Treasury Building's neoclassical style (and Aquia Creek sandstone) at 42½ cents per cubic foot. The 1882 *American Architect and Building News* article that briefly described Meigs's design and its projected cost, concluded: "The sum for which it is to be built, amounting only to five dollars for every square foot of ground covered, is very small for a fire-proof building, but the lesson to be learned from it will be none the less useful, as showing the dignity which can be given to simple materials in the hands of one who knows how to use them."[70]

LIBRARY OF CONGRESS

Revisions in 1870 to the copyright law centralized its functions in the Library of Congress and further required that multiple copies of materials to be copyrighted be deposited and registered. Its passage made T. U. Walter's 1853 cast-iron Library of Congress, located in the Capitol, too small to accommodate anticipated amounts of new books and other materials. The 1873 competition to design a new library building was the beginning of a protracted history that resulted in the adoption in 1886 of one of several designs submitted by the Washington-based German-American architects, John L. Smithmeyer and Paul Pelz; they were hired to oversee its construction under the jurisdiction of the Department of the Interior.[71]

A three-man building commission included Librarian of Congress Ainsworth Spofford, who in 1873 had conceptualized how the building was to be laid out with a central octagonal reading room and corner pavilions linked by curtains. Within a year, lawsuits brought by contractors caused construction delays and an investigation led to Smithmeyer's dismissal. Between May and September 1888, hearings held by the House Committee to Investigate Contracts for the Construction of the Library of Congress Building recommended transferring jurisdiction of the library's construction to the Treasury Department. The new Secretary of Interior, William F. Vilas, suggested that the Corps of Engineers take over its construction supervision; on October 8 General Casey, now Chief of Engineers, was put in charge. Thus Casey reported to the Secretary of the Treasury, not the three-man commission.

"[T]hanks to the perfect discipline of Mr. Green, the 300 men engaged on the work move almost as one, without jar or friction, nobody getting into his neighbor's way."

This decision led to contradictory claims of authorship for many of the Library's most notable features and culminated in a second lawsuit brought by the architects. Modern scholarship has not yet unraveled where all the credit is due during the complex quarter

Civilian engineer Bernard R. Green spent most of his career working with Corps engineers on Washington projects. For the Library of Congress, where he worked closely with Thomas Lincoln Casey, Green invented a pneumatic tube and conveyer belt system to order and transport books from the stacks to the reading rooms.
Library of Congress, Prints and Photographs Division, LC-USZ62-90221

century when dozens of architects, specialty contractors, engineers, muralists, and sculptors were directly involved or consulted. In reality, the design process, once responsibilities began to be shared, was so fluid and so interwoven with constructing the decorated parts of a very ornate building, that several people might have or did contribute many elements of the Library's facades, interiors, and art works.

Civil engineer Bernard Green, who had been hired in the spring of 1888 by the building commission, was promoted to "Engineer and Superintendent of Construction" in charge of day-to-day operations by Casey, while Pelz retained the title and functions of the Library's architect. The *Evening Star,* which generally reported favorably on supervision of architectural projects by the Army Engineers, on September 24, 1889, commented "thanks to the perfect discipline of Mr. Green, the 300 men engaged on the work move almost as one, without jar or friction, nobody getting into his neighbor's way." Green kept a daily diary from October 4, 1888, to August 19, 1902, the source of much detailed information about the Library's construction.[72]

Under Casey's direction Pelz made two sets of drawings for the Library, presented to Congress based on Smithmeyer and Pelz designs done in 1884–85. The more costly was for a larger building than originally planned by the architects in 1873. Designs for a smaller building were estimated at $4 million before members of the Joint Committee on the Library toured European national libraries during the summer of 1885. Working with a joint congressional committee, Casey secured appropriations for a $5.5 million building "capable of extension without marring its symmetry or involving costly demolitions." This appropriation was eventually increased to $6,245,000.[73]

Casey and Green worked closely with Spofford, who provided them with fifteen functional considerations relating to abundant light, ventilation, dimensions of rooms, and efficient movement between them, as well as innovative alcove and stack systems. Because of Spofford's insistence on the rapid movement of books and other materials from stacks to reading rooms, Green invented a "bookcarrying apparatus," the first pneumatic tube and conveyor belt system in an American library. Green's most famous invention was his 1890 patent for cast-iron book stacks, manufactured for the Library of Congress in Louisville, Kentucky, then subsequently available for general library use.[74]

In his first annual report, Casey predicted that construction of the Library of Congress would take eight years. The engineer's ability to efficiently manage the logistics of

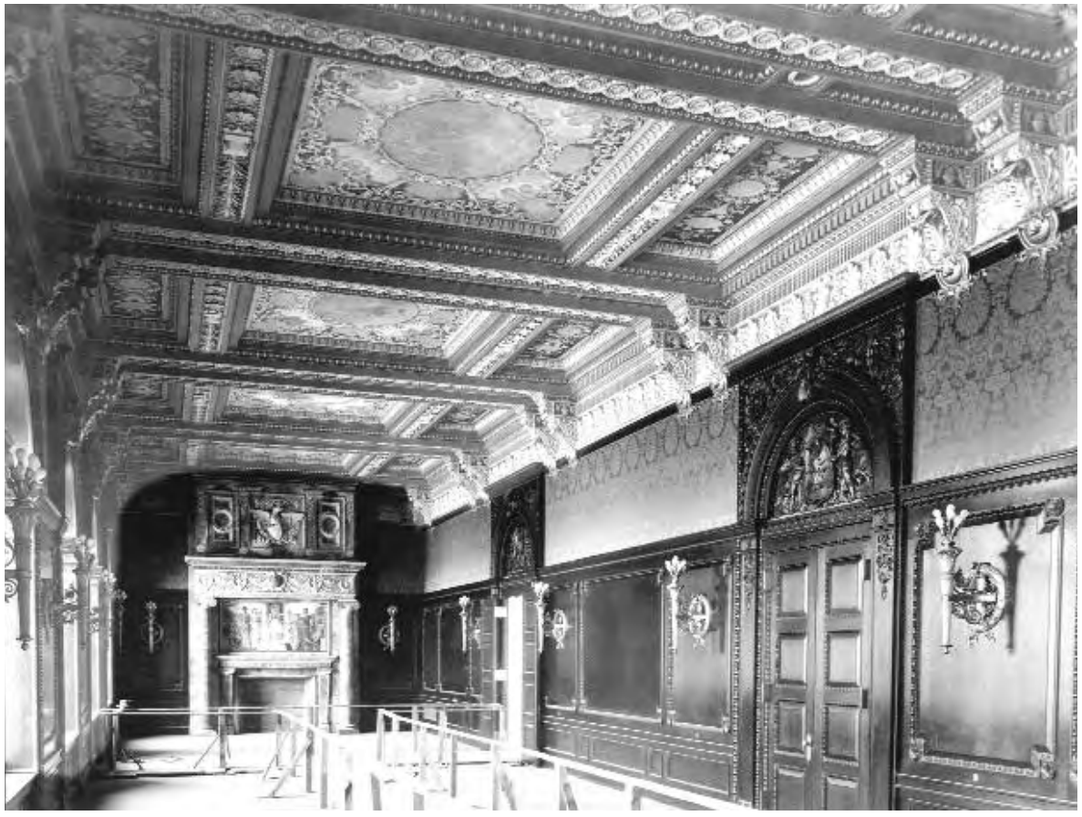
October 1890

November 1892

January 1894

Library of Congress under construction

Library of Congress, Prints and Photographs Division, Lot 12042-1 no. 12 (OSE)
Library of Congress, Prints and Photographs Division, Lot 12042-2 no. 42 (OSE)
Library of Congress, Prints and Photographs Division, Lot 12042-2 no. 58 (OSE)



Private reading room, House of Representatives, under construction, designed by Edward P. Casey
Library of Congress, Prints and Photographs Division, LC-USZ62-102087

constructing a very large, complex, and highly decorated building in which traditional masonry walls, cast-iron-supported floors, roofs, and dome, modern utilities including nine pneumatic elevators, multiple lavatories, and electric lights was proven beyond doubt in the Library of Congress. Knowing when and where to employ each subcontractor's team in concert with the library's own workforce of about 400 men was coordinated with the delivery of materials and pre-fabricated elements, such as the patented book stacks. The Corps of Engineers, along with architects trained in the Treasury's Office of the Supervising Architect, brought to such large projects a coordination matched by few large private architectural or engineering firms during the era that typically overran budgets and schedules. Casey's estimate that the Library could be built in eight years was exceeded by only a few months; costs were $200,000 less than appropriated.

"If Gen[eral] Casey had stated to the Committee his program, it is quite likely it would have been approved....I suppose it did not occur to him that such statuary was anything more than architectural decoration."

