

West Battery and Fort Scott Endicott Batteries Construction, Evolution, and Modification

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Background and Context

The line of gun batteries stretching along the Presidio bluffs south and west from the Golden Gate Bridge toll plaza forms an outdoor museum of late 19th-century fortifications rivaled by few other places in the United States. These gun batteries, constructed between 1870 and 1900, show the transitional nature of United States defenses at the time when its harbor fortification system was changing from “storybook castle forts” filled with muzzleloading cannon to modern low-profile earth and concrete fortifications mounting long-range, rifled-steel guns.

These batteries, referred to as “works” by the U.S. Army engineers who constructed them, represent not only a time capsule of evolutionary military design, but also include some of the earliest modernized American fortifications constructed anywhere in the country.

Beginning in 1865, the American military began to reassess its system of harbor defenses. Battlefield lessons learned during the Civil War showed that multi-tiered masonry forts of the style typified by Fort Sumter in Charleston, SC, and Fort Pulaski at Savannah, GA, had proven highly vulnerable to land attack. Built to design standards that went back to the 1820s, these forts – and about 40 similar works around the United States – were referred to as “Third-System forts” because they represented the third generation of American fortification designs. However, during the just-finished war their towering masonry walls had proven to be inviting targets for land-based long-range artillery. Instead of withstanding months of siege, some masonry forts had surrendered after only a few days of bombardment. (Fort Pulaski’s Confederate defenders held out for only 30 hours before its 7½-foot walls were penetrated by Union artillery.)

In addition, steam-powered ironclad warships could pass these masonry fortifications, suffering relatively minor damage, especially when compared to the wind-propelled wooden warships that had been state-of-the-art when the Third System was begun.(1)

The lesson was clear: Forts with exposed masonry faces within range of land-based artillery had become obsolete due to advances in military technology. This included the three-story fort at Fort Point in the Presidio of San Francisco, a work that had only been completed in 1861. These sobering revelations would have major impacts, both abroad as well as in the United States.

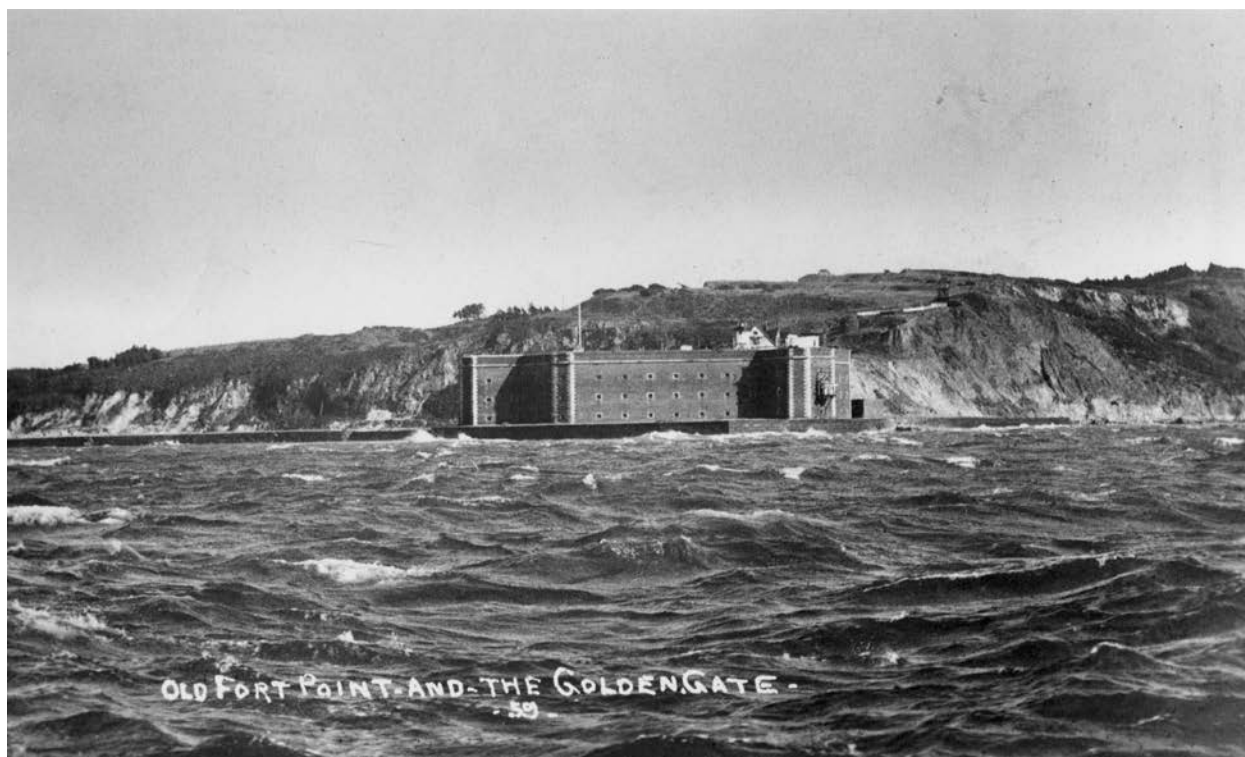


Fig. 1. The visibility and vulnerability of masonry works are illustrated by this view of the fort at Fort Point in the Presidio, c. 1900. *GOGA, PARC, FOPO Collection.*

Historian E.R. Lewis, the preeminent expert in the evolution of American coastal defenses, summarized the situation as it existed in the late 1860s:

By 1865 several European nations were already starting to respond to the technical lessons of the Civil War by drafting plans for the construction of entirely new, and extremely expensive, types of permanent harbor defenses armored with great masses of iron, thus beginning a trend in military architecture which was to continue well into the twentieth century, making use in its extreme instances of shore-mounted battleship turrets.

The United States, however, was in no position to commence an extensive new system of harbor defenses. The planning engineers, mindful of the suddenness with which the existing (i.e., Third System) fortifications had been rendered obsolete, were reluctant for technical reasons to turn to elaborate works that might quickly become outmoded, as there was much to suggest—correctly, as events proved—a coming period of further rapid advances in artillery. Nor would such an undertaking if proposed have stood much chance of realization, for under the extreme postwar stress on reduced military spending, any appropriations large enough to be meaningful would also have been out of the question.⁽²⁾

The U.S. Army Corps of Engineers carried out limited testing with armor plates attached to the faces of existing masonry forts, but with disappointing results. Iron plates frequently split or shattered when hit by projectiles, and the sheer weight of the plates presented huge installation problems. Costs were enormous, and one glaring defect in the plan could not be overlooked; as one historian wrote, “The fort was still a large, obvious target, easy to hit.”⁽³⁾

Even during these tests, the engineers’ thinking was leaning towards the simple earthen batteries erected during the Civil War. These emergency works had been constructed of copious amounts of earth and sand cover, and had very low profiles when viewed by an attacking enemy. These improvised

fortifications, they noted, had been simple to build, provided excellent protection against enemy fire, and were easy to repair. Earthworks, they decided, would become the basis of the next generation of permanent American forts.

In August 1868 the Board of Engineers for Fortifications presented a report concerning the proper profile for postwar barbette batteries. These specifications would be the standards for what came to be called the “Plan of 1870” because of the year of their actual implementation. Historian Erwin Thompson summarized the board’s 1868 findings:

- * As a material for parapets, sand was far superior to clay.
- * A parapet of sand, 20 feet between the crests, supported by a breast-height wall 4 feet thick, would suffice as a minimum.
- * A wall in the body of the parapet was not recommended.
- * The introduction of iron plates in parapets was inexpedient except in peculiar cases.
- * The minimum distance between 15-inch guns should be 34 feet, and the minimum distance between 10-inch guns should be 22 feet.
- * The terreplein should not be less than 30 feet in depth.
- * There should be a traverse for every two guns that were exposed to direct or oblique fire, and a traverse for every gun subject to enfilading fire. When practicable, there should be a parados for guns liable to reverse fire.
- * Minimum dimensions for a traverse should be 14 feet in height, 12 feet thickness at the top, and 20 feet thickness at the bottom.
- * Service magazines were indispensable. Good, well-rammed concrete was the best material, with no lining.

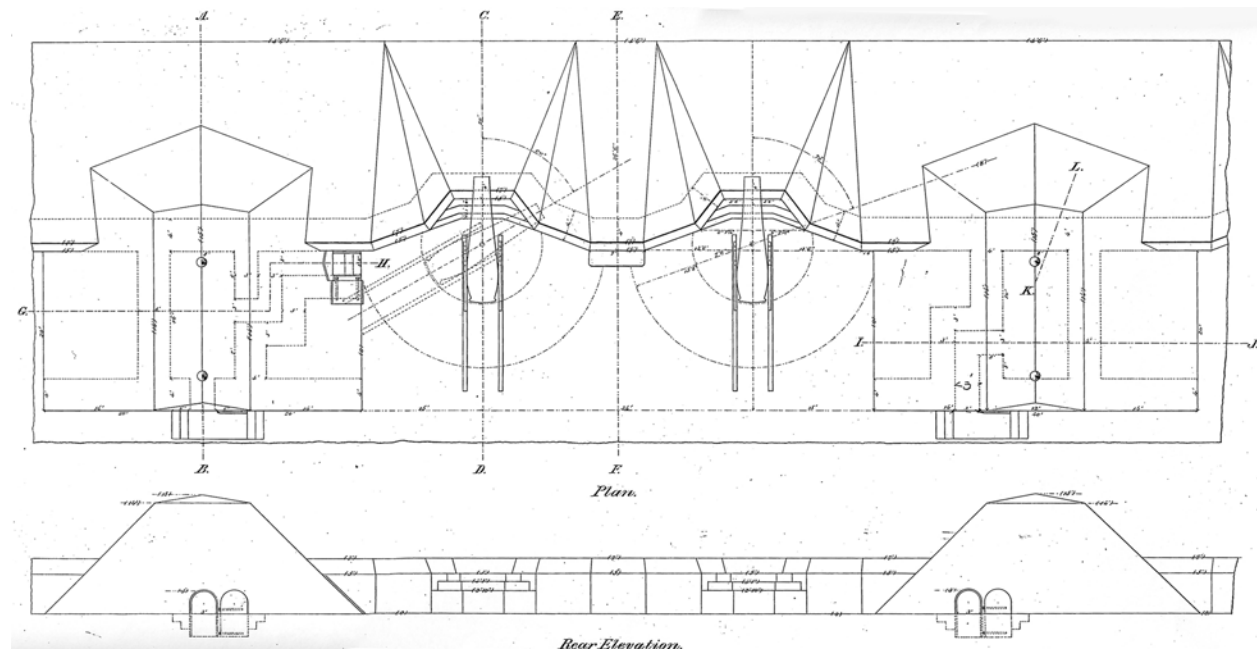


Fig. 2. Prototypical plan of an earthwork emplacement: “Plans Sections and Elevations of a Barbette Battery as Proposed by the Board of Engineers for Fortifications,” 1868. *NARA RG 77, Dr. 155, Sht. 14.*

The board concluded that the use of guns in barbette batteries would be greatly modified in the future, and it recommended that the present carriages and platforms not be constructed in great numbers.(4) (The last-mentioned carriages and platforms would be a heated topic of research and development. The Ordnance Department was then carrying out experiments on a wide variety of cannon and carriage designs, and one that showed particular potential was King's Depressing Carriage, in effect, a conventional muzzleloading gun mounted on an inclined, sliding steel carriage. After firing, the cannon slid down and out of view for loading. Battery technology for the next half-dozen years revolved around the anticipated – but never implemented – introduction of the depressing carriage.)

These new American fortifications would be low-rise affairs, extending only a dozen feet at most above grade when viewed from the sea. In order to provide maximum protection for the guns, the weapons would no longer be mounted in the long-unbroken lines of platforms built in the 1850s. It was now planned to emplace the cannon in pairs, and each pair would be separated by earth (or sand) hills called “traverses.” Each traverse was also to house a powder magazine for ammunition storage. Brick-lined, arched tunnels through the earthworks allowed safe movement of men and supplies during battles.