The efficiency of Casey's and Green's management of the Library of Congress construction, particularly in containing its costs, is most remarkable when one considers the considerable extra expense of ornamenting the building. Casey's most visible contribution to the building, always credited to the architects Smithmeyer and Pelz, was to enlarge upon and realize the library's iconographical and decorative schemes. Spofford was particularly adamant that the central reading room's walls be "decorated" with tier upon tier of books,

rather than "crass architectural display."[75] Smithmeyer had from the beginning considered the Library of Congress to be "more of a museum of literature, science and art, than strictly taken as a collection of books," and thought that the building itself should provide visitors with an insight into the range of human knowledge.[76]

Grand staircase in the Great Hall of the Library of Congress
National Archives no. 200(S)-MHW-8

Casey started hiring muralists and sculptors as early as 1890 but they were not singled out in his reports. By subsuming the work of the sculptors under "marble work," and that of the artists under "painting," in his annual reports, Casey may have wanted to avoid lengthy congressional debates and public criticism by the many vocal opponents of elaborate government buildings. Green's report for 1896 (Casey having died on March 25) summarized which contractors had been responsible for supplying materials or building specific parts of the building, information not given by Casey in his reports that listed that year's accomplishments. Significantly, Green included two pages (out of ten) listing all of the artists and their works.[77]

Casey embarked on the library's decorative scheme without prior approval by Congress, or even the knowledge of the members of the Joint Committee on the Library. It is a mark of the general respect for, and confidence in, Casey that Senator Justin Morrill of Vermont, when he learned in 1893 that Casey had contracted with artists, asked first if the library's decoration could be done without additional appropriations. "Morrill admitted that it did 'look strange that the Gen[eral] sh[oul]d not have talked over with us so important [and] valuable [a] point in the progress of his great work,' but explained this away by adding, 'If Gen[eral] Casey had stated to the Committee his program, it is quite likely it would have been approved….I suppose it did not occur to him that such statuary was anything more than architectural decoration.'"[78] American government buildings, with the exception of the Capitol, had little allegorical painting and sculpture in comparison to their European counterparts and many American municipal and commercial buildings.[79]

Each of the key participants in the library's formation contributed some part either to the literary or artistic realization of its theme of collective world knowledge and culture. In 1894 Casey set up a "committee of selection" to choose artists and their themes consisting of himself, his Columbia University educated son, architect Edward Pearce Casey (whom he designated the Library's "decorative designer,") and Green as supervisor of construction.

Main reading room of the Library of Congress, (n.d.)
Library of Congress, Prints and Photographs Division, LC-USZ62-59277

They wrote to and met with the country's leading artists to ensure high quality work. Yet Green later recounted: "So Casey and I just went ahead and hired artists on our own." Casey did direct the muralists and sculptors, leaving them free to choose their subjects within the established schema, but subject to his approval. Both the architects and engineers sought credit for what they realized would be one of America's most important buildings.[80]

"So Casey and I just went ahead and hired artists on our own."

General Casey and his son invited three prominent sculptors to be members of a committee to advise on the building's sculptural decoration.[81] John Quincy Adams Ward, Olin Levi Warner, and Augustus Saint-Gaudens, all of whom had undertaken many public commissions, first met with the engineers on January 26, 1894, when they collectively

laid out a sculpture program for forty-four free-standing figures or relief panels. Casey and Green carefully managed contracts so that the art works were accomplished within their regular construction budget.[82]

Muralist Henry Oliver Walker's "Lyric Poetry" located in the south corridor of the Great Hall
Library of Congress, Prints and Photographs Division, LC-USZ62-104456

Spofford chose the subjects of the portrait busts set in the bull's-eye windows above the central entrance. He also chose the sixteen great men to be commemorated by bronze statues embodying ancient and modern practitioners of the eight branches of knowledge represented by each side of the reading room: art, science, religion, history, law, commerce, poetry, and philosophy. But Casey and Green had the authority to veto his choices and they rejected his selection for "modern law." The engineers also invited Harvard president Charles W. Eliot to choose the quotations for the main reading room, while Spofford selected those for literature within the Great Hall. Spofford set the height of the reading room's dome at seventy feet in his original instructions to competing architects in 1873. Casey and Green raised the dome to 195 feet, a height that appeared on Pelz's revised design accepted by Congress on March 2, 1889. This height interfered with vistas of the Capitol along Pennsylvania Avenue from the west and the east.[83]

On March 29, 1892, Casey terminated Pelz's services "as you have now entirely completed the designs of the [library's] architectural characteristics and features."[84] During these early years of construction, professional relations between Green and Pelz were antagonistic because each claimed credit for solutions to design problems and because Pelz had joined with Smithmeyer in a lawsuit against the government seeking full monetary compensation and intellectual ownership of the library's design. Edward Pearce Casey was officially named architect of the Library of Congress on March 12, 1896, two weeks before his father's sudden death. When he exhibited a section drawing of the Library of Congress in New York in 1895 claiming the design as his own, the Washington chapter of the American Institute of Architects wrote a letter of censure and New York architectural critics questioned his rights to this claim.[85]

Plaster casts of stock sculptures used to decorate the Library of Congress, October 1894
Library of Congress, Prints and Photographs Division, LC-USZ62-120936

In his 1889 annual report on the library's construction, Casey quoted the Congressional act of March 2, 1889, that stated "said building shall be constructed in accordance with the

The Washington Canal, constructed along the courses of the Tiber and St. James Creeks, was an open cesspool before a series of sewers replaced it beginning in 1872. The Board of Public Works under the territorial government began the project, later inherited by Army engineers in July 1874. The portion pictured above (ca. 1859–61) lies roughly along the current path of Constitution Avenue, NW.
Library of Congress, Prints and Photographs Division, LC-USZ62-62174

plans marked 'D,' submitted by the Chief of Engineers with his annual report to Congress" in 1888. In the same report, Casey noted that "the architect, Mr. Paul J. Pelz, has been engaged in preparing the drawings necessary for the work for the coming year as well as for the year past, in all their varied and complicated details, and the progress made on the building [masonry cellar walls] has been materially assisted by his work."[86]

At congressional hearings held on November 20, 1896, Green claimed that the plans from which the library was built "were made in the office under General Casey's and my own direction between October 2 and November 23, 1888," but in the same hearing acknowledged that the "small plan was a reduction and modification of the original Smithmeyer plan." Several hundred signed and dated drawings for the Library of Congress preserved in its Prints and Photographs Division indicate that all design aspects were determined by Smithmeyer and Pelz except for the patented system of metal stacks and the decoration of very extensive areas beyond the vestibule and main reading room. Certainly, Casey expanded the scope and extent of this program and chose the artists to execute the work.[87] General Casey provided additional intellectual stimulus for the library's symbolic ornamentation and the organizational abilities to

build it. Upon the Library's completion in 1897, Green wrote an illustrated article, "The Building for the Library of Congress," concentrating on their joint functional, rather than artistic, achievements.[88]

ENGINEER COMMISSIONERS

Part country town, part capital city, Washington after the Civil War promised much to its residents but provided little in necessary urban services. "Upon the whole," Walt Whitman wrote during the war, "the city, the spaces, buildings, etc., make no unfit emblem of our country, so broadly planned, everything in plenty." Yet, he added, "the fruit of the plans, the knit, the combination is wanting…many a hiatus yet."[89] L'Enfant's public reservations remained empty, weed-grown fields or had been turned to other uses, a few even having had churches built on them illegally. The Washington Monument stood incomplete on the unkempt Mall, its grounds having been used to pen cattle during the war. Sloops and scows nosed along the Washington Canal beside North B Street. Tiber Creek, the canal, and other streams were open sewers. Slash Run marsh and tidal flats near Foggy Bottom were breeding grounds of malaria, and the Potomac Flats were a noisome marsh uncovered twice a day when the river fell. Cursed with slums adjacent to mansions, Washington in many ways remained a village where cattle, geese, and chickens roamed at will.[90]

"[T]he city, the spaces, buildings, etc., make no unfit emblem of our country…. [T]he fruit of the plans, the knit, the combination is wanting…"

The sheer discomfort of the capital, combined with memories of its Southern sympathies, convinced many that it was not a fit place for the government. At the end of the Civil War, Congress debated proposals from mid-western states to move the capital to America's heartland, the Ohio or Mississippi valleys. Worried by the agitation to move the government, Washingtonians embarked on a new effort to recreate their city as a worthy national capital. Alexander R. Shepherd, a native Washingtonian, an alderman, a wealthy contractor, as well as a friend of President Grant, led local boosters who advocated a more active district government and a building program to make the city handsome and to revitalize it with modern amenities becoming common in other American and European cities.[91]

Washington's population of 130,000 in 1870 had doubled since 1860, yet the city "was less advanced in the matter of civic conveniences than many a State capital of smaller size." The aqueduct's water did not serve all parts of the city and water in all of the city's quadrants continued to be pumped from wells or from springs; septic systems were rudimentary and individual to each structure; and the hilly landscape over which L'Enfant's streets had been laid was picturesque to look at but very difficult to

navigate for carts, carriages, and pedestrians. These rolling streets also impeded organized urban growth, especially the siting and building of row houses. Moreover, "Pennsylvania Avenue alone enjoyed the distinction of being lighted and that but poorly." Sewers, a healthy supply of water, street lighting, and street paving and grading were of the first importance.[92]

The city "was less advanced in the matter of civic conveniences than many a State capital of smaller size."

Urged on by these forces, on February 21, 1871, Congress fused L'Enfant's original city with the "county," the land ceded by Maryland that still comprised the District of Columbia (the Virginia portion had been retroceded in 1846), into a single national territory under a territorial form of government. A governor to serve four years was to be appointed by the president, as was an eleven-member council, each serving two years, representing eleven new districts, two in Georgetown and two in the old county. Washington's citizenry, however, elected the twenty-two members of the House of Delegates. The president also was to appoint four members of a board of public works to serve four-year terms, the fifth member to be the governor. The duties outlined for the Board of Public Works (the Board of Health being the only other municipal office under the territorial government) gave them: "entire control of and [the power to] make all regulations which they shall deem necessary for keeping in repair the streets, avenues, alleys, and sewers of the city, and all other works which shall be entrusted to their charge by the legislative assembly or Congress." Army Engineers later inherited this authority.[93]

"…an officer of the Engineer Corps of the Army, because… under such an officer, whatever work is done will be well done, and by an officer responsible to the executive and to Congress."

President Grant chose as governor Henry D. Cooke, brother of banker Jay Cooke, whose name and connections would be useful in selling bonds. But it was Shepherd, appointed vice president of the Board of Public Works in May 1871, and governor, and thus its president, in 1873, who emerged as the dominant figure in transforming the district. In his three-year reign, "Boss" Shepherd worked with architects Alfred B. Mullett and Adolf Cluss to pave over a hundred miles of streets, build sidewalks, set up about three thousand streetlights, install a sewer system, and cover the Washington Canal as far as Third Street. Most noticeable to visitors was the landscaping that went hand-in-hand with paving and grading the streets, as public reservations were planted with trees and flowers and the "parking" (public land between the streets and building façades), was landscaped on the wide avenues; this amenity can still be appreciated on East Capitol Street where the public "parking" is maintained by private owners as their front gardens. Although Shepherd's Board of Public Works of 1871–74 (notably its architects Cluss and Mullett) are always given credit for conceptualizing as well as overseeing the "parking" and paving of Washington's streets, Army engineer Nathaniel

Michler reported on the results of Meigs's 1867 study trip to Europe concerning the most advanced technology for roadbeds being employed in Berlin and Paris. The engineers also suggested "parking" on these European models as the way to humanize L'Enfant's inordinately wide avenues. Shepherd's pell-mell pace, ruthless treatment of property owners, and financial juggling brought the territorial government down in a major scandal. In the summer of 1873 the bankrupt district faced a major change in its political life.[94]

The board's maladministration led to a federal takeover of the city. In 1874 congressional investigators probed the board's work, discovering irregularities (but no positive evidence of fiscal corruption), that led them to recommend a new government of three civilian commissioners to be appointed by the president. To assume the duties of the abolished Board of Public Works, the committee recommended "an officer of the Engineer Corps of the Army, because…under such an officer, whatever work is done will be well done, and by an officer responsible to the executive and to Congress."[95] Cluss had been discredited by allegations of contract irregularities during the 1873 investigations, and Mullett (whose term ended in June 1873) was overworked and under criticism in his main position as the Supervising Architect of the Treasury.

Tours of duty for the engineer officers were frequently rotated, giving them valuable experience solving difficult engineering problems in difficult situations all over the country. Throughout their careers they were required to write (and illustrate) concise reports stating the problems they faced, their solutions, and their costs. Thus they were uniquely equipped to go beyond the administrative and oversight duties that Mullett and Cluss had performed from 1871 to 1874. President Grant chose another protégé as the municipal engineer in what was thought to be a temporary form of government, First Lieutenant Richard L. Hoxie (1844–1930), a West Point friend of his son Frederick Grant. In 1878 an act made the Board of Commissioners permanent and stipulated that one of the three commissioners be an engineer officer above the rank of a captain. In 1890 a joint resolution of the board required that its engineer officer must have served fifteen years in the Corps of Engineers as a requirement for appointment.[96]

The sensational is news and Washington's short period of territorial government was reported widely in local and national newspapers and journals because Shepherd became at first infamous for his reckless extravagance and later famous for his vision. "The work of reconstructing the city had been so thoroughly begun that there was no option but to complete it. This was cautiously and carefully done," reported the *Century Magazine*

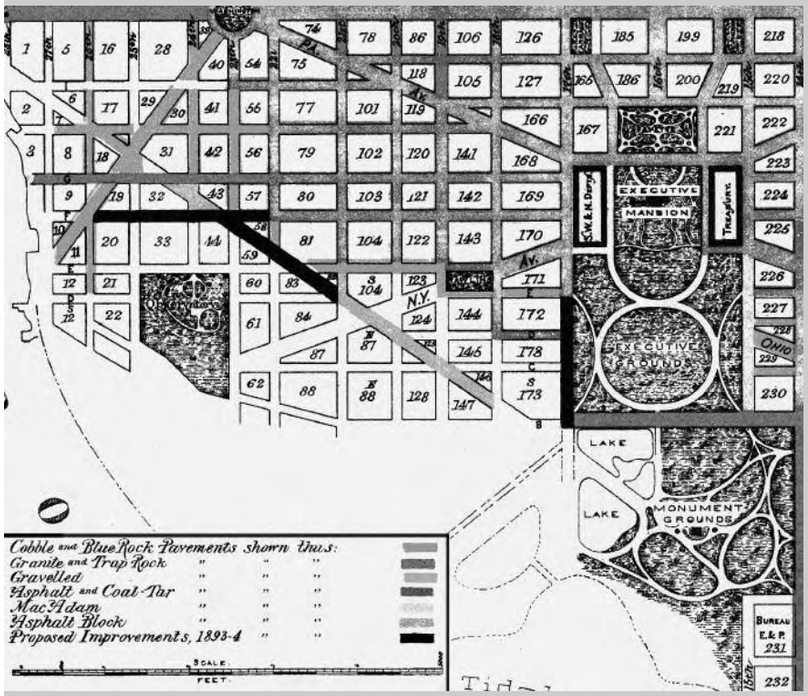
in 1884. Although Shepherd's name figured prominently in this article on "The New Washington," Hoxie's name was not linked with his accomplishments during the decade he worked first as the sole engineer during the temporary government beginning in 1874, and after 1878, as one of the assistants to Major William J. Twining, who served as engineer commissioner until his early death in 1882. In fact, the *Century Magazine* writer who found little to criticize in Shepherd's accomplishments—wood paving blocks that "went to pieces very quickly" being the exception—was in reality praising the results of much of Twining's, Hoxie's, and Captain F. V. Greene's (assistant from 1879 to 1885) work. "Year by year the wood has been replaced with asphalt, which now covers a length of fifty miles, and is a great luxury for all who use the streets, whether with cushioned carriage or heavy express wagon. By far the greater part of the streets used for residences are covered with these asphalt pavements, which are somewhat similar to those in Paris, but cover an extent three times as great."[97]

"By far the greater part of the streets used for residences are covered with these asphalt pavements, which are somewhat similar to those in Paris, but cover an extent three times as great."

Beginning in 1878 one of the Engineer Commissioner's two assistants was assigned to sewers and the other to streets. Twining developed plans for increasing the water supply, extended the sewage system, paved many miles of streets, and urged upon Congress a plan for reclaiming the Potomac flats. In the course of work to drain and fill the old city canal, Greene employed 1,500 people, "laborers, carts, and water-boys…selected by the police from among the needy and deserving poor."[98] In 1879 Greene urged Congress to prevent further unplanned growth in the district by adopting a unified street plan, although nothing happened until 1888. Such essential, but mundane, jobs were the underlying infrastructure of the "new Washington," but did not lend themselves to the sensational when no scandal was involved.