The new plans also called for a high degree of standardization of weaponry. Instead of the hodgepodge of calibers so common in pre-Civil War forts, the new batteries would mount only four different types of guns: 13-inch smoothbore mortars; 15-inch and 20-inch Rodman-pattern smoothbore guns; and a 12-inch rifled Rodman gun still under development. Neither of the latter two gun types, however, would ever proceed beyond the testing phase.(5)

Parts of a Rodman Gun & Carriage

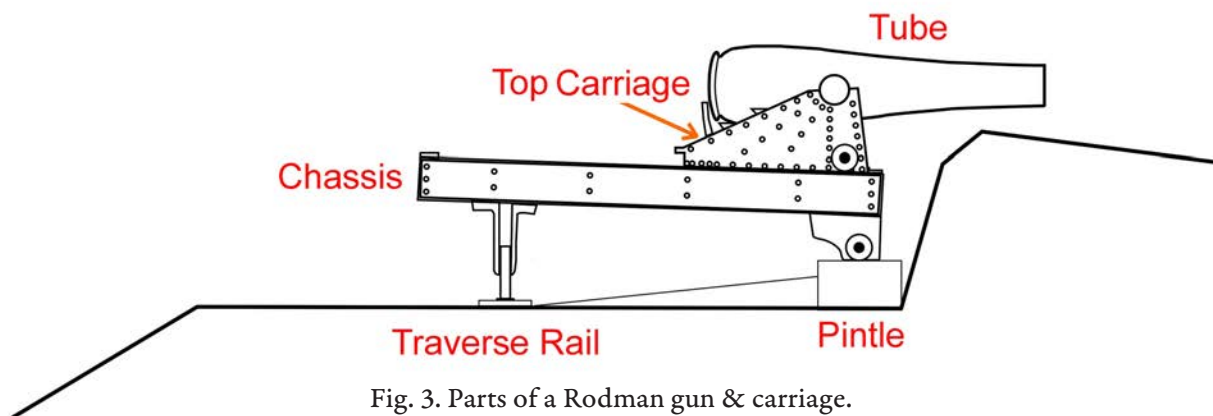


Fig. 3. Parts of a Rodman gun & carriage.

These batteries would be conspicuously similar in design, varying only slightly between forts due to local material availability and engineer preferences. Guns were to be emplaced entirely *en barbette* (i.e., mounted in the open), sitting atop simple wood or masonry platforms and firing over a parapet wall directly in front of the gun. Set into this wall were brick steps for the gunners to use when loading powder and shell into the muzzleloading Rodmans. Guns would be mounted in pairs, with a standard spacing of 34 feet between centerlines. Each pair of guns would be flanked by high traverses, some as tall as 20 feet, whose purpose was to prevent an enemy from being able to fire down the entire length of a gun battery (enfilading fire). And if a gun was struck by enemy fire, the traverses on either side would limit the damage to the two guns within the emplacement.

Parts of an Earthwork Battery

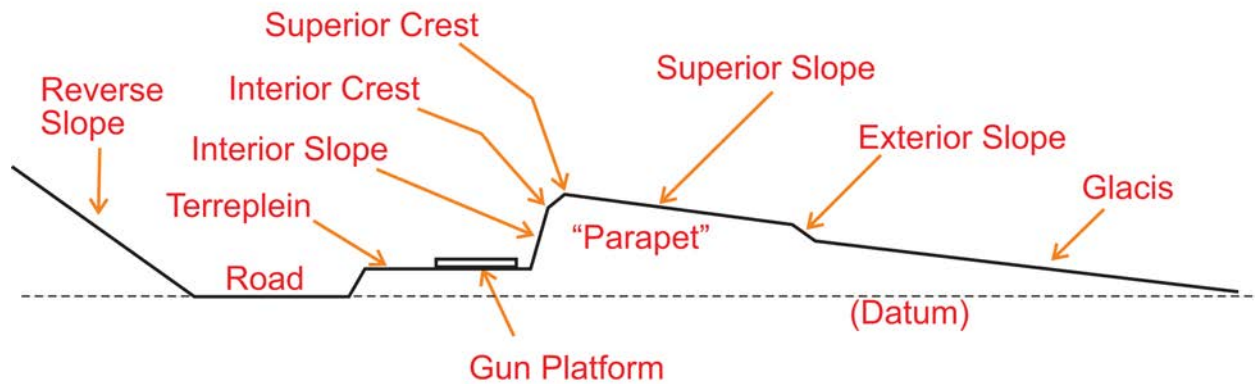


Fig. 4. Section through an emplacement showing architectural features.

Inside each traverse was a service powder magazine for storing gunpowder for the nearby guns. These service magazines were meant to provide ready-access for the gunners, while much larger “great magazines” held central reserves of propellant. Standard interior dimensions for a service magazine were to be 8 feet x 16 feet, although exact dimensions, entrance locations, and arrangement of approach tunnels would vary. Shot (solid projectiles) and shell (hollow explosive rounds) would usually be stored outside on shot beds close to the guns themselves.

Historian Glen Williford described the flexibility and features of a typical “Plan of 1870” earthwork battery:

These units could be strung together like beads on a string and lines or batteries could contain twenty or more gun emplacements. ... In place of stone or brick, the plans incorporated the use of concrete – its first widespread application in American defenses.

The principal material used for the parapet itself, any glacis in front, for the high traverse covers, and for any rear parados was sand, whose availability and cost advantage were obvious. Some 30 feet of earth or sand were specified for the depth of the terreplein. Magazines had hung wooden doors, and their interiors had special niches for oil lamps.⁽⁶⁾

Another feature of the Plan of 1870 works was the incorporation of mortars into the batteries. More than 100 model 1861 13-inch mortars had been manufactured during the war, and their inclusion in the batteries and their plunging fire would be a perfect addition to the relatively flat-trajectory fire of the Rodman cannon.

The drawbacks to the 13-inch mortar were its relatively short range, slow rate of fire (weapons during this period were still aimed by brute force), and relative inaccuracy. A partial solution was to emplace mortars in groups; firing volleys of mortars at the same target greatly increased the probability of a hit. Two to four mortars per emplacement became the standard, with several mortar emplacements spaced along the length of a battery.

As opposed to the extensive masonry platforms required to support a 15-inch Rodman, mortar beds were relatively simple affairs, overlapping courses of wood topped with iron skid plates. A mortar platform measuring 13 feet square and 2 feet thick was set nearly flush with the ground. However, only three mortar emplacements around the country were armed before funding for the fortification



Fig. 5. A “Plan of 1870” two-gun emplacement at East Battery, Fort Scott, c. 1910. Note the entrance to the service magazine at right. *GOGA, PARC, FOPO Collection.*

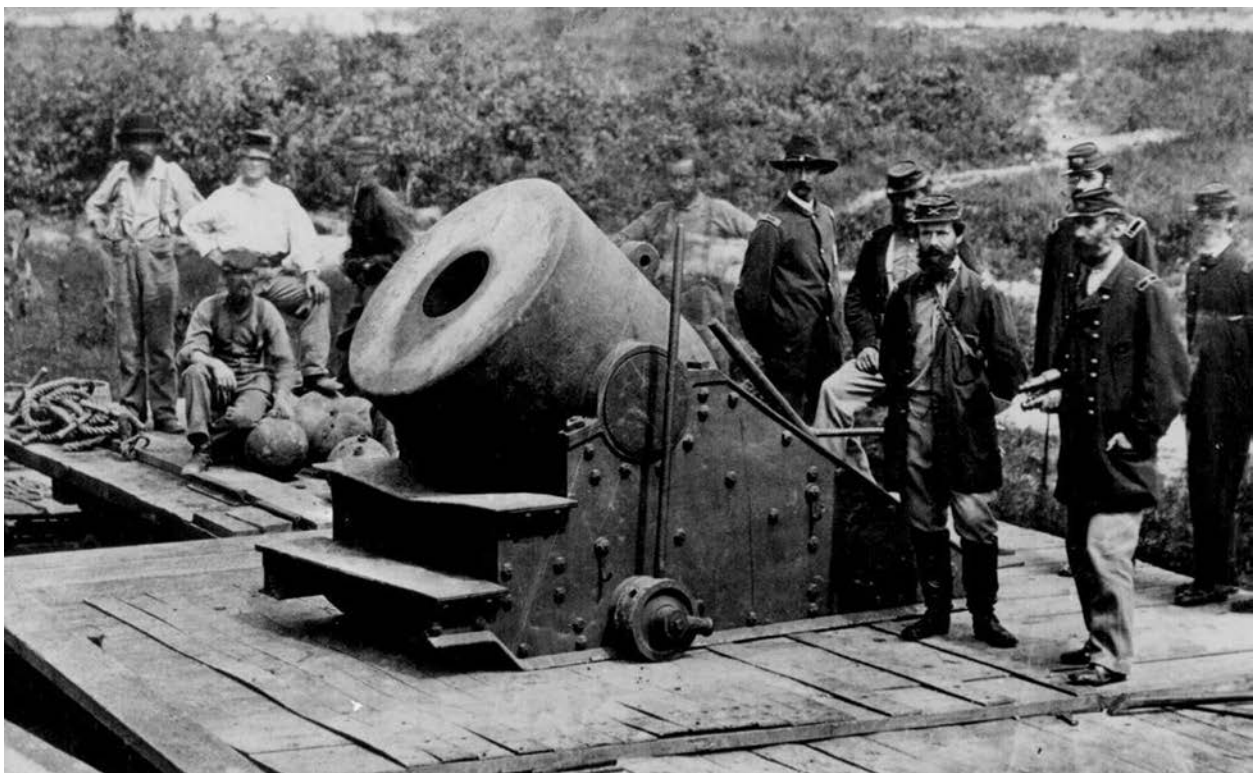
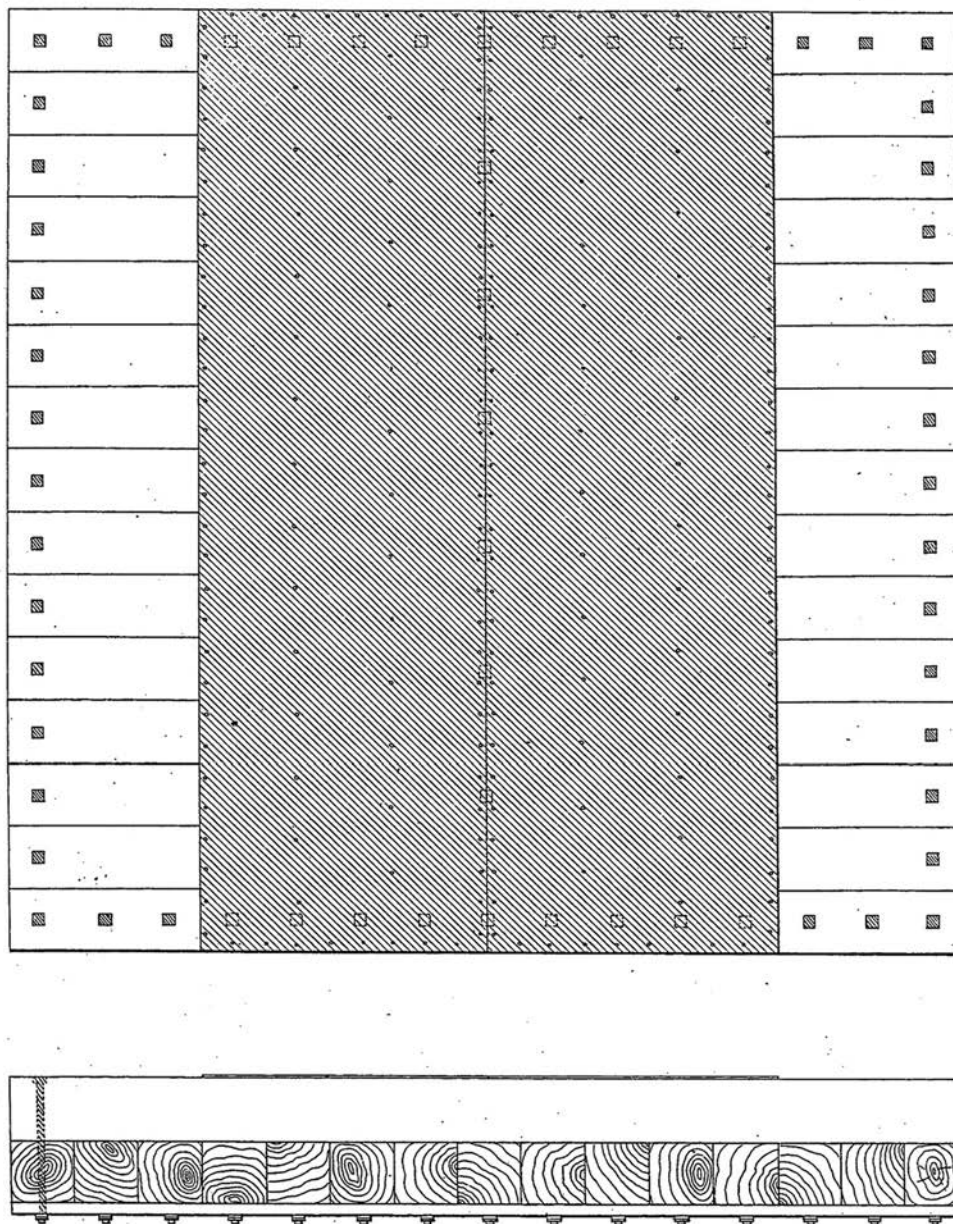


Fig. 6. A Union model 1861 13-inch mortar during the siege of Petersburg, VA, in 1864. *NARA.*

program was cut off, and none of these batteries was on the West Coast. (7) Numerous wooden mortar platforms were completed, though, and remained in place for decades.