Humane and competent administration won Twining great popularity, and his death from overwork in 1882 was regarded as a public misfortune and grave loss to the Corps. President Chester A. Arthur, members of the cabinet, and lawmakers from both houses of Congress attended his funeral.[99]

The three members of the temporary commission appointed in 1874 were Republican politicans, but when the commissioner form of government became permanent in 1878, President Rutherford Hayes initiated the practice of appointing a civilian commissioner from each major political party, a practice that became customary. Congress apparently believed that the third member should be a non-partisan expert. According to Congressman Joseph Blackburn of Kentucky, "No third man could be found who would come nearer meeting the requirements and demands made than an officer of the U.S. Army, who ought not to be burdened with politics; an officer detailed from the Engineer Corps than who



This 1885 view shows the sparse development of much of the area southwest of the White House, including newly reclaimed land. Virginia Avenue appears graded though unimproved. The Engineer Commissioner map (detail) reveals that by 1893 the commissioners had paved portions of the avenue and surrounding streets. The section from the Washington Monument to B Street remained unimproved and would eventually be abandoned. The portions between 18th and 21st Streets and between F and G Streets were covered with gravel; the small section between 25th and 26th Streets paved with cobble and blue rock; and the stretch from 21st to 23rd Streets proposed for improvement the following year.

Washingtoniana Division, D.C. Public Library
Image Archives of the Historical Map & Chart Collection/Office of Coast Survey/National Ocean Service/NOAA, MSSP (detail)

I am free to say there is no set of men to be found in all the land who have maintained through war and peace an escutcheon more perfectly free from stain and blot."[100]

After many upheavals, Washingtonians largely acquiesced to the 1878 "Organic Act." Blacks saw Congress as their protector, while white property owners noted Congress's apparent promise to pay half the expenses of the district and to underwrite the local debt. Local finances failed at last under the strain of supporting Shepherd's building program, and the federal government had taken over the city. At the cost of the franchise, the district became the nation's city under the nation's care. As a direct result, the Army Engineers acquired an unprecedented role in the regular, peacetime government of an American city. The Organic Act remained in force until 1967 with a member of the Corps of Engineers one of three people who conducted the city's business for nearly nine decades.

"No third man could be found who would come nearer meeting the requirements and demands made than an officer of the U.S. Army, who ought not to be burdened with politics; an officer detailed from the Engineer Corps than who I am free to say there is no set of men to be found in all the land who have maintained through war and peace an escutcheon more perfectly free from stain and blot."

In 1902 Rufus Rockwell Wilson noted the social and political results of Washington's governance by the Board of Commissioners:

> *Free from scandal of every sort, successive boards of commissioners of ability and character have administered the affairs of the District during the past twenty-seven year more efficiently and economically than the affairs of any other American municipality have been administered, and to such general satisfaction that there has been no lasting criticism. Indeed, to quote the words of an experienced and acute observer, "Washington is one of the best governed cities in the world. There is no political party to profit from the knavery of contractors or the finding of places for henchmen, no boss to whom universal tribute is paid. Its streets are clean and well lighted, its policemen polite and conscientious, its fire department prompt and reliable, its care for the public health of the sick and indigent admirable, and its rate of taxation one of the lowest in the country."*

Wilson went on to describe many beauties and amenities found in Washington at the turn of the century, noting, "all money for street improvements is virtually controlled by the engineers."[101]

The engineer commissioners and their assistants lived in the city they administered and participated in its social and cultural life. Hoxie's life and career were unusual for a career American military officer, in that he was educated in Italy in his youth and joined the Union Army in 1861 while a student at Iowa State University. His gallantry in combat led to his appointment to West Point in 1864. After working on engineering projects in New York

and Boston, at the age of thirty, his exceptional talents led to his appointment as the temporary municipal engineer. In 1878, the year he became Twining's assistant, Hoxie married the sculptor Vinne Ream, to whom he had been introduced by Lieutenant General William T. Sherman. The Hoxie's house on Farragut Square, the setting for Ream's famous salon of artists and intellectuals, overlooked her statue of Admiral Farragut, one of her many notable monumental works of sculpture. Hoxie's social standing in Washington matched his professional achievements; his erudition in hydraulics and astronomy was particularly notable and he retired in 1908 a brigadier general.[102]

"Washington is one of the best governed cities in the world. There is no political party to profit from the knavery of contractors or the finding of places for henchmen, no boss to whom universal tribute is paid."

BUILDING CODES

The most pervasive influence the engineer commissioners had over the city's architectural appearance was adding to, administering, and enforcing its building regulations. Washington's 1790s building codes focused primarily on the city's urban appearance, addressing materials, building heights and their position on lots, party walls, temporary structures (such as gateways), and projections into the public spaces beyond individual lot lines. The 1871 act that established the Board of Public Works gave it the authority to "make all necessary regulations respecting the construction of private buildings in the District of Columbia." The commissioners inherited this authority. As published on August 19, 1872, the comprehensive Building Regulations addressed safety in terms of fire protection and structural stability. The regulations called for building permits for new buildings and substantial alterations, outlined several rules ranging from roofing contiguous buildings to fireplace flues for private buildings, and addressed safety in theaters and other public halls that included their seating capacity and ventilation.[103]

In 1875 the District of Columbia Commissioners appointed a committee to update the regulations to include more stringent safety measures and to address health issues such as requiring either a water closet or an outhouse for every structure in the city. In 1877 the engineer commissioner required non-combustible materials, such as iron for cornices and eaves, on buildings erected to a height of sixty feet or more, and by 1887 fire escapes were required for buildings fifty feet in height. Bay windows had been allowed by the Territorial Government in 1871; the 1877 regulations allowed towers and projecting shop windows as well as bays, but all required building permits issued by the commissioner. By 1887 "oriel" (a bay window above the first floor) windows were allowed. For nine decades the engineer commissioners helped formulate and regulate the appearance of

"All money for street improvements is virtually controlled by the engineers."

Washington's streetscapes and much of the character of its housing developments and individually designed homes erected in suburban neighborhoods.[104]

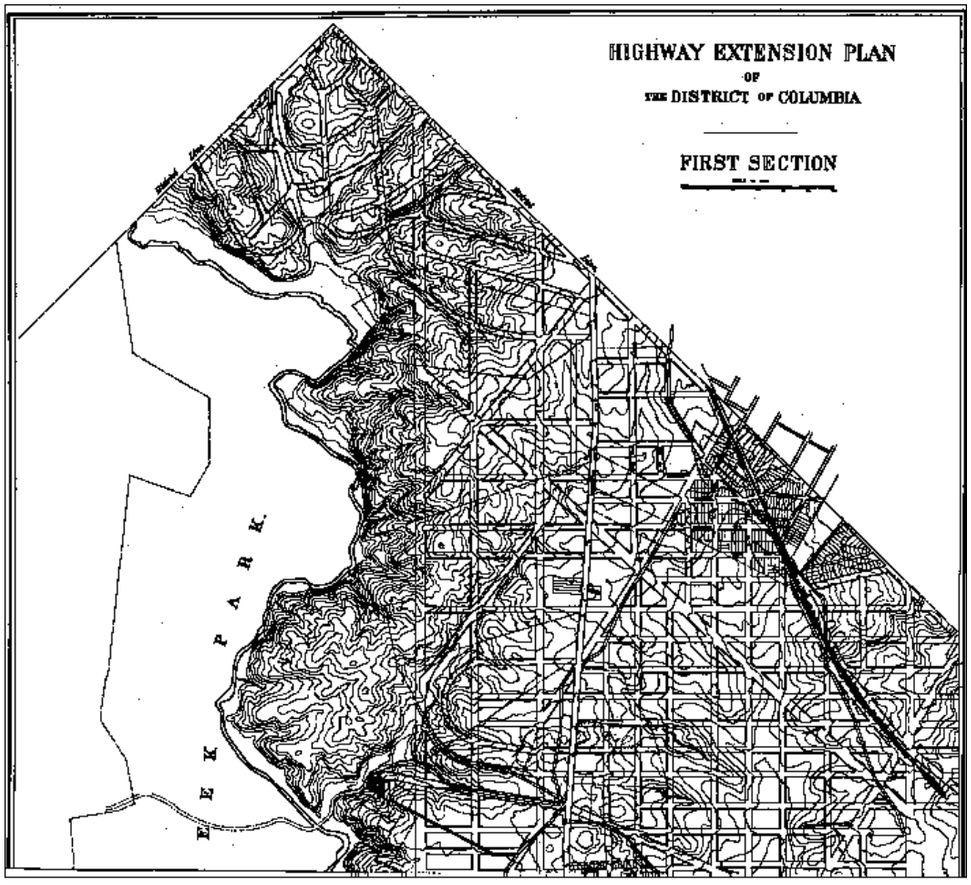
In 1870 neighborhood associations began forming to enable the collective voices of citizens to exert influence on the Board of Commissioners in the daily running of the city. The associations routinely wrote to the board to express their local concerns or banded together to influence decisions of citywide import. The House and Senate committees on the District of Columbia depended on reports and recommendations issued by the engineer commissioners and almost invariably acted as the engineer advised.[105]

PERMANENT SYSTEM OF HIGHWAYS

Piecemeal suburban development in the county of Washington beginning in the late 1860s threatened to ring L'Enfant's organized city with a patchwork of individual and mismatching street plans. In 1879 assistant engineer commissioner Greene urged the formulation of a master street plan for the entire district, based on "a thorough geodetic and topographical survey" that he proposed be created under a collaboration between the city's engineer department and the Coast and Geodetic Survey.[106] Congress began funding this ten-year mapping project the next year, but took no action on controlling suburban growth until 1888. In August the District Commissioners received authority for the first time to approve the plats of new subdivisions, which were required to conform to the city's "general plan."[107]

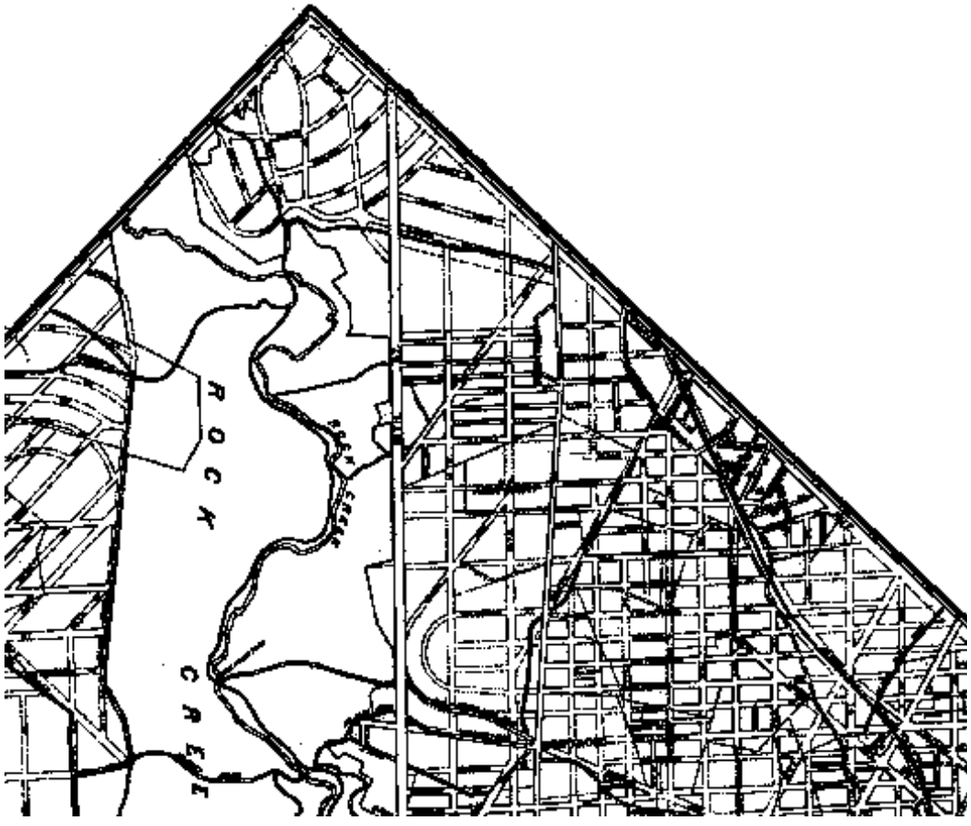
Lacking an overall master plan on paper made it problematical to interpret whether street patterns of real estate developments in the county accorded with the city's plan. The Highway Act of March 2, 1893, attempted to solve this problem. It directed the creation of a Highway Plan for the entire district be formulated and mapped in four sections beginning with the area outside Florida Avenue between North Capitol Street and Rock Creek Park that contained a majority of Washington's nonconforming subdivisions. Each section of the plan was to be approved, after public comment, by the Board of Commissioners and finally by a special Highway Commission comprised of the Secretaries of War and Interior and the Chief of Engineers.[108] Engineer Commissioner Captain Charles F. Powell named civil engineer William P. Richards the assistant engineer in charge of highway extensions, and he directed the extensive work of developing and implementing the Highway Plan until 1905.

The Highway Act called for extensive condemnations of rights-of-way through many of the district's oldest and most developed suburban subdivisions. Legal challenges,



"Highway Extension Plan of the District of Columbia, First Section, 1898." Shown is the Engineer Commissioner's projection for extending a modified version of L'Enfant's plan to the northwestern section of the city.

Image Archives of the Historical Map & Chart Collection/Office of Coast Survey/National Ocean Service/NOAA, MSPHS1C



"Map of the Permanent Highway System of the District of Columbia. Prepared in the Office of the Engineer Commissioner, 1914." Sixteen years after the highway system became law, its implementation was still spotty east of Rock Creek Park.

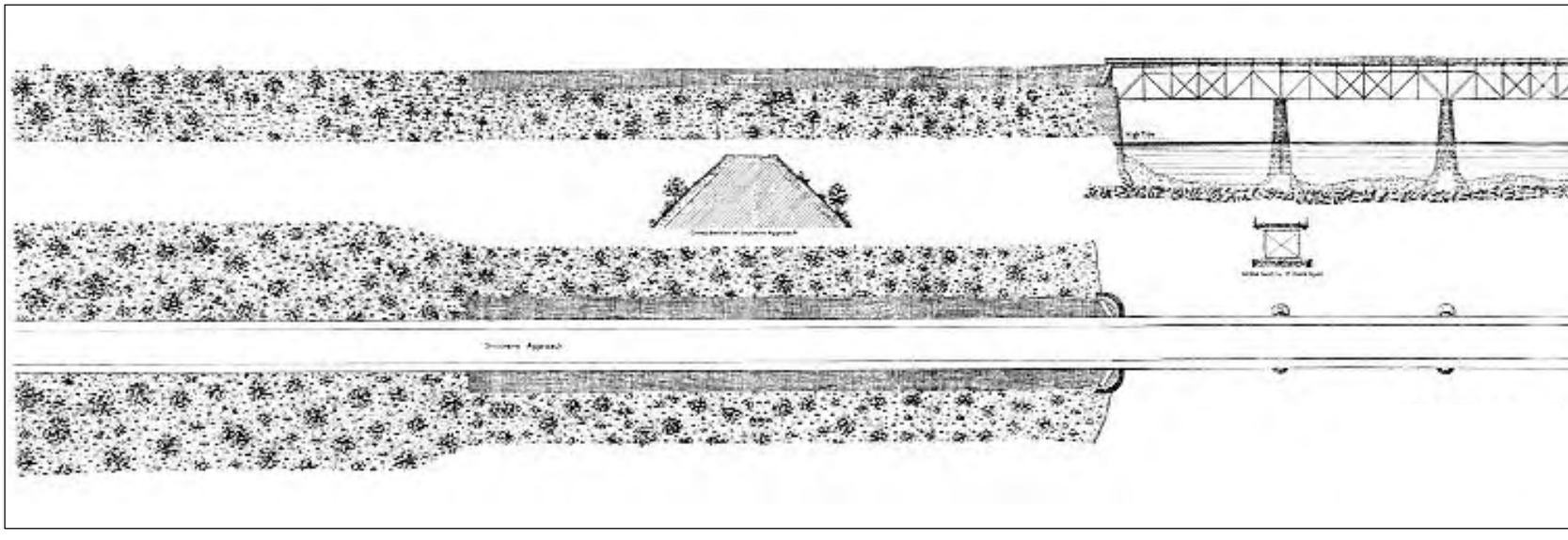
Image Archives of the Historical Map & Chart Collection/Office of Coast Survey/National Ocean Service/NOAA, MSSH (detail)

Chain Bridge undergoing repairs, 1928. One end of the wrought-iron bridge built by Babcock in 1874 was lifted to repair one of its piers.
Library of Congress, Prints and Photographs Division, LC-USZ62-77637

condemnations, and a flawed system set up in the act for determining damages and benefits in condemnation cases held up implementation of the Highway Plan from mid-1895 until mid-1898. An act of June 28, 1898, however, broke the stalemate by amending the Highway Act to exempt most pre-August 1888 subdivisions from revision under the Highway Plan. The fourth and final section of the plan, which covered all the land south of the Anacostia River, was completed in 1900, assuring that L'Enfant's vision of a monumental city would be preserved, under the oversight of the Engineer commissioner, as the city grew into the twentieth century.[109]

POTOMAC AND ANACOSTIA RIVER BRIDGES

The relation of the Potomac and Anacostia Rivers to Washington is similar to that of the Thames to London with wide, deep, and swiftly flowing waters dividing rather than connecting disparate parts of each city. A succession of early nineteenth century wood bridges connected Washington to the Virginia shore and the Eleventh Street Bridge connected the Navy Yard to Anacostia. These bridges were rebuilt and additional ones erected across the Potomac River during the middle decades of the nineteenth century. Land east of the Anacostia was slow to develop and be incorporated into the city partially because of the paucity of bridges and partially because of the river's wide flood plain. Throughout the last quarter of the century, engineers detailed to the Office of Public Buildings and Grounds and the Washington Engineer District updated the city's river connections by overseeing the planning of six, and the installation of five, similar iron bridges over both rivers.