Platform for XIII" Mortar.

*30 Pieces of timber, each 15' x 12' x 12", fastened together by 62 bolts each 1" diam. the nuts and heads being 2" x 2" x 1".
 2 iron plates, each 15' x 4 3/4' x 3/4" extending from front to rear of platform leaving a space of 3' on right and left uncovered. Plates fastened to timbers by wood screws each 2" long, diam 1/2", diam of head 3/8".
 Underneath is a course of 2" plank 12" wide, laid parallel to upper course of timbers.
 Entire thickness of platform 2' 2".*

Fig. 7. The 1870-type of platform for a 13-inch seacoast mortar installed at West Battery. NARA, RG 77.

In 1870 the army established a special Pacific Board of Engineers to oversee design, construction and modernization of the works around San Francisco Bay, where new batteries were proposed for Fort Point, Alcatraz Island, Angel Island, Lime Point in Marin County, and Point San Jose (Fort Mason) in San Francisco. At Fort Point the board proposed to construct two lines of batteries on the hills behind the old masonry fort. These works would be named West Battery and East Battery, reflecting their locations atop the bluffs west and east of the now-obsolete masonry fort.

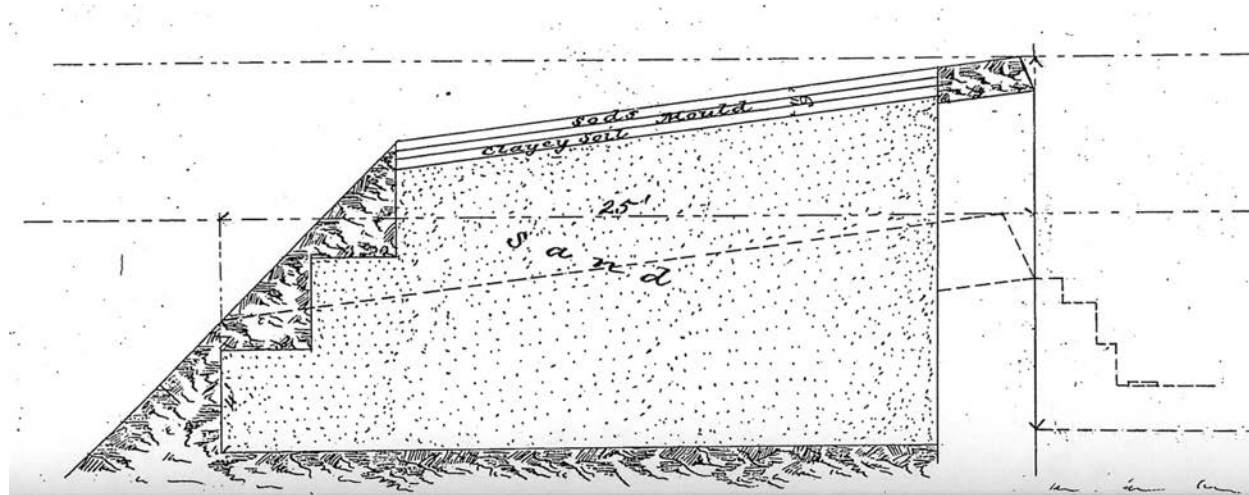


Fig. 8. Detail from drawing titled “Cross-section of Parapets Shewing [sic] Their Construction in Sand,” 1871. Note the layers of sod, mould, and clayey soil on the superior slope. *NARA, RG 77, Dr. 155, Sht. 17.*

As work progressed on the Plan of 1870 fortifications, financial and political realities began to rear their heads. Congress began to question the army’s continued expenditure of funds on what was becoming increasingly apparent to be an obsolescent system of weapons, especially since international advances in weapons, warships, and tactics had left the old-pattern American smoothbore guns, no matter what their size, increasingly obsolescent. Rather than allocating money for modern armament and fortifications, Congress decided in 1876 to grant a mere \$100,000 for “preservation and repair” of fortifications, and nothing for new construction. In 1877 things became even tighter when Congress adjourned without even passing an army appropriations bill.

For all intents and purposes, work on the Plan of 1870 ceased in 1876. Except for paltry amounts for repair and preservation, no serious expenditures would occur until 1890. Again, Historian Lewis described the situation that followed:

The deserted batteries were periodically inspected by caretakers, but neither funds nor labor was available to them for arresting the progressive deterioration that was to continue into the early 1890s. Third System forts, though patently outdated, and armed for the most part with smoothbore guns of Civil War or earlier vintage, continued to serve, of necessity, as major components of the nation’s harbor defenses.

This abortive program nevertheless marked a distinct turning point in American fortification practice, for the technical and tactical concepts on which it was based set a pattern that was to characterize all future harbor defense undertakings in the United States. ... From this time on, a fort was a piece of real estate occupied by a number of dispersed individual batteries. Furthermore, the various items of armament intended for this project, though never in fact adopted, remained under constant development throughout the 1870s and 1880s, with the result that by about 1890 there became available greatly improved weapons around which was conceived the very advanced and extensive generation of defenses that followed.(8)

In some ways, the lull in construction was a boon to the Corps of Engineers. Instead of completing and arming the Plan of 1870 works, the army was compelled to wait until the early 1890s to begin construction on the next generation of defensive works, and during this period they were able to reap the windfall of developments in artillery and construction by foreign powers.

During this period, numerous improvements were made that had a direct impact on America's next generation of harbor and coastal defense fortifications:

- * Methods of manufacturing and rifling modern steel artillery pieces evolved to the point where breechloading mechanisms could be introduced, allowing for greater range and accuracy.
- * The development of the "disappearing carriage" that utilized the recoil energy of a gun to lower it behind a protective parapet for loading and aiming, without endangering the crew or exposing its location to the enemy.
- * The introduction of nitrocellulose and nitroglycerin-based propellants by the end of the century that yielded higher muzzle velocities to effectively propel pointed projectiles.(9)

In addition, by the turn of the century, military architecture had made great strides. Mechanical hoists could lift projectiles from subterranean magazines to surface gun emplacements, and embryonic telephonic and electrical systems were revolutionizing communications between various parts of the battery, the fort, and even the entire defensive area.

As Lewis summarized:

Compared to the best of the smoothbore muzzle-loading cannon of the post Civil War period, the new weapons which began to emerge from the developmental stage around 1890 could fire projectiles that, caliber for caliber, were four times as heavy to effective ranges two to three times as great; and they could do so with remarkably increased armor-penetration ability and accuracy.(10)

In 1885, Secretary of War William C. Endicott convened a long-overdue board to review the state of the American defenses and make recommendations for upgrading the nation's forts and other defenses. The board's recommendations became the basis for the next generation of construction that would extend from 1890 to 1910, and give rise to the designation "Endicott Era" for these works. In 1886 the Endicott Board made its report, calling for extensive fortification projects at 26 coastal locales. Recommendations ran from gun batteries to mortars, to patrol boats and underwater minefields. Not all recommendations would be implemented, but the results would still bring sweeping changes to the coastal fortifications.(11)

In general, the Endicott Board recommended emplacing several calibers of guns, each with its own anticipated class of target, ranging in caliber from 12-inch rifles and mortars designed to deal with heavily-armored battleships and cruisers, down to 3-inch rapid-fire guns meant to take on swift motor torpedo and patrol boats and to defend minefields. In between these extremes were several other calibers of guns, each with its own justification for existence. In addition, electrically controlled underwater minefields would be planted in shipping channels and approaches.

Beginning in 1890, Congress began acting on the Endicott Board's report and resumed making annual appropriations for construction of coastal defenses. In 1890 and 1891 it authorized almost \$2 million in new construction. San Francisco and New York Harbor were at the head of the list. Over the next several years, construction would proceed rapidly at these two ports, reflecting their importance and the concern that they might be the primary targets of enemy attack.(12)



Fig 9. Endicott batteries at Fort Scott along the former location of West Battery. L to R: Batteries Boutelle, Marcus Miller, Cranston, and Lancaster. A portion of trapezoidal 1870s Traverse 21 is visible between Boutelle and Marcus Miller. *John A. Martini Collection*



Fig 10. View north from Battery Boutelle circa 1920, with a WWI cantonment in the right background. *Rod Crossley Collection*

Work began in 1891 above Fort Point, where ground was broken for a 10-inch disappearing gun emplacement in Battery Marcus Miller. Before long, additional batteries were being constructed at the post (formally named Fort Winfield Scott in 1882) that would mount a variety of large-caliber guns, rapid-fire weapons, and mortars. The best location for many of these emplacements was the bluff occupied by West Battery, and by 1900 five different Endicott batteries had been built atop its earthworks. These new works obliterated nearly every trace of the 1870s emplacements, but a handful of service magazines in truncated traverses survived to be incorporated into the new batteries.

The Endicott program would be succeeded by newer generations of coastal defenses in the 20th century, but their stout emplacements would survive long after the guns were dismantled. In the Presidio, some of the 1890s emplacements would see military uses as late as the 1960s, frequently as storage facilities but sometimes as command posts and even soldiers' quarters during wartime.

Construction Plan of 1870

The construction of earthwork batteries at Fort Point followed very closely the guidelines set forth in the 1868 report by the Board of Engineers. The most extensive retelling of the construction of West Battery and East Battery is in the National Park Service publication, *Historic Structure Report: Fort Point Historic Data Section*, prepared by historian Edwin C. Bearss in 1973. This researcher has excerpted extensively the sections concerning West Battery taken from Bearss' landmark report.(13)

Guided by the concepts contained in the Board of Engineers' 1868 report on earthwork fortifications, the Board of Engineers for the Pacific Coast developed an extensive scheme of defense for San Francisco Bay. In their September 1870 report to the chief of engineers, the members outlined their vision for works at Fort Point: "The best position on this shore for Barbette and Mortar Batteries to defend the approaches to the harbor were along the crest of the bluff, south of Fort Point, and that a powerful battery can be placed on the bluff East of the Fort."

The proposal was nothing if not expansive. In its original form, the board envisioned West Battery as a series of gun and mortar positions to emplace 57 guns and 28 mortars, extending along the ridge-line from directly behind Fort Point all the way to Telegraph Hill in the Presidio (today's Robb Hill). Its guns would face almost due west and command the channel approaches to the Golden Gate. Guns on its extreme right flank could also intersect with fire from batteries planned at Lime Point.

East Battery, by comparison, was envisioned as a relatively small work consisting of only 16 guns and four mortars. Its field of fire was almost entirely within the bay, half of its guns oriented towards Alcatraz Island and the others facing towards Point San Jose.

Following closely the Board of Engineers' guidelines, the traverses would be 64 feet apart on their centerlines, allowing enough room for two 15-inch Rodman guns in each emplacement. This spacing would also allow sufficient room for any modifications in platform design or carriages that the Board of Engineers might later require. (At this time the army was still considering King's Depressing Carriage, described earlier.) Far behind the batteries, earthwork positions for riflemen would be constructed near Robb Hill to prevent the artillery emplacements from being seized from the rear.

But the Pacific Board was also realistic about the eventual expense, stating the batteries would "probably absorb in their construction all the appropriations that will be made for defensive works at Fort Point for several years." They prioritized work on various sections of the batteries, with initial priority going to the northern half of West Battery, which would include positions for a 20-inch Rodman, fourteen 15-inch Rodmans, and eight 13-inch mortars. (The proposed 20-inch gun would later be replaced by another 15-inch Rodman.)(14)

A meticulously detailed map accompanied the report, showing the locations of the proposed works. This plan would be followed with almost slavish accuracy as actual construction work took place, and today's surviving features of West Battery only vary by inches from measurements shown on the 1870 proposal.(15)

The concurrence of the chief of engineers was required, of course, and he went along with the board's proposal, although he felt the West Battery positions, "though unnecessarily high and too oblique in direction for the most efficient fire on hostile fleets running through mid-channel to enter the Golden Gate," occupied the only available ground in the area. The southernmost of its guns near Telegraph Hill would actually be more than 2½ miles from mid-channel – almost the extreme range of a 15-inch Rodman. Consequently, Chief of Engineers Gen. Andrew A. Humphreys only approved construction of the northern portion of West Battery – the portion that survives today. With these modifications, Humphreys sent the Fort Point proposal to the secretary of war, who approved the project on November 9, 1870, "subject to such changes in details by the Chief Engineer, as in the course of construction may be found advisable."(16)