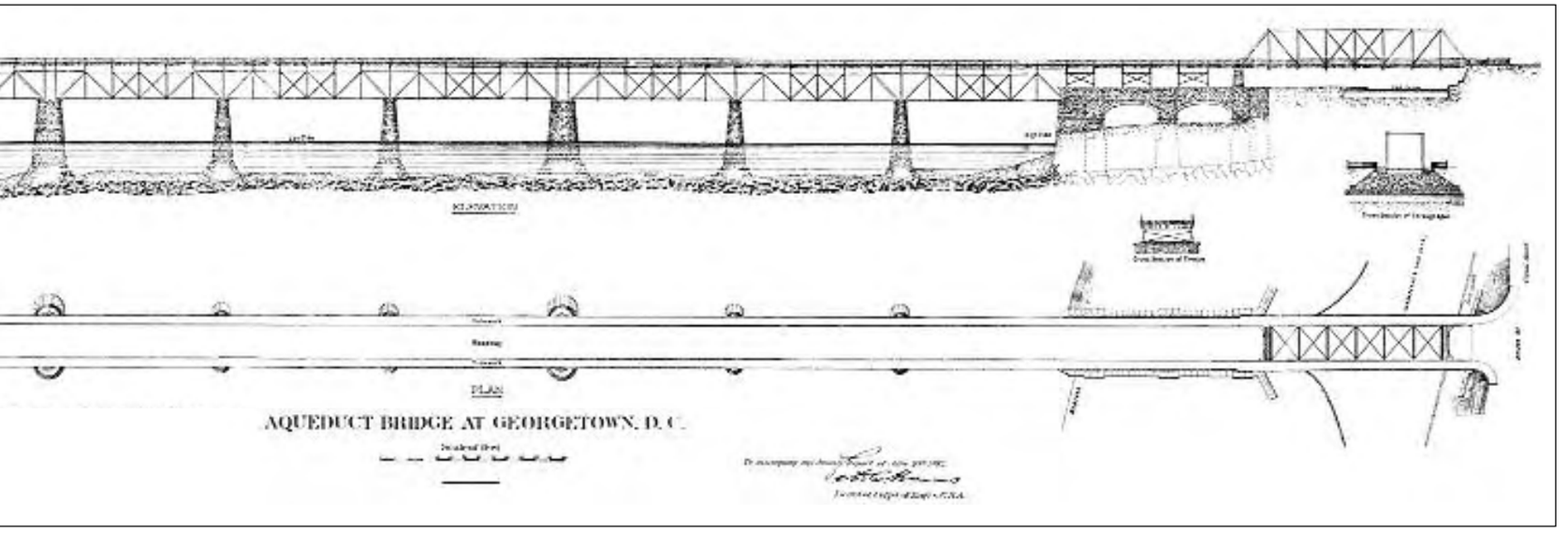


"A substantial wrought-iron bridge, 1,352 feet long, was built over the Potomac at the site of 'Chain Bridge,'" reported Babcock in an 1877 summary of his achievements as Officer in Charge of Public Buildings and Grounds.[110] Six bridges had successively occupied a site below Little Falls since 1797, including three of the chain-suspension type. Flooding in 1870 destroyed the heavy timber superstructure of an 1850s span, leaving its stone piers in place. In August 1872 Babcock contracted with S. R. Dickson of New Haven, Connecticut, for a new wrought-iron bridge on the standing piers. He annulled the contract fourteen months later, when no work had been done, and made a new one with Clark, Reeves and Co. of the Phoenixville Bridge Works in Pennsylvania. They completed the bridge four months later, in March 1874. This iron bridge stood until replaced in 1939.[111]

The Office of Public Buildings and Grounds next replaced the Anacostia River Bridge east of the Navy Yard. The existing wooden structure on the site had been almost entirely rebuilt by the Army during the Civil War to cope with the heavy use it received. In 1868 Michler proposed that a new, permanent iron bridge either replace the old bridge or supplement it up the river where direct communication would be made with Virginia or Pennsylvania Avenues. No action was taken and the bridge continued to accommodate "an immense travel" and require "almost constant repairing." In July 1873, "as a four-horse team belonging to the Government Insane Asylum was crossing the Navy Yard bridge, a span of the bridge broke, and let them through into the water. A patient from the hospital was seated with the driver, and narrowly escaped being drowned. Two of the horses were drowned."[112] More repairs followed, and the

Plan and elevation drawings of the Aqueduct Bridge, 1887, showing its low landfall in Arlington, Virginia (on the left) and Georgetown, which was higher in elevation

Office of History, Corps of Engineers, ARCE 1887



Superstructure built in 1887, supervised by Hains, on the piers of the Aqueduct Bridge between Georgetown and Rossyln
Office of History, Corps of Engineers

next year Congress authorized a completely new wrought-iron truss bridge set on masonry piers. The Office of Public Buildings and Grounds under Babcock again contracted with Clark, Reeves and Co., which built the bridge to plans and specifications it had drawn up as part of the bid process. This structure lasted until 1908, when a heavy steel arch bridge designed by a civil engineer in the D.C. Bridge Division replaced it.[113]

During the Civil War, the Army converted the trough of the Aqueduct Bridge, which connected Georgetown to Virginia, into a wagon way. The bridge's private owners turned it into a toll bridge in 1868. Engineers inspected the bridge several times in the following decades but did not condemn it as unsafe until 1886, when the private owners agreed to sell the bridge. The federal government set up an engineer board under the auspices of the Washington Engineer District, composed of Lieutenant Colonel William E. Merrill, Lieutenant Colonel Peter C. Hains, and Major W. R. King. This board was charged with

Pennsylvania Avenue Bridge across the Anacostia River, built between 1887 and 1890, was replaced by the John Philip Sousa Bridge in 1940. (Photographed October 1926)
Office of History, Corps of Engineers

planning the reconstruction of the bridge. It proposed erecting a new iron-truss superstructure with wood floor joists and planking on the existing 1830s piers. Limitations in the federal appropriation for construction prevented the building of a drawbridge that the board had strongly recommended, but construction proceeded and the bridge opened on June 30, 1888. Hains supervised the construction.

In May 1886 the long process to erect a Memorial Bridge linking the District of Columbia at Observatory Hill to Arlington National Cemetery began with a congressional resolution; Hains proposed an iron-truss bridge composed of four 300-foot spans. The job fell to Captain Thomas W. Symons who collaborated with architect Paul Pelz to design a monumental stone bridge with two towers masking a central bascule draw, their model being Tower Bridge in London. This bridge, conceived as the Grant Memorial Bridge, was never built both because of its perceived insult to Virginia and the South and because of congressional opposition to the Corps' involvement with its design.[114]

While work on the Aqueduct Bridge progressed, District Engineer Hains took up another river-spanning project. Lobbying efforts by a local citizens' association led Congress to authorize a bridge extending Pennsylvania Avenue over the Anacostia River in 1887. No bridge had occupied this site since the privately owned Middle Bridge had burned in 1845. A board of Army Engineers planned the structure at Congress's request, and Hains contracted the work to the Groton Bridge and Manufacturing Co. A dispute over the placement of the west abutment arose with the Baltimore and Potomac Railroad, over whose tracks the bridge passed. Hains worked out an alteration to the plans that met the

Major General Peter C. Hains during World War I. Many long-retired engineer officers returned to service during the war as district engineers throughout the United States so that active duty officers could serve in France. Hains's most lasting contribution to Washington was dredging the flats of the Potomac and Anacostia Rivers to improve the healthfulness of the entire city.
Office of History, Corps of Engineers, U.S. Army Signal Corps Photo (detail)

Construction of the inlet bridge for the Tidal Basin, 1909. The inlet and outlet bridges served as actual bridges at the same time their substructures were designed to flush out the Washington channel with each tide.
National Archives no. 77-H-3334-45

needs of the government, the railroad, and the contractors, and the bridge was completed in July 1890. This bridge was replaced by the John Philip Sousa Bridge in 1940.[115]

Benning's Bridge, crossing the Eastern Branch in line with H Street, NE, was another of the city's nineteenth-century wooden bridges, and it, like the others, was perpetually being repaired. It was strengthened by the Corps of Engineers to handle heavy guns during the Civil War, and it was later maintained by the Office of Public Buildings and Grounds, surviving until 1934.[116] A second bridge constructed of iron was built in 1892 under the authority of the Engineer Commissioner, whose highway department contracted its construction with the Keystone Bridge Co.[117]

District engineers made surveys and plans for two additional Anacostia bridges that were not built. Major Charles E. L. B. Davis considered placing one at the foot of First Street, SW, in 1895, and two years later Major Charles J. Allen planned one extending Massachusetts Avenue, SE, to connect the city's divided southeast sector. Both Anacostia River bridges would have employed steel-truss systems on masonry piers.[118]

WASHINGTON ENGINEER DISTRICT

Alongside the challenges of constructing the government's major public buildings and its bridges, as well as running the district government, the Corps of Engineers brought its expertise in river control and land reclamation to bear in Washington at the end of the nineteenth century. In 1875 the Washington Engineer District came into existence when the Chief of Engineers chose civilian Sylvanus T. Abert (son of Colonel J. J. Abert, who had been Chief of Topographical Engineers during the middle of the century) to undertake the improvement of the Potomac River.

"[T]he reclamation of this flat is an absolute necessity for the preservation of the health of the city, and must be included in any plan… for the improvement of the water-front of Washington."

The Potomac flowed through the District of Columbia in two channels. The easternmost of these, the Washington Channel, was prone to filling as the Potomac emptied into its broad estuary and dropped its burden of silt. As settlement and deforestation increased upstream, the flats around the channel gradually became larger, forming a marsh that threatened navigation. A dam built by Virginia from Analostan Island to the shore and the causeway of Long Bridge accelerated the marsh's growth. Submerged at high water, these shoals formed at low water a foul-smelling mud bank stretching from not far south of the White House to below the Long Bridge. Reeds and grasses covered the muck, and wastes from the Washington Canal—later to be the B Street sewer—decayed in the sun. The flats were widely believed to be a breeding ground for malaria. "The Presidential mansion," Hains once commented, "being distant only about half a mile, got the full benefit of the condition of affairs when the wind was from the south."[119] Repeated efforts at the end of the century to build a new White House elsewhere in the city were in part motivated by the existence of the flats.

Little was done about the situation until federal expenditures for rivers rose following the Civil War. Then engineers dredged channels and removed the rocks obstructing Georgetown harbor. They pointed to the condition of the canal and the flats and recommended that the causeway of Long Bridge be replaced with pilings. Dredging, suggested Michler in 1868, could provide spoil to reclaim the flats.[120]

In 1872 a board of survey that included Officer in Charge of Public Buildings and Grounds Babcock, vice president of the Board of Public Works Shepherd, and Chief of Engineers Humphreys, plus the governor of the District of Columbia and two officials from the Coast and Geodetic Survey, proposed a general plan for improving the river. Specially noting the "immense marshy flat," the board wrote, "the reclamation of this flat is an absolute necessity for the preservation of the health of the city, and must be included in any plan…for the improvement of the water-front of Washington." Their plan proposed building a new Southwest waterfront out in the river and filling the

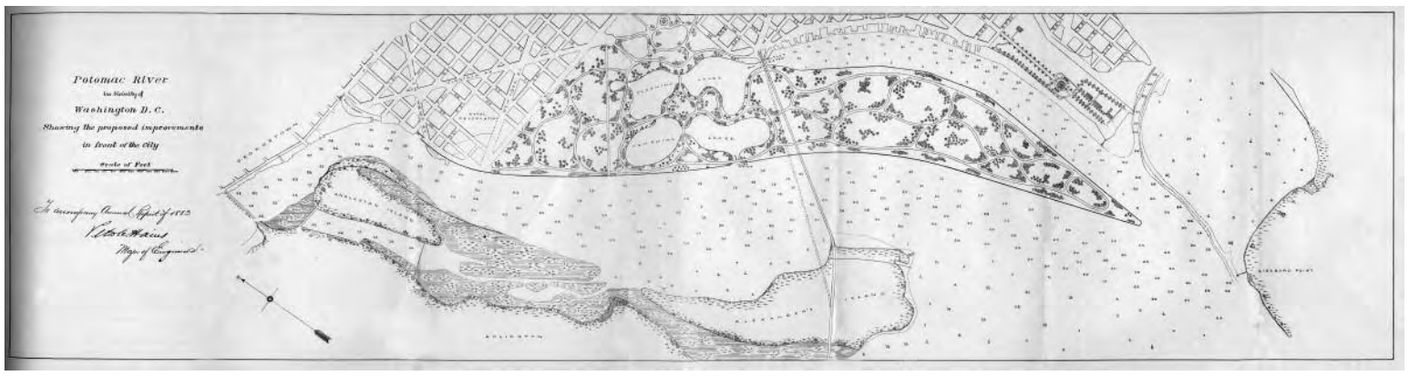
Periodic flooding of the Mall and downtown Washington, as in 1889 when Pennsylvania Avenue was flooded, declined markedly after Hains built up the Potomac flats.
Office of History, Corps of Engineers

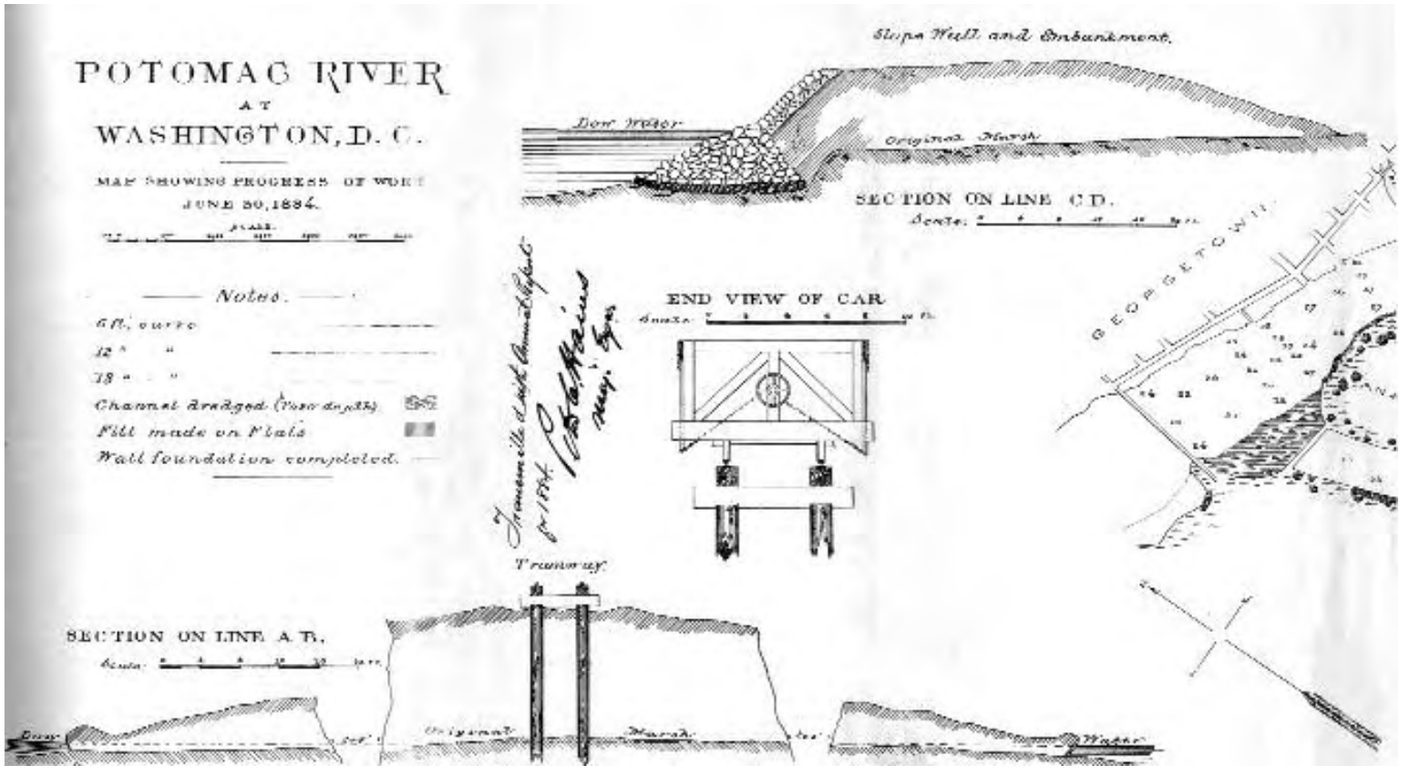
area between its new docks and the old river's edge with the dredged mud. The result would have added more than one thousand acres to the city and completely covered the Washington Channel and the flats.[121] Seven years later Engineer Commissioner Twining proposed a similar solution, filling up the flats in front of the waterfront, but leaving the Washington Channel mostly intact as a tidal arm of the river. At the new upper limit of the channel, north of Long Bridge, he conceived the idea of providing four flushing ponds, or tidal reservoirs, on the reclaimed land. These lakes, fitted with inlet and outlet gates, were to assure a twice-daily flow of fresh water through the channel, thereby preventing stagnation and silting.[122]