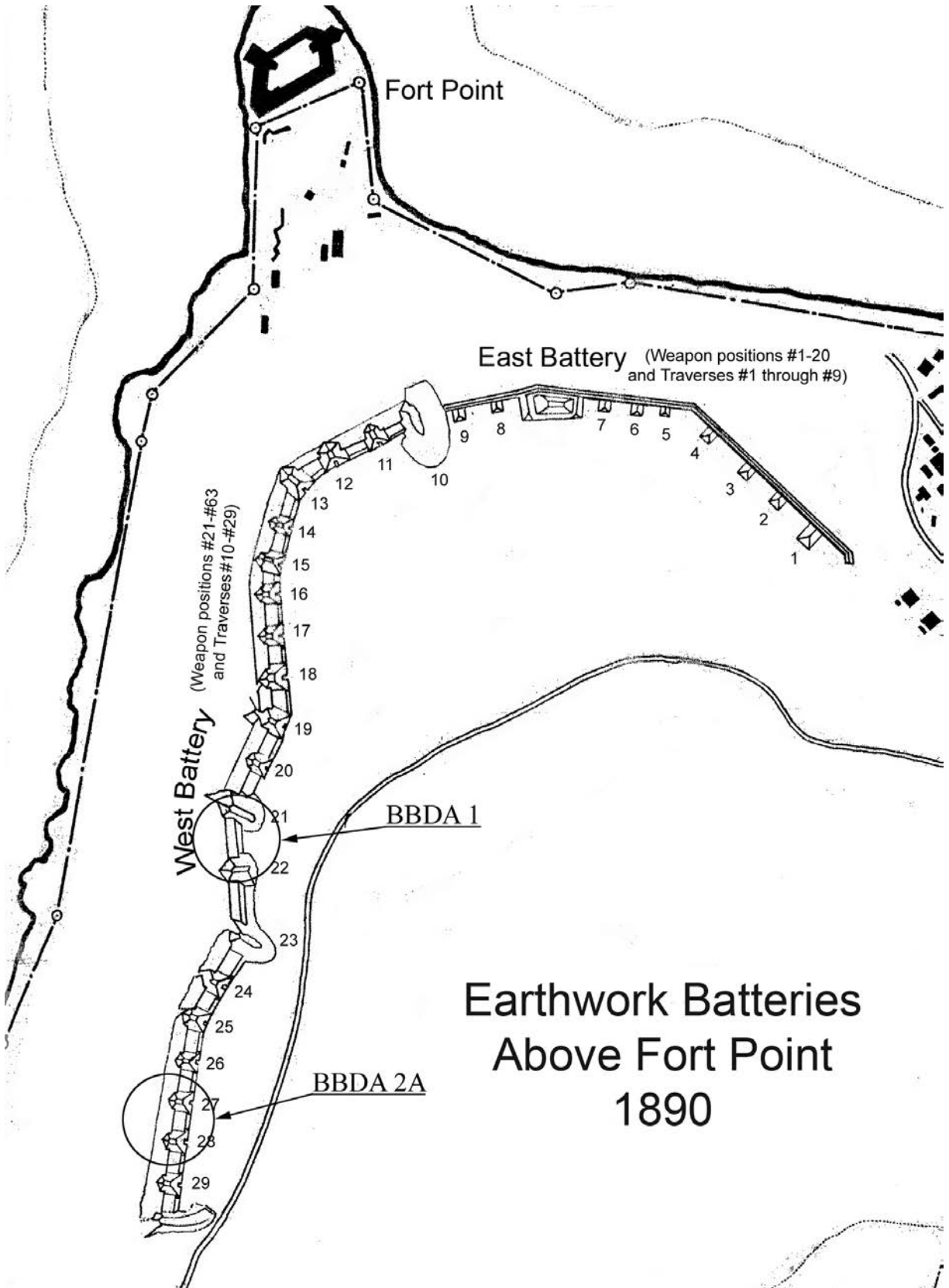
Actual work on West Battery commenced in late December 1870, beginning with the six emplacements directly behind Fort Point. Initial efforts included stockpiling materials, building and improving roads to the construction site, grading the battery site, and excavating and embanking earth for its terreplein and traverse.

Over the next several months, battery construction proceeded swiftly at Fort Point, indicating the army's desire to complete modern fortifications as soon as possible. Extensive correspondence in the National Archives indicates that work began at the north end of West Battery and then proceeded southerly. By mid-April 1871, Stewart was able to report that work had progressed as far as the two mortar batteries, and that a portion of the traverse on the right flank of the battery had been embanked and excavations made for its magazine walls (today's Magazine 21). By May, the front, side, and end walls of the two mortar magazines had been raised to the spring lines of their arched interiors, and their parapets constructed.

Elsewhere along line of emplacements, work was in varying stages of progress in excavating, laying granite blocks and pouring concrete for gun platforms, constructing magazine walls, grading terrepleins, and sodding slopes. By June 30, 1871, the embankment of the terrepleins, traverses, etc. had been 2/3 completed for a length of 1,324 feet. Altogether 29,586 cubic yards of embankment had been positioned. Sodding totaled 7,180 yards. The breast-height wall had been begun, the masonry of two traverse magazines almost completed, and eight others about 2/3 finished. Foundations for 12 platforms and pintle blocks for mounting 15-inch Rodman guns had been put down. Altogether, 1,928 cubic yards of brick, stone, and concrete were in place.(17)

An unwelcome complication arose in early June when orders arrived from Washington directing that work on the batteries be suspended until decisions were made about how to arrange them for "King's counterpoise carriage."(18) This directive surprised the supervising engineer, Lt. Col. C. Seaforth Stewart, who had been constructing standard barbette emplacements, not depressing ones. He replied that the interior crests of the emplacements under construction at Fort Point varied in height from 180 to 196 feet above sea level, giving no tactical advantage to this style of embryonic disappearing gun.(19)

The situation was clarified in a couple of weeks when the Board of Engineers made an updated report on the use of King's depressing carriage and noted its inefficiency atop the Fort Point bluffs. "As it [West Battery] is quite exempt from enfilade fire and cannot be closely approached in front, it is believed that ordinary mounted barbette guns may be served with entire efficiency."(20) Work resumed in July.



Earthwork Batteries Above Fort Point 1890

Fig. 11. Extent of completed earthwork batteries above Fort Point in 1890. Remedial action project areas are circled.

Over the next year, the completion and partial arming of West Battery proceeded. Completing the magazines and emplacements occupied much of the workers' time, along with details such as sodding, grading, terracing, installing traverse rails, and hanging inner and outer magazine doors.(21) By summer 1872, Stewart was readying West Battery for its armament and noted that to complete the process he wished to finish the rear slopes and to "unmask the fire" of several gun positions. This latter remark indicates that during construction, the terrain immediately in front of some of the guns had intentionally been left in its natural state, possibly to prevent prying eyes from seeing the work in progress. The cover now needed to be removed so the guns could have a field of fire.(22)

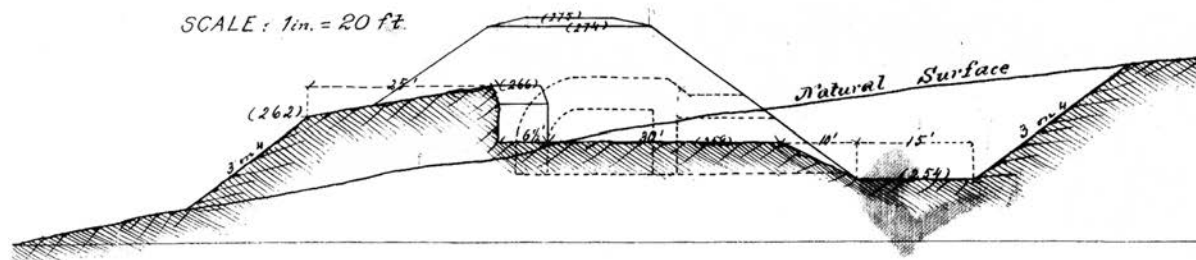


Fig. 12. Cross-section of a West Battery Rodman gun emplacement. The traverse and its service magazine are also shown. From the engineers' 1870 proposal for barbette batteries above Fort Point.



Fig. 13. Aerial view of East Battery in 1934, before construction of the Golden Gate Bridge toll plaza, showing the covered way and parados behind the emplacements. Battery Lancaster is at lower right.

Courtesy GG Bridge, Hwy & Trans. Dist.

Plans for East Battery were finally approved in early 1873, and work commenced shortly afterward. For the next year, work proceeded simultaneously on both East and West Battery. Although East Battery falls outside the immediate scope of this report, it should be noted that it differed from West Battery in one major feature: the presence of a covered way provided with a high earthen slope on the backside of the emplacements (a *parados*) that protected the road and battery from reverse fire, coming from a ship entering the Golden Gate Straits to the west.

At East Battery, the engineers were given permission to elevate each pair of guns slightly from the adjacent pair to the right (i.e., to the east). As the emplacements changed in elevation, they would “become better protected” from warships outside the Golden Gate, using the sloping topography of the hill west of the emplacements to form a *parados*.⁽²³⁾ The layout of Battery East and its sunken road – later filled in – were documented in a 1934 aerial photograph showing early construction work on the Golden Gate Bridge (see Fig. 13).⁽²⁴⁾

By contrast, West Battery did not have a covered way. While some – but not all – of its emplacements did have reverse slopes, these features varied in height from two feet to slightly more than ten. None formed a true *parados*, but could better be described as uneven road shoulders resulting from the undulating topography adjacent to the emplacements.

Numbers for the individual emplacements became standardized during construction of the two batteries. It should be noted that the terms West Battery and East Battery were never formal military names but evolved out of common usage. To the army’s constructing engineers, the fortification was

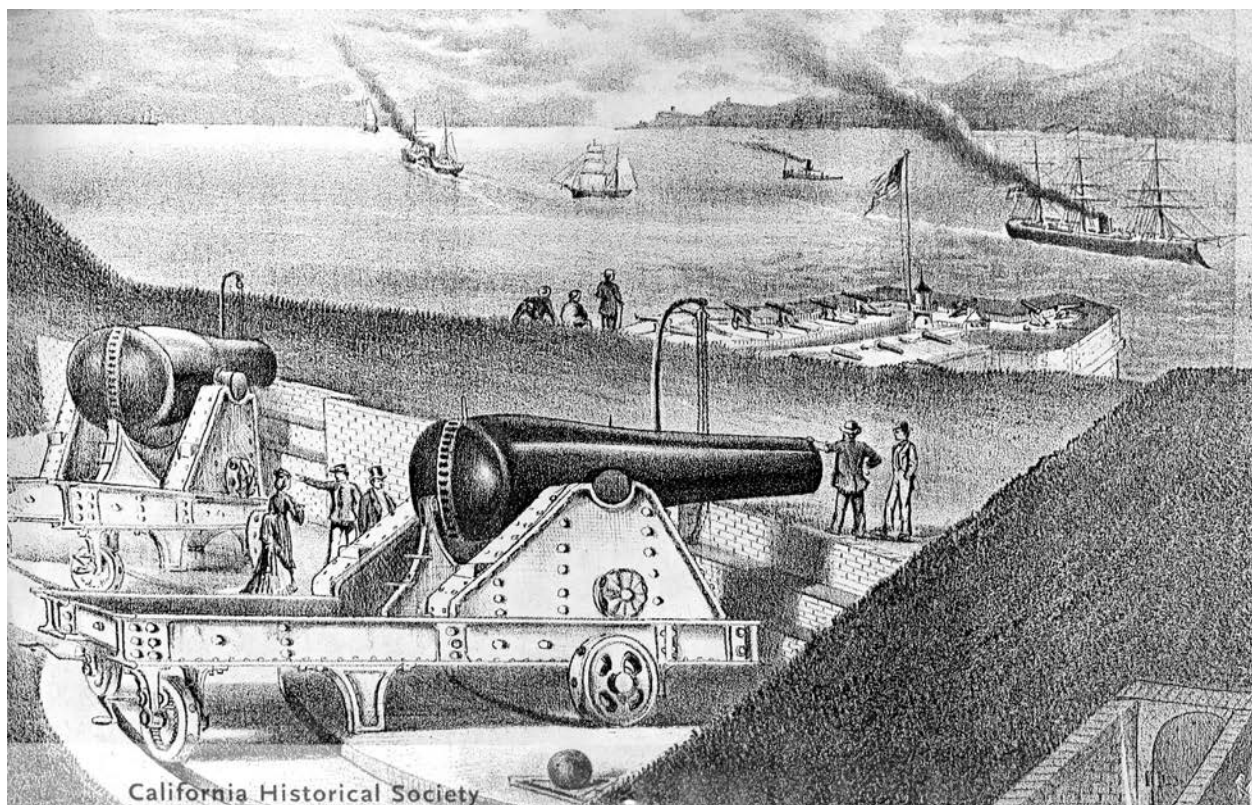


Fig. 14. A pair of 15-inch Rodmans in West Battery as portrayed in an 1877 issue of *The Wasp*, a satirical San Francisco publication. The accompanying article berated the government for wasting money on obsolete fortifications. The artist took several liberties with perspective and location, since Fort Point is not visible at this angle from West Battery. Also, the fort is drawn backwards. *Courtesy California Historical Society.*

simply one large earthwork. Correspondingly, they began numbering the emplacements at the extreme right flank of East Battery and numbered them consecutively from east to west.

In its final form, East Battery consisted of gun positions 1 through 20 (including platforms for four mortars), and West Battery consisted of positions 21 through 63 (including platforms for eight mortars).

Col. Stewart reported that West Battery was “essentially completed” on June 30, 1873. The magazines could all be used (although not all the asphaltic floors had been laid); stone platforms, pintles, and traverse rails had been completed for 12 Rodmans; a ramp had been constructed between West Battery and East Battery; and eight wooden platforms for 13-inch mortars had been constructed in the two mortar emplacements midway along the line of batteries. In his annual report, Stewart noted that a dozen 15-inch Rodmans had been emplaced, all on the right flank of West Battery.(25)

On May 18, 1874, the Rodmans in Positions 21 through 32 were test fired for the first time. The targets were one to two and three-quarter miles distant, and the guns loaded with powder charges ranging from 60 to 100 lbs. When fired at elevations of 33 degrees, the Rodmans and carriages performed perfectly, but when one 15-incher was intentionally fired at 0 degrees elevation, it recoiled violently against the end stops on its carriage. Although the iron chassis and carriage were slightly damaged, the emplacement itself took the shocks well and suffered only slight spalling of granite on the pintle block. The earthworks had not fared quite as well, though, and it was reported that the muzzle blast from the horizontal firing experiment had torn the sod off the parapet.(26)

When Congress decided in Fiscal Year 1876 to reduce funding for harbor defenses, Fort Point was hit hard. Instead of the \$80,000 requested, only \$25,000 was allocated.(27) The result was an immediate changeover from construction to mere maintenance. Work was suspended on both batteries, before even a single gun was emplaced in East Battery. The scene was grim for the supervising engineer, and would only get more frustrating. Historian Bearss summarized the sad entries from the annual reports for the following years:

“Congress for the next 14 years refused to vote funds for construction of seacoast fortifications, thus preventing completion of Battery East. With work suspended, the earthen batteries slowly deteriorated. Weasels and gophers burrowed into the traverses and parapets, and torrential rains caused some of the magazines to leak, with serious erosion wherever the works had not been sodded.”(28)

Eventually, civilian fort keepers were employed with the paltry maintenance funds allocated. Their jobs included security, mowing, scraping rust, and painting ironwork. Sometimes they were assisted by soldiers from the regular garrisons of old Fort Point – when the fort was occupied. One 1880s report stated that portions of the sodded slopes of the earthwork parapets and traverses had recently been mowed, and observed how the sod consisted of “the thin and now matted roots of weeds and grasses.” Without the additional expense of watering and weeding, it was impossible to keep the slopes “looking well during the long dry season.”

Experience had shown the sod actually held up better not being mown when exposed to “the sun and strong steady winds of summer,” and that the weeds and grasses acted as a mat, keeping the “light, dry soil, loosened and pulverized by the burrows of gophers, ... from being blown away.” For this reason, considerable areas of the slopes were left unmowed.

Given the lack of funds for nearly five years, and all the hindrances to proper maintenance, Col. Stewart took a remarkably positive outlook when he reported the batteries looked “in tolerable good order.”(29)

Periodically, the watchmen and the garrison were also able to perform maintenance on the non-earthwork portions of the batteries. This included clearing drains, painting doors, and painting and

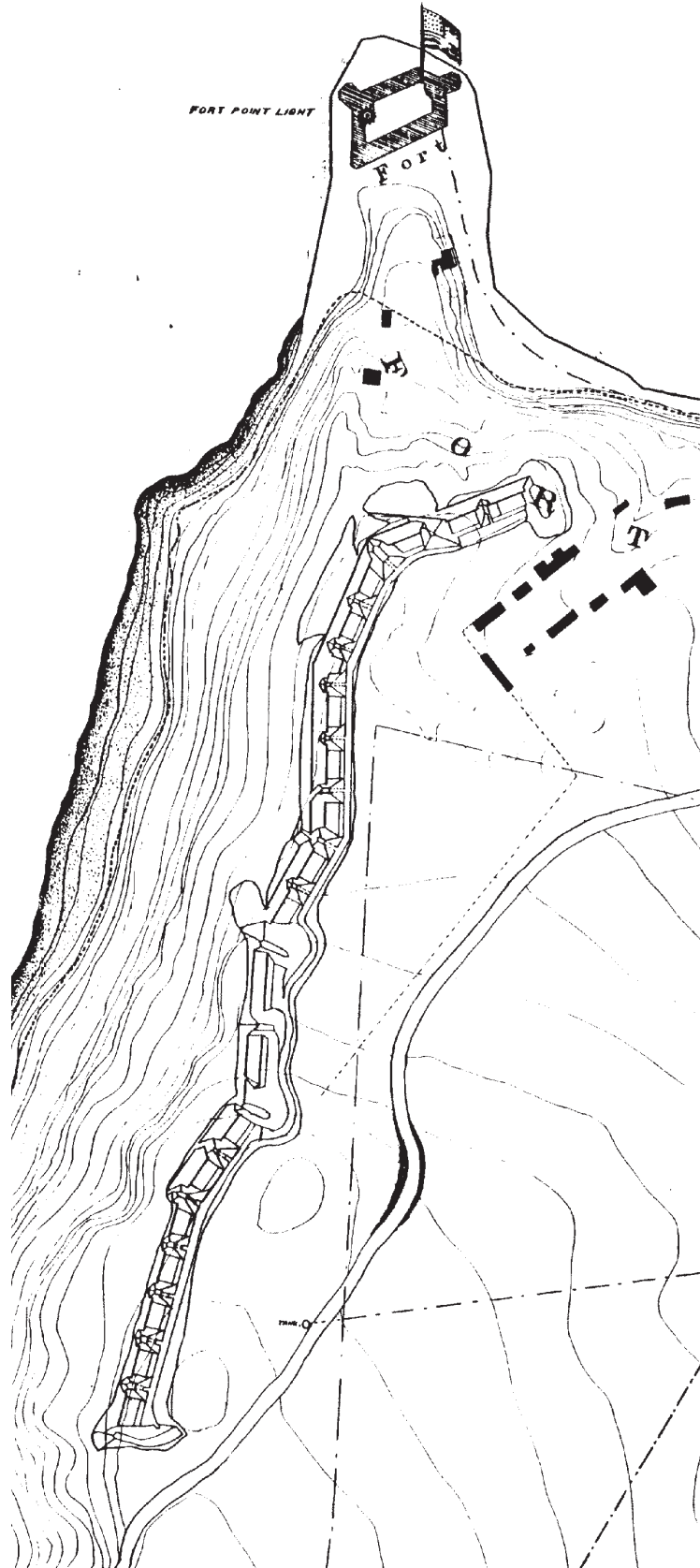


Fig. 15. West Battery in 1880. GOGA, PARC.

lacquering the ironwork on the wooden mortar platforms.

An 1882 inspection of the earthworks found a variety of completed and incomplete emplacements. It also noted that 12 timber platforms for heavy mortars had been laid in West and East Batteries, but that decay had set in. It further noted that ground had been prepared at the south end of West Battery for 14 Rodman positions but no platforms had ever been constructed there.(30)

For some unknown reason, the long-neglected 15-inch guns were again test fired on October 1, 1884. The guns were manned and the targets selected: an offshore rock about halfway between Fort Scott and the Cliff House. After a couple of firings with reduced charges and only so-so accuracy (blamed on defective fuses), the colonel in charge ordered a gun loaded with a 450 lb. solid shot and a full charge of 100 pounds of black powder. The results were predictable. The aging weapon recoiled along its chassis, which in turn buckled under the strain, causing the 50,000-pound barrel and top carriage to jump completely off the chassis. The barrel ended up splayed across the battery.(31)

In 1886, maintenance work ceased entirely for two years when Congress stopped all appropriations for preservation and protection of fortifications. When funds became available once again in 1888, workers cut brush and weeds around the earthworks, repaired sod on slopes and broken ventilators, cleaned brickwork, painted magazine doors, and built steps over the earthen parapets. Iron plates from 10 of the badly decayed mortar platforms were removed and stored in adjacent magazines.(32)

Endicott Era Construction

West Battery was perfectly sited to deal with an enemy approaching the Golden Gate, and for this reason it was also selected as the site of the first Endicott batteries in the San Francisco defenses. Work began on the new fortifications in June 1891 under the direction of Col. George Mendell of the Corps of Engineers.



Fig. 16. A 12-inch rifle in Battery Godfrey at the moment of firing, c. 1915. The brick entrance to Traverse 27, integrated into Godfrey's earthworks, is visible at lower left. *GOGA, PARC.*

By the end of the first month, Mendell's workers had dismantled four of the 15-inch guns in West Battery and begun demolishing their masonry platforms and other nearby emplacements. With the ordnance and earthworks gone, work next commenced on excavations for the disappearing gun emplacements. Progress was rapid, and by December 1892 six of the new Endicott emplacements were nearly completed except for their armament. (These emplacements today comprise Batteries Marcus Miller and Godfrey.)⁽³³⁾

In October 1896, construction on another concrete emplacement, today's Battery Lancaster Emplacement No. 3, required the removal of four more 15-inch Rodmans and their earthwork emplacements. The guns were dismantled, their carriages and platforms salvaged, and the traverses and earthworks demolished.⁽³⁴⁾

Then in June 1897, work began on two more emplacements (today's Battery Cranston), necessitating the removal of two more Rodmans, with their carriages and platforms, from West Battery. When these were removed, the positions were demolished. Only five 15-inch Rodmans remained in place: four in the extreme right end of West Battery and one in East Battery. The latter weapon – East's first armament – had only recently been emplaced after being dismantled from West Battery.⁽³⁵⁾

Work began in summer 1898 on the last concrete emplacements that would require the removal of armament from West Battery. These two disappearing gun positions (Battery Lancaster Emplacements Nos. 1 and 2) stood directly on the site of Rodman Positions 21-24, and by the end of the year these last four smoothbore guns had been removed to make way for new construction. With their removal, West Battery effectively ceased to exist.⁽³⁶⁾

Battery East, although initially planned as the site for five more Endicott weapons, was left undisturbed. Although it had never been completed during the original "Plan of 1870" construction, it now mounted five weapons: a 15-inch Rodman in Position 16 and four 8-inch converted Rodman rifles in Positions 13, 14, 17, and 18.



Fig. 17. A pair of 8-inch rifled Rodmans and the covered way behind East Battery, 1915. The Panama Pacific International Exposition can be seen in the distance. *GOGA, FOPO Collection.*

The last Endicott fortification constructed at West Battery was Battery Boutelle, emplacements for three 5-inch guns on balanced pillar mounts. No 1870s armament had to be removed to make way for the new work, since the 13-inch mortars intended for the site had never been mounted. Even their wooden platforms had been removed sometime prior to 1898.(37) When designing Boutelle, the engineers took advantage of pre-existing earthworks on the site by nestling the new emplacements snugly between Traverses 22 and 23. Work on the battery began in 1898 and was completed in 1901. During the course of construction, the decision was made to retain the magazine in Traverse 22 and incorporate it into the new battery, where it apparently served as an auxiliary ammunition storage room for the battery's 5-inch fixed ammunition under the designation "old magazine."(38)

Retelling all the details of construction of the Endicott batteries falls outside the scope of this report, but the following summary provides an outline of their origins. Starting at the north end of the line and working south, they are:

<u>Battery</u>	<u>Armament</u>	<u>Commenced</u>	<u>Completed</u>
Lancaster	Three 12-inch rifles on disappearing carriages	1896	1900
Cranston	Two 10-inch rifles on disappearing carriages	1897	1898
Marcus Miller	Three 10-inch rifles on disappearing carriages	1891	1898
Boutelle	Three 5-inch rifles on balanced pillar mounts	1898	1901
Godfrey	Three 12-inch rifles on barbette mounts	1892	1896

Alternations and Later Uses

Following its disarming, only a few traces of Battery West remained. These included six traverses and magazines (Nos. 21, 22, 23, 27, 28 and 29), a four-gun mortar pit (Positions 42-45), and the partial outlines of two unfinished two-gun Rodman emplacements at the south end of the line (Positions 60-63). One of these magazines (No. 23) was incorporated into the structure of Battery Godfrey and became a storeroom off the battery's generator room. The other surviving magazines remained as distinct structures with their own entrances, and show up on period maps and drawings simply labeled "magazine." Their exact uses are unknown, but they probably served as simple storage spaces for the adjacent Endicott batteries.

The history of the Endicott batteries surrounding the Golden Gate is documented extensively in Erwin Thompson's *Historic Resource Study: Seacoast Fortifications of San Francisco Harbor*, prepared for the National Park Service in May 1979. For the batteries along the former alignment of West Battery, their history was relatively short. By 1918 the batteries were recognized to have several faults: all were located too far inside the Golden Gate straits to have effective fields of fire; their carriage designs prohibited the barrels from being elevated for maximum range; and they were of an obsolescent design. Within a few years of their completion, the batteries' defensive roles were shifted to forts that had better fields of fire and were located further west – closer to any potential enemy - posts such as Fort Miley in San Francisco and Fort Barry in Marin County.