With many elements of a comprehensive plan already worked out, Congress acted after the severe flood of 1881 inundated the Mall and Pennsylvania Avenue. The lawmakers first ordered a new survey, which was submitted by Sylvanus T. Abert, "U.S. Civil Engineer in charge of Washington and Georgetown Harbor Improvements," in January 1882.[123] The next month a Corps of Engineers' board comprised of Lieutenant Colonels Q. A. Gillmore, William P. Craighill, and C. B. Comstock assembled a plan combining elements of Twining's and Abert's proposals.[124] This report laid the groundwork for an act of August 2, 1882, appropriating $400,000 to improve navigation and raise the flats.[125]

The greater part of the work that followed fell to Hains (1840–1921), head of the Washington Engineer District from 1882 until 1891. Dredging the channel, Hains first had the dredged material moved on scows to a receiving basin, from there to be piped into hopper cars and hauled by railroad to the dumping ground. There it was dumped and spread by methods similar to those of contemporary levee work. Hains found the

Major Peter Hains's initial plan for reclaiming the Potomac flats, "Potomac River in the Vicinity of Washington, D.C., Showing the Proposed Improvements in Front of the City." Hains's Potomac flats would be a picturesque park like Downing's Mall.
Office of History, Corps of Engineers, ARCE 1883

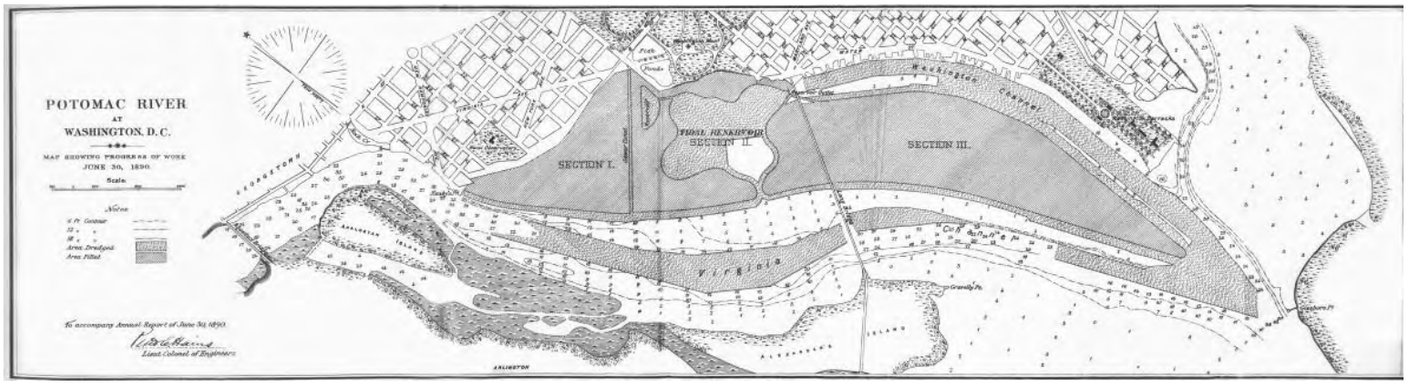




Detail from map of the Potomac Flats Reclamation, June 30, 1884. A cross section of the early retaining walls and the hoppers that were initially used to move dredged material onto the flats to create landfill. The newly developed pipeline dredges allowed more efficient pumping of dredged material from the river bottom to areas to be filled.
Office of History, Corps of Engineers, ARCE 1884

double dredging and repeated construction of railroad trestlework to be too expensive, and he subsequently switched the work to hydraulic dredges that could pump the spoil directly to its destination. For the twelve years prior to this monumental reclamation project, Hains had been on lighthouse duty as engineer for the 5th and 6th districts (the southern states on the Atlantic Ocean and Florida), where he gained invaluable experience in the varied conditions found in tidal rivers, marshes, and swamps. "In 1891, when he was called elsewhere, about three-quarters of the 12,000,000 cu. yd. estimated to be necessary had been placed on the flats. About 620 acres of malignant swamp had been transformed into healthful dry land."[126] Under Hains and his successors, Major Charles E. L. B. Davis and Lieutenant Colonel Charles J. Allen, the land that was to

Progress in reclaiming Potomac flats to June 1890
Office of History, Corps of Engineers, ARCE 1890

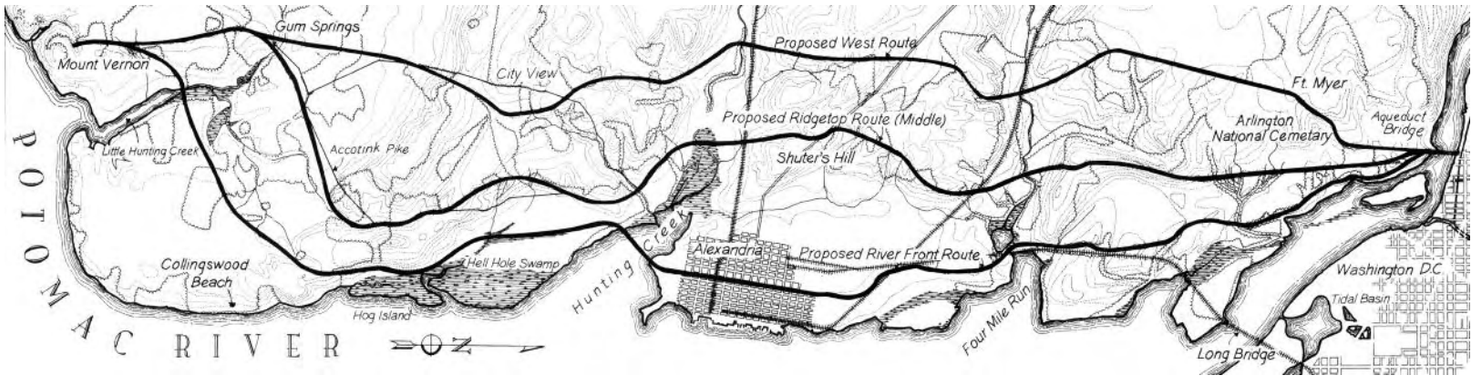


Aerial view of the Potomac reclamation project almost complete in 1892. The point at the downstream end of the park was named for Peter Hains, Washington District Engineer, who worked on the project for nine years.
Washingtoniana Division, D.C. Public Library/National Park Service

become Potomac Park rose from the waters of the estuary, while the river flowed through deeper and straighter channels.[127]

During the summer of 1889 Hains also oversaw the survey of three possible routes for a national road from the Virginia end of the Aqueduct Bridge to Mount Vernon. The "river route" followed the Chesapeake & Ohio Canal bed to Alexandria and then skirted swampland; the middle route went along Arlington Road and passed Alexandria north of Shuter's Hill; while the western route was along a ridge of hills, the Virginia highlands. Hains saw the national road as having the "character of a monumental structure" because its purpose was neither commercial nor military, but commemorative of Washington's virtues and to "satisfy the cravings of a patriotic sentiment that fills the heart of the American people" to visit Mount Vernon.[128] Hains hired B. F. Mackall to carry out the actual survey and the proposed costs ranged from about $1.3 million to $1.8 million. The river route was the most expensive, the highland the least costly, and Hains recommended the latter both for economic reasons and because the views were superb.

Between 1866 and the early 1890s, Washington's development as a city and as the national capital depended on the Corps' multiple activities as engineers, administrators,



In 1889 Hains oversaw the survey of three possible routes for a memorial parkway to take tourists from Washington to Mount Vernon.
Library of Congress, Historic American Engineering Record, National Park Service, Robert Dawson and Ed Lupyak, 1994

and designers. The magnitude of projects with which Congress entrusted them during peacetime was unprecedented in the country. From the Corps, Congress could draw upon an enormous pool of talent and expertise already on the government's payroll with an established administrative structure that was proving itself as efficient in peace as it had been in war. Casey was first in his class at West Point in 1852, Babcock third in his class in 1861, Michler fourth in his class in 1844, and Meigs fifth in his class in 1836. Successive chiefs of engineers chose for positions of authority from among their officers those whose training and experience best equipped them to succeed as construction engineers, hydraulic engineers, or whatever the current development needs of Washington required. Their responsibilities were often complementary and the engineers advised one another, consulted with national experts in the arts and sciences, and developed personal and institutional relationships with the country's political leadership. If one studied in detail what was being built in Washington during any single year between 1865 and 1890, dozens of members of the Corps would be quietly directing most of the work.[129]