Battery Boutelle was the first to be disarmed in 1918, when its 5-inch guns were removed for use in Europe. Battery Cranston was disarmed that same year, and Marcus Miller's guns were removed in 1920. Cranston and Godfrey both retained their guns into World War II, apparently more as a matter of neglect than for any tactical purposes. They finally lost their armament in 1943 during a general scrapping of 10-inch and 12-inch Endicott weapons remaining in the bay defenses.

Alterations to 1870s Traverses

The earthen traverses covering these magazines also survived, but four of the six were truncated by several feet to lower their profiles when viewed from the sea. When originally constructing the earthworks, the engineers seemingly gave little thought to making West Battery inconspicuous. Historic photographs taken from the bay reveal the battery's traverses standing out against the sky as a series of tall, trapezoidal shaped mounds stair-stepped along the Fort Point hillside. The battery was so pronounced that its earthworks and guns were even visible from Pacific Heights. (See illustrations following.)

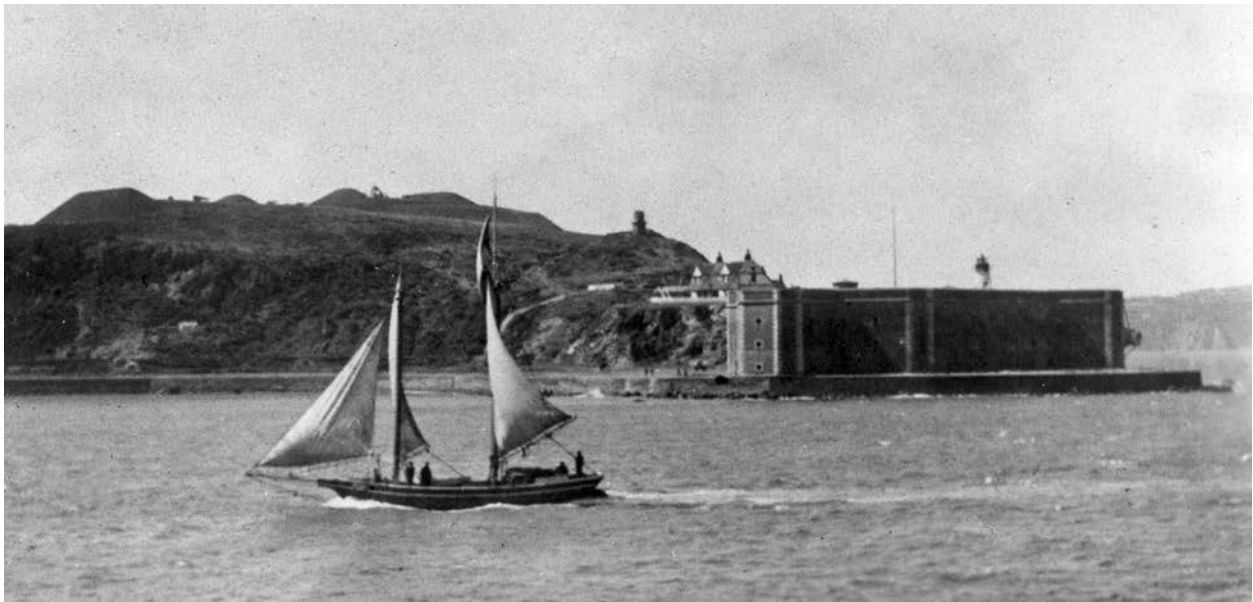


Fig. 18. Fort Point and a portion of West Battery as viewed from the bay, c. 1890. Note the 15-inch Rodmans between the traverses. *Courtesy California Historical Society.*



Fig. 19. The traverses of West Battery appeared like a serrated edge in this view from Broadway and Lyon Streets in Pacific Heights. A portion of the Presidio's main post is in the foreground. *Courtesy California Historical Society.*

By contrast, the army wanted to draw as little attention as possible to the presence of the Endicott batteries, not so much for secrecy but to deny enemy gunners a good target. The traverses from the 1870s that still remained adjacent to the newer works would have only served to draw attention to the fortifications.

In his 1920 treatise, *Notes on Seacoast Fortification Construction*, Col. Eben E. Winslow of the U.S. Army Corps of Engineers described the evolving theory of coastal fortification design in the late 19th century:

In the earthen emplacements constructed during and just after the Civil War, the guns were mounted on barbette carriages and were, therefore, always visible. In order to obtain a sufficient volume of fire they were mounted fairly close together along a parapet, although it was customary, wherever infilade [sic] fire was feared, to place frequent traverses in the line of guns so as to reduce the effect of this infilade fire. In general, the guns were emplaced in pairs, two guns in the interval between two traverses.

These traverses extended high above the parapet and, in fact, above the guns and, therefore, were visible from a considerable distance. The guns then in use were mounted in barbette and were always exposed to view, the ranges used at the time were comparatively short, and since the guns themselves were not concealed no concealment was lost by the exposure of the traverses to view.

When, however, the disappearing principle was introduced into seacoast gun carriages so that the gun in the loading position was entirely out of sight, it became desirable to conceal, if possible, the position of the gun. It appeared to be desirable to reduce the height of the traverse to that of the parapet, so that when seen from the front, the emplacement appeared with an unbroken horizontal crest, no guns being visible and no traverses indicating the approximate positions of the guns. The early designs for disappearing emplacements as prepared by the Board of Engineers were all based on this idea.⁽³⁹⁾



Fig. 20. Section of original 1870 engineer plan showing Traverses 21 (top) and 22 (bottom) and positions for 13-inch mortars. NARA, RG 77, Dr. 94, Sht. 102.

During the construction of the Endicott batteries, the tall earthwork traverses of West Battery were lowered to correspond to the adjacent parapets and superior slopes of the new concrete fortifications. Although the engineers' reports for the concrete fortifications at Fort Scott make no specific reference to lowering the old traverses, it was likely done in accordance with the new design standard described by Winslow as "an unbroken horizontal crest ... and no traverses indicating the approximate locations of the guns."

The best-documented reduction of a traverse's profile is Traverse 21 on the right flank of the mortar battery, adjacent to Battery Marcus Miller. The original 1870 map shows a proposed crest of 228 feet for this traverse, while an 1891 drawing shows the finished elevation as 229 feet. (Discrepancies of about a foot are common to historic maps of the area.) By 1902, however, seven feet of the traverse had been shaved off, reducing its elevation to 222 feet, bringing its crest to the same level as the superior crest of the adjacent mortar emplacement. Although this left the magazine with only about two feet of earthen cover, the traverse was now much less conspicuous. Viewed from the water, the battery now appeared more like a simple earthen bank in the hill.⁽⁴⁰⁾

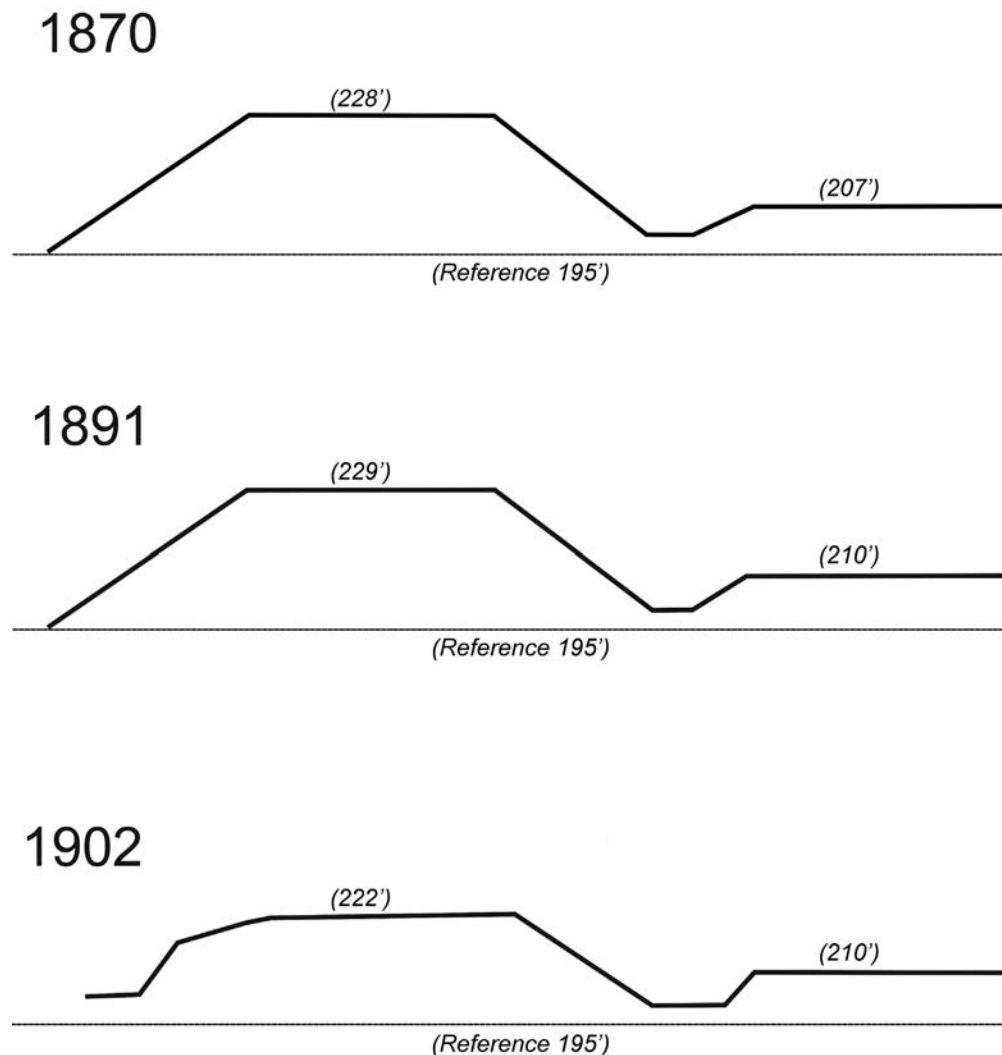


Fig. 21. Three views of Traverse 21, looking north. Note the change in road width and the three-foot height increase of the open area behind the battery.

The same re-contouring efforts occurred at Traverse 27 on the left flank of Battery Godfrey, which was reduced from an original elevation of 274 feet to a post-Endicott elevation of approximately 270 feet.(41) Based on visual inspections, similar reductions in height also appear to have been made to Traverses 28 & 29, although confirming measurements have not yet been made.

By contrast, Traverses 22 and 23 seem to have retained their original contours, although their crests are now suffering from erosion caused by visitors scrambling across the batteries. In fact, the footprint of Traverse 22 is somewhat larger than when first constructed, probably due to additional fill being placed around its eastern and southern sides when Battery Boutelle was constructed. As a result of this additional fill, a 25-foot extension had to be added to the corridor leading to the traverse magazine inside.(42)

Alternations to 1870s Mortar Battery

The four muzzleloading mortar positions between Batteries Marcus Miller and Boutelle lasted well into the 20th century, along with the traverses flanking both sides of their emplacement. Subsequent alterations and filling can be traced through historic drawings made of the battery, beginning with a section from the original 1870 engineer map for the Fort Point batteries. This map shows the relationship between the original slopes, the mortar platforms, road, reverse slope, and “natural surface.” (See Fig. 22.)

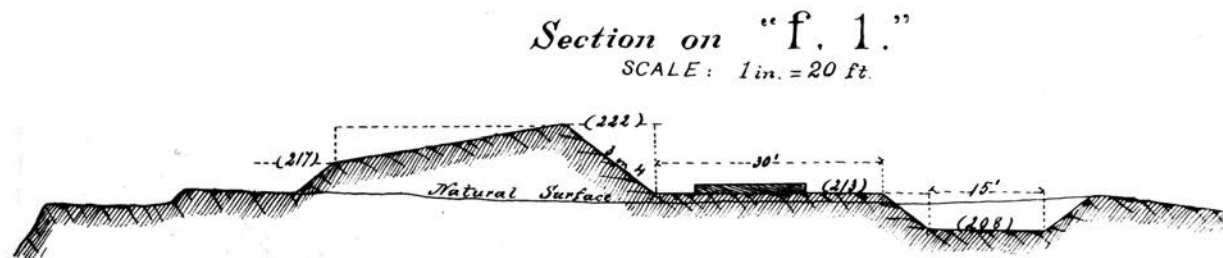


Fig. 22. Section on “f, 1” through mortar positions, showing original height of road cut behind emplacement. NARA, RG 77, Dr. 94, Sht. 102.

A map prepared in 1902 showing a proposed (but never implemented) extension of the Endicott batteries onto the mortar site revealed that the original outline of the earthwork emplacement was still recognizable, complete with the interior slope and intact (albeit truncated) earthen traverse and Magazine 21 on the right flank. The four wooden platforms were gone, but the open area where they had been located was still plainly discernible.(43)

At some undetermined date, the superior slope of the old mortar battery was flattened and a disposal site established on its site. This dump was likely associated either with the garrison buildings at nearby Fort Winfield Scott or with a sprawling complex of World War I temporary barracks erected behind the batteries in 1917. Initially, debris appears to have been simply dumped down the face of the cliff leading to Baker Beach. In 1922, a concrete and brick trash incinerator was built on the flattened area. Designated as Fort Scott Building No. 237, it measured 6’4” x 8’ and cost \$414 to construct. It was arranged on a general east-west alignment across the former superior slope.

In 1934, the original incinerator was replaced by a newer version built primarily of concrete. It measured 9’ x 13’ and cost \$800. Based on historic photos, this new incinerator was located on the north side of the dump area, and was oriented roughly north-south. To make room for this structure, yet another portion of the 1870s superior slope had to be cut away. The 1934 photograph also shows



Fig. 24. 1922 incinerator on dumpsite, looking south. *GOGA, PARC.*



Fig. 25. 1934 incinerator, looking north. Note excavation into earthworks at right. *GOGA, PARC.*

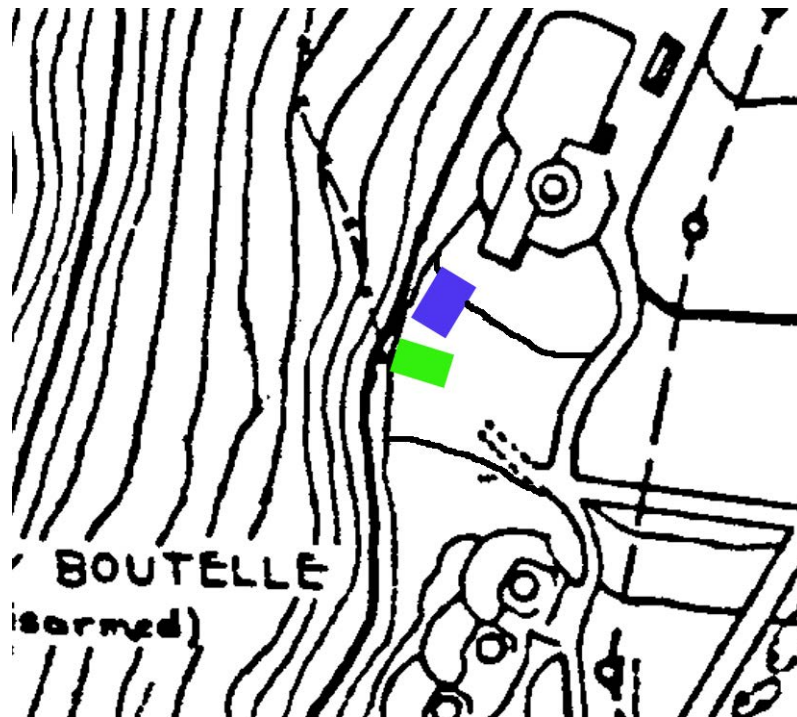


Fig. 26 Approximate locations of two incinerators: 1922 (lower) and 1934 (upper).



Fig. 27. The “new” incinerator at the dump site, lower right, February 1935.
Courtesy GG Bridge, Hwy & Trans. Dist.



Fig. 28. Aerial photo taken in May 1967 documents extensive fill on the former site of both the dump and across the road behind the batteries. A pool of water has apparently formed directly over the dump site. The curved outlines of the traverses flanking the former battery are still visible.

Courtesy GG Bridge, Hwy & Trans. Dist.

Rodman Emplacements

As noted in the 1882 inspection of West Battery, the last 14 Rodman positions were never completed. An 1898 plan of the Fort Point batteries confirms that construction work on the positions had only extended to completion of the magazines and traverses and grading of the parapets, superior slopes, and glacis. No work was ever carried out on the masonry parapet walls lining the interior slopes, the firing steps, or gun platforms. The 1898 plan also reveals a never-constructed traverse and magazine planned for the south end of the line, which would have become Traverse 30.(45) Whether or not any grading for this traverse was completed is unclear. The same map shows three of the wooden platforms removed from the mortar battery between Traverses 21 and 22; a fourth remained in place but was “unserviceable.”

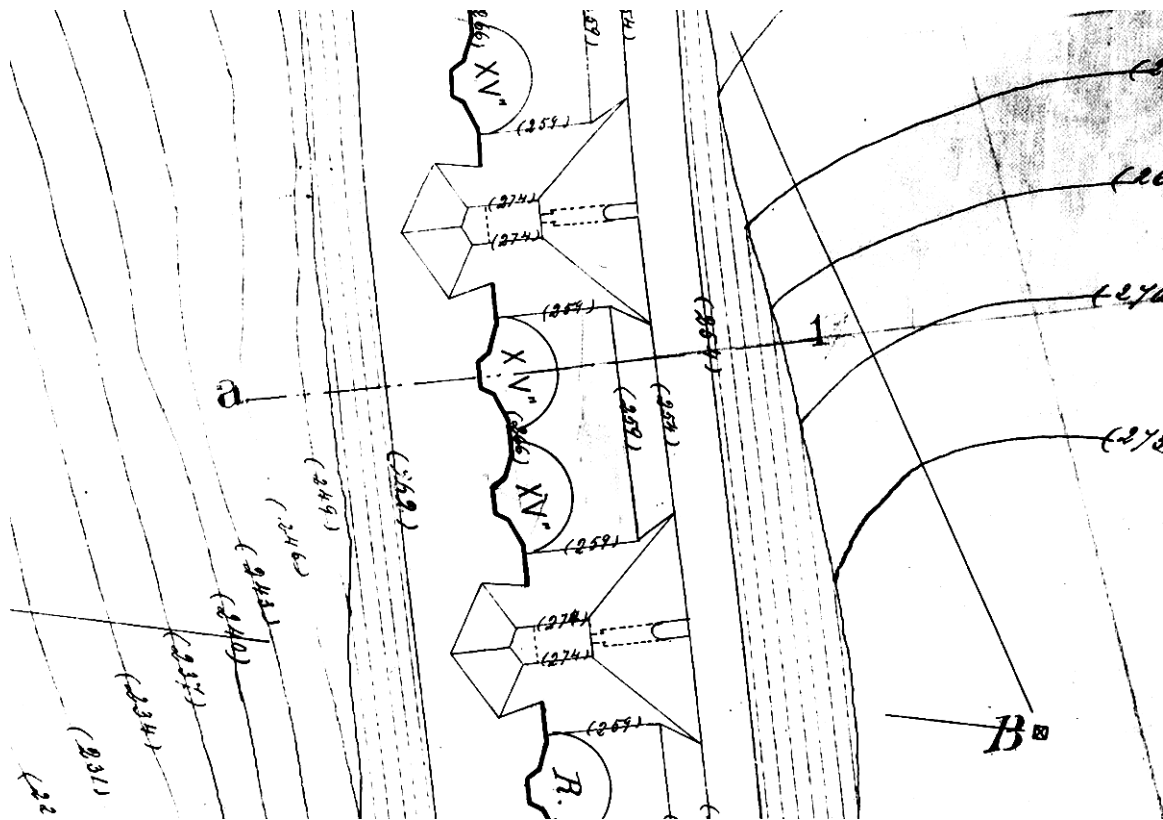


Fig. 29. Plan of original 1870 engineer plan showing Traverses 27 (top) and 28 (bottom), and Rodman Positions 59 and 60. Section "a - 1" is the site of the present overlook access road. NARA, RG 77, Dr. 94, Sht. 102.

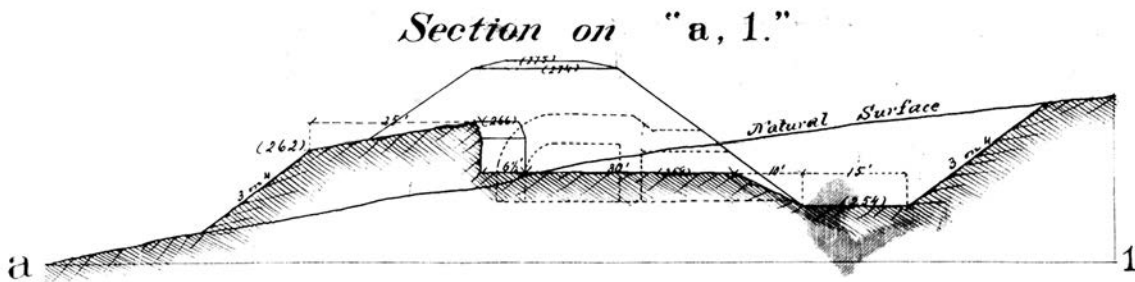


Fig. 30. Section on "a, 1" through Rodman positions 58 and 59, showing deep road cut (now filled) behind emplacement. NARA, RG 77, Dr. 94, Sht. 102.

When Battery Godfrey was constructed beginning in 1892, Gun Positions 50 through 57 were demolished along with Traverses 24 through 26. Traverse 27 was incorporated into the left flank of Godfrey. Gun Positions 58-59 were buried at this time and the road cut behind the emplacement filled by a high bank of earth. This bank, approx. 8 feet high, formed a traverse at the south end of the battery that prevented enfilade fire from ships entering the Golden Gate. This embankment was later converted into a service road leading to a dump constructed on the forward slope of Battery Godfrey sometime around 1940.

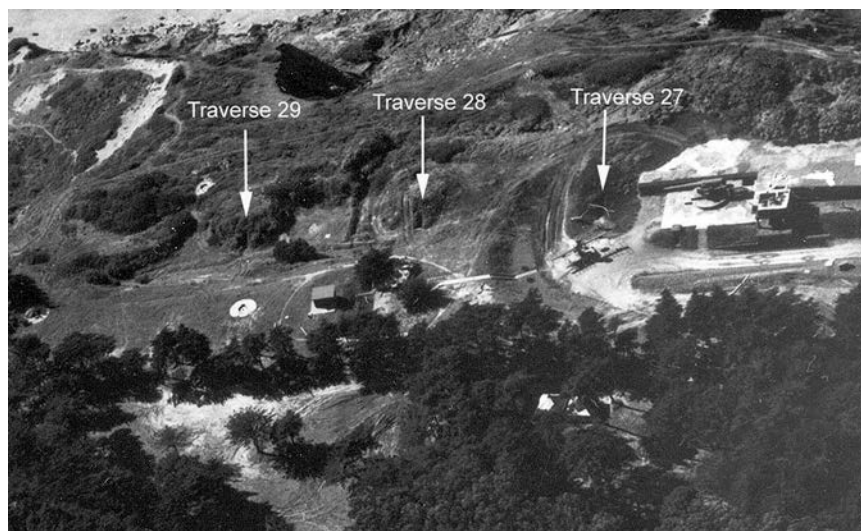


Fig. 31. The three 1870s traverses on the left flank of Battery Godfrey are visible in this February 1942 view. The curved landform between Traverses 27 and 28 is a berm that formed a protective traverse at the south end of Godfrey. Tire tracks probably indicate dump activities on the forward slope.

GOGA, PARC, Cooper Collection.

A detailed topographic survey of the dump area was prepared by the 663rd Engineer Topographic Company in July 1954. It showed the general area of the dump, access roads, and proposed locations for a new salvage shop and reclamation bins. It also showed that the reference elevation for the dump access road across the former Rodman positions was 262 feet, and the elevation of the surviving historic road behind the traverses was 255 feet – a difference of only one foot from the 1870 road elevation.(46)

This filling episode also explains why the entrance door to Traverse 27 is so far below current grade; the magazine lintel is at the historic road level while the adjacent service roads leading to Battery Godfrey and the 1940s dump are built atop seven to eight feet of fill that formed the 1890s parados.

Today this road over the Rodman positions serves as the unpaved access road to the Fort Scott Overlook.

Alterations to Superior Slopes

As part of the construction of the Endicott batteries, the area immediately in front of each gun emplacement (the superior slope) was cleared and graded to give the weapon a clear field of fire towards the Golden Gate. Each slope had a downward angle based on the lowest declination the gun barrel could be depressed below horizontal. In a major-caliber battery, the superior slope closest to the gun was constructed of concrete. At a distance from the muzzle, however, the material changed to graded and sodded earth. In order to prevent the weapon's powerful muzzle blast from tearing up the earthen slope, a thin concrete extension called a "blast apron" was frequently added to the concrete superior slope – usually based on experience with the gun's particular firing characteristics.

The following illustration of Battery Marcus Miller shows both the masonry and earthen superior slopes that were incorporated into its design. (See Fig. 32.)

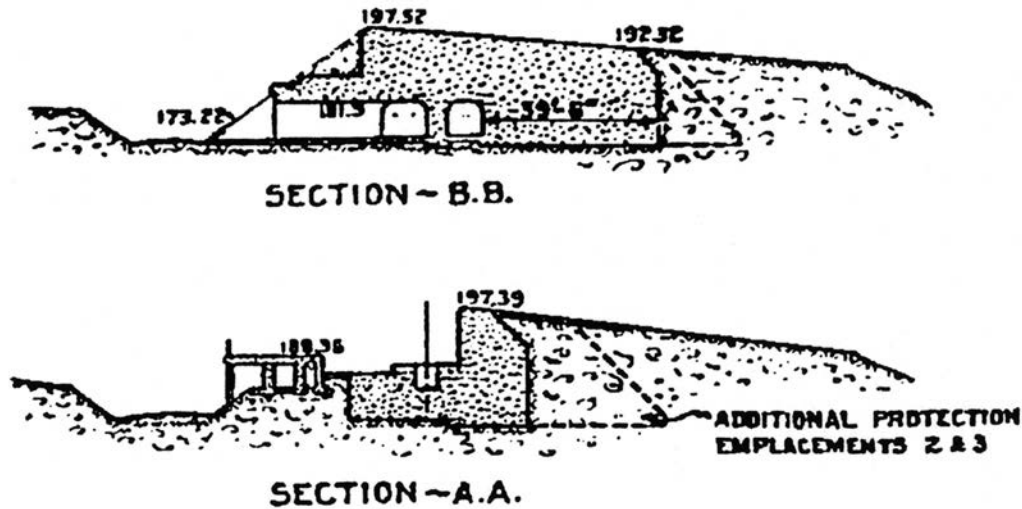


Fig. 32. Sections through two portions of Battery Marcus Miller.
 Note the impressive thickness of the concrete in front of the magazines (upper).
Report of Completed Works, Form 7, Marcus Miller, NARA, RG 77, Entry 1007.

Due to the increasing elevations of the batteries south of Fort Point, each emplacement's superior slope ended up at a slightly different elevation from the adjacent battery. These differing heights created a visibly terraced, or "stair stepped," landscape when viewed from the ocean. (See Fig. 33.)

When the batteries were active, these superior slopes were kept totally free of trees and any large vegetation that might obstruct the field of fire. As time progressed and the guns became obsolete, the army ignored the superior slopes and their once-clean grades and profiles were eventually softened by vegetation and erosion. Portions of the graded slopes and terraces still exist beneath the brush and tree cover that grows in the area today, and are periodically exposed to view when the park carries out vegetation removal projects.(47)



Fig. 33. The terraced superior slopes of Endicott-era batteries are visible above Fort Point in this c. 1900 view. A 12-inch disappearing rifle at Battery Lancaster appears at left. *Courtesy California Historical Society.*

Filling Adjacent to Batteries

The access road paralleling the line of Fort Scott batteries has its origins in the original service road constructed in the early 1870s to serve the West Battery. Over the years, this road has frequently been referred to as a “covered way,” based on the assumption that the road was constructed with high sides to protect it from enemy fire.

However, the road was not originally sunken below ground level. When first constructed the road was roughly at the same elevation as the surrounding landscape. This landscape, however, has been raised over the decades as a result of grading activities associated with the Endicott fortifications and other construction.

The earliest map of the West Battery road indicates that the height of the outboard shoulder on the side away from the gun positions varied from exactly ground level to 19 feet above the road’s surface. The lowest areas were behind the Rodmans on the site of today’s Batteries Cranston and Marcus Miller, where the shoulder was at grade, while the highest slope was behind the Rodmans on the site of present-day Battery Godfrey. For most of its length, the outboard shoulder was usually only one or two feet in height.(48)

These elevations would start to change when construction began on the Endicott batteries that replaced West Battery, and land that had previously been at grade was suddenly raised by several feet. The assumption is that the vast quantities of earth and sand removed to make way for the new batteries were spread atop the natural terrain behind the batteries, resulting in a significant increase to the area’s elevation.

For comparison purposes, an arbitrary spot was chosen 50 feet east of Battery Marcus Miller Gun No. 3 and its elevation changes were tracked over the last 160 years. (Except for the last entry, all elevations are based on engineer surveys.)

<u>Year</u>	<u>Surveyed Elevation(49)</u>
1847	Approx. 190 feet
1870	190 feet
1871	189 feet
1891	198 feet
1914	198 feet
1945	195-198 feet
2000	205 feet

The park’s GIS expert has compared the relative accuracies of these historic surveys and believes they are correct to within 3/4 foot.(50) Given this variance, it is believed the terrain behind Battery Marcus Miller has been raised somewhere in the vicinity of 12 to 15 feet since 1847.

These filling activities appear to have occurred in two significant episodes: 1871-1891 and 1945-2005. The first episode, which resulted in an 8-foot elevation change, is probably associated with the construction of the Endicott batteries. Work began in 1891 on excavations for Batteries Marcus Miller and Godfrey, which coincides with this first increase.

These excavations were immense, and must have resulted in vast quantities of spoil. For example, the area occupied by Battery Marcus Miller measures 560 feet in length x 65 feet deep x 120 feet wide. An excavation this size would conservatively result in 161,177 cubic yards of spoil. It is theorized that this removed material was spread atop the natural hillside behind the batteries – the nearest flat dumping area adjacent to the battery site.

There is also the possibility that additional filling took place behind the batteries during construction of the Golden Gate Bridge toll plaza in 1936-1937. Photographs document that during this period, much of East Battery on the other side of the plaza was extensively filled. This created today's Battery East Parking Lot adjacent to Lincoln Blvd.(51) However, any filling on the south side of the bridge approach likely took place close to the toll plaza and outside the current project areas.



Fig. 34. East Battery partially filled, October 1937. Compare to 1934 conditions in Fig. 13.
Courtesy GG Bridge, Hwy & Trans. Dist.

The source of the second episode behind Marcus Miller (an increase of 7 feet) is harder to pin down but probably occurred during the 1960s. The 1967 aerial photograph in the Golden Gate Bridge Collection shows extensive filling operations on the sites of both the Fort Scott dump and behind Batteries Marcus Miller and Cranston. In this photo, the area between the batteries and Merchant Road is covered with freshly-dumped piles of light-colored fill, each pile corresponding to about the capacity of a dump truck. Tire tracks can be seen among the piles, indicating dumping is still taking place.

The source of the fill is unknown but could have come from excavations for the “new” Letterman General Hospital on the Presidio, whose construction was just getting started about this time. The area being filled is bounded roughly by the batteries on the west, Merchant Road on the south, and the Golden Gate Bridge employee parking lot. Today, this area is covered by extensive growths of non-native vegetation and trees; additional (but informal) parking areas, many of them abandoned; and temporary modular office buildings associated with the Golden Gate Bridge’s administration.



Fig. 35. Dumping activities occurring near Golden Gate Bridge toll plaza in May 1967. Battery Marcus Miller area at left, East Battery area at right. Courtesy GG Bridge, Hwy & Trans. Dist.

In short, today's deeply sunken "covered way" behind Battery Marcus Miller is not a vestige of the Plan of 1870s earthworks but rather the result of Endicott-era and later filling activities. The historic grade in this area should be considered the elevations that existed following completion of the Endicott works.

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23. Board of Engineers, Pacific Coast to Humphreys, May 18, 1872, NARA, RG 77, Letters Rec'd, Chief Engineer.
24. Photo GG 37, in collection of Golden Gate Bridge and Highway District.
25. *Annual Report of Progress made in the Construction of Fort at Fort Point in Fiscal Year 1873*, NARA, RG 77, Letters Rec'd, Chief Engineer. Positions occupied by Rodmans were Nos. 21-30, 36 and 37.
26. Stewart to Humphreys, May 21 & 27, 1874, NARA, RG 77, Letters Rec'd, Chief Engineer.
27. Humphreys to Stewart, March 10, 1875, NARA, RG 77, Letters Sent, Chief Engineer.
28. Bearss, p. 258.
29. *Executive Documents of the House of Representatives for the 1st Session of the 48th Congress, 1883-1884* (Washington: 1884), Serial 2183, Vol. 3, pp. 47-48
30. *Executive Documents of the House of Representatives for the 2nd Session of the 47th Congress, 1882-1883* (Washington: 1883), Serial 2092, Vol. 3, pp. 51-52.
31. Stewart to Chief Engineer, October 2, 1884, NARA, RG 77, Letters Rec'd, Chief Engineer.
32. Col. George Mendell, Project Engineer, to Chief Engineer, July 7, 1890, NARA, RG 77, Letters Rec'd, Chief Engineer.
33. Mendell to Chief Engineer, September 29, 1892, NARA, RG 77, Letters Rec'd, Chief Engineer.
34. Lt. Charles L. Potter, Project Engineer, to Col. Charles R. Suter, District Engineer, December 31, 1896, NARA, SF Records Center, RG 77, Letters Sent by Project Engineer, Entry 1914.
35. Potter to Suter, June 30, 1897, NARA, SF Records Center, RG 77, Letters Sent by Project Engineer, Entry 1914.
36. Lt. Louis C. Wolf, Project Engineer, to Maj. Charles E.L.B. Davis, District Engineer, December 31, 1898, NARA, SF Records Center, RG 77, Letters Sent by Project Engineer, Entry 1914.
37. Drawing, "Armament Sketches of Defensive Works in San Francisco Harbor," January 1, 1898, GOGA, PARC, FOPO Collection.
38. "Report of Completed Works, Form 7, Battery Boutelle," corrected to December 1919, NARA, RG 77, Entry 1007.
39. Winslow, Col. Eben E., *Notes on Seacoast Fortification Construction* (Washington: GPO, 1920), pp. 109-110.

40. Drawing, "Plan and Sections of Batteries for Fort Point," 1870, GOGA, PARC, FOPO Collection; NARA, RG 77, Dr 94, Sht. 102, and Drawing: "Gun Emplacements No 12-13 for 10 in. guns at Fort Point etc," 1891, PARC, GOGA, Dr 27, Fldr 2; NARA RG 77, Dr 94, Sht. 110-1; and "Battery Commander Station for Battery Cranston," August 12, 1902, GOGA, PARC, Dr 272, Fldr 4; NARA RG77, Dr 94, Sht. 110-12.
41. Drawing, "Plan and Sections of Batteries for Fort Point" 1870; and "Report of Completed Works, Form 7, Battery Godfrey," corrected to 1919, NARA, RG 77, Entry 1007.
42. "Report of Completed Works, Form 7, Battery Boutelle," corrected to December 1919, NARA, RG 77, Entry 1007.
43. Drawing "Battery Commander Station for Battery Cranston," August 12, 1902, GOGA, PARC, Dr 272, Fldr 4; NARA RG77, Dr 94, Sht. 110-12.
44. Photograph in the collection of the Golden Gate Bridge & Highway District, PIC037 May 1967.
45. Drawing, "Armament Sketches of Defensive Works in San Francisco Harbor," January 1, 1898, GOGA, PARC, FOPO Collection.
46. Drawing, "Special Map for Redesign of Salvage & Dump Area Zone 1300," July 1954. Prepared by the 663rd Engineer Topographic Co., U.S. Army, Office of the District Engineer, San Francisco, PARC, GOGA, Dr. 275, Fldr. 2.
47. The author of this report directed one such project in the late 1980s at Battery Marcus Miller. The clearing work was carried out by members of the San Francisco Conservation Crew, and extensive areas of earthen slopes and berms became discernible after clearing dense brush from the superior slopes. These outlines disappeared within a year, though, to returning vegetation.
48. Drawing, "Plan and Sections of Batteries for Fort Point," 1870.
49. Maps referenced are as follows: Lt. William Warner's 1847 survey of the Fort Point area, NARA, RG 77, W9; "Plan and Sections of Batteries for Fort Point," 1870, GOGA, PARC, FOPO Collection; NARA RG 77, Dr. 94, Sht. 102; "Map Showing the Military Reservation of the Presidio of San Francisco," 1871, PARC, GOGA, Dr. 211, Fldr. 1; NARA RG 77, Dr. 93, Sht. 4-23; "Gun Emplacements No. 12-13 for 10 in. guns at Fort Point, etc," 1891, GOGA, PARC, Dr 27, Fldr. 2; NARA, RG 77, Dr 94, Sht. 110-1; "Armament Sketches of Defensive Works in San Francisco Harbor," 1898, GOGA, PARC, FOPO Collection; NARA RG 77, Dr. 256, Sht. 10-16; "Presidio of San Francisco and Fort Winfield Scott," 1914 GOGA, PARC, Dr. 312, Fldr. 2; "Fort Winfield Scott," Harbor Defenses of SF Annexes, 6 November 1945, GOGA Archeology lab, Ft. Scott drawer; Photogrammetrical Presidio Contours (based on 1988 NAVD), 2000, GOGA, GIS mapping Project.
50. Interview with Hans Barnaal, GIS specialist for Golden Gate NRA, at Presidio Archaeology Lab, August 13, 2005.
51. Photograph in the collection of the Golden Gate Bridge & Highway District, October 1937, Pic. B1095.