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A Brief General History of the Construction of the Endicott System of Seacoast Defenses in the Continental United States, 1885- June 30,1912

Prepared by

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A Brief History of the Construction of the Endicott Period System of Sea-Coast Defenses of the Continental United States, 1885 - June 30, 1912.

1. General Program, 1888-1912:

The development of giant rifled, breechloading, steel cannon, and improved gunpowder and projectiles for use in these weapons rendered the numerous magnificent brick and masonry sea-coast fortresses of the so called "Third System", built by the United States Government to protect its harbors from 1816 to 1860, obsolete after 1865. Iron-clad warships armed with the new steel rifles could destroy the most powerful of the masonry fortresses, while at the same time remaining beyond the range of the forts' smoothbore iron armament.

In 1889, Brigadier-General Thomas Lincoln Casey, Chief of Engineers, United States Army, explained America's need for a completely new comprehensive system of coastal fortifications to Secretary of War R. Procter in the following terms:

" The permanent (sea-coast) defenses of the country remain in the same inefficient condition that has obtained since the close of the Civil War. No appropriation for new construction has been made since that February 10, 1875....

" Our country, great in population, wealth, and natural resources,... is absolutely helpless against the attack of any third rate power possessing modern iron-clad vessels armed with heavy rifled cannon...

"The Board on Fortifications (the Endicott Board), organized under the act of March 3, 1885, and the permanent Board of Engineers (U.S. Army) have made a careful study of the whole problem, and an efficient system of defense

has been prepared and is awaiting construction. It only remains for Congress to give life to the project by making the necessary appropriations.

"The main features of this project," General Casey continued, "are:

(1) Armaments of the heaviest rifled guns mounted on disappearing carriages, which, while widely dispersed, can concentrate their fire on the enemy's vessels, and which, in range and penetration of projectiles, will equal if not exceed the heaviest fire that can be brought against them by the most powerful fleet, thus keeping the latter at a safe distance or destroying it while attempting to pass the mined area.

"(2). A well developed system of submarine mines planted in the channels and roadways for the purpose of holding the vessels of the enemy under the fire of our guns and preventing their running the batteries and reaching the harbors and cities.

"(3) The protection of these mined areas from counter-mining and removal by batteries of rapid-firing guns of small caliber and wide field of fire.

Explaining the new defensive problems, General Casey wrote:

"The great increase in effective range of the present heavy rifles [Estee L.] over those of former years has greatly changed the extent and character of the defense. Where formerly 1,000 yards was deemed a safe allowance for the position of fortifications in advance of the city or depot to be defended, 14,000 to 17000(8 to 10 miles) is now considered not too far for the exterior line of defense....

"Detailed projects for the defense of our principal sea-board cities and roadsteads have been or are being prepared. Those relating to the gun defense provide for five classes of work mounting the heaviest rifled ordnance:

(1) Mortar batteries, with and without scarp walls and flank defenses.

(2) Barbette batteries armed with guns mounted on disappearing carriages.

(3). Barbette batteries armed with guns mounted on vertical lift carriages.

(4) Iron-clad casemated batteries.

(5) Iron or steel turrets.

"The efficiency and economy incident to the first three classes are so well determined that I am prepared to recommend their immediate construction at Boston, New York, Hampton Roads (Va.), San Francisco, and Washington, D.C. as the commencement of a comprehensive system of defense, which should be extended to other localities from year to year..." [1]

1. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year Ending June 30,1889 (Washington, D.C.,1889)(Serial 2716),pp. 4-6. His Annual Reports hereafter refered to as ARCE . Also Emanuel Raymond Lewis, American Seacoast Fortifications: An Introductory History (Washington, D.C.,1970), pp.75-77.

"The Board on Fortifications," just mentioned by General Casey, had been appointed by President Grover Cleveland in 1885. Headed by Secretary of War William C. Endicott and composed of officers of the Army and Navy, as well as civilians, their function was to make a complete review of the coastal defenses of the country and to submit recommendations for a new program. Not since 1816, when the four-man board headed by Bvt. Brigadier General Simon Bernard from France had made a study which recalled in the construction of the Third System coastal forts, had the subject of fortifications, types of armament, etc., been subjected to such an intensive study. The Endicott Board made its report on January 16,1886.[2]

The Board recommended that new fortifications be constructed at 27 harbors or ports and that these gun and mortar batteries should be supplemented by submarine mine fields, floating batteries, and small torpedo boats. The total cost of this program, including the cost of manufacturing 577 heavy guns (8 to 16-inches) and 724 10-and 12-inch mortars, together with their carriages, the Board estimated would come to $ 126,377,800.00.[3] Their consolidated estimate of costs read as follows

1. For Construction of masonry and earth work batteries at 27 ports.....	$ 31,863,000
2. For Armor for the batteries.....	20,300,000
3. For Structural metal for the batteries.....	3,320,000
Subtotal for construction of gun emplacements, 1,301 heavy guns and mortars:	55,483,000

2. Report of the Board on Fortifications or Other Defenses Appointed by the President of the United States Under the Provisions of the Act of March 3,1885(House Executive Document 49, 49th Congress, 1st Session) (Serial Numbers 2395 and 2396), hereafter referred to as the Endicott Board Report. (Washington,D.C. ,1886).

3. Endicott Board Report , Part 1(Serial 2395),p. 28

4. For manufacture of 577 heavy steel rifle and 724 steel mortars..... # 28,554,000

5. For manufacture of 1,301 gun and mortar carriages.. 18,875,000

Subtotal for guns and carriages, $ 47,429,000 # 47,429,000

6. For submarine Mines and Adjutants;.....

	Never Built	Cost of
Mines in store	1,421	0
Mines to be purchased	4,740	$ 1,659,000
Sub-Total	6,161 mines	$ 1,659,000

Operating rooms or mining casemates to be built: 50 rooms- $ 635,000

Electric lights etc. for mines 200 plants # 1,200,000

Subtotal, Mining Structures: $ 1,835,000 $ 4,334,000

Subtotal, items 1 to 6: $ 107,246,000

7. For Floating Batteries (Never built) $ 4,334,000

8. For Torpedo Boats (Never built) # 9,720,000

Grand total estimated cost: $ 126,377,800.00 [4]

On March 29,1887, the Board of Engineers was directed by Secretary of War Endicott to begin preparing plans for the defense of the Nation's more important harbors in accordance with the recommendations of the Endicott Board. Operating under these guidelines, the Engineer Board " undertook a thorough revision of plans for the defense of our chief ports by submarine mines and study of the precise locations of the [gun emplacements] [5] new armaments [1] rendered necessary by modern modes of attack."

4. Endicott Board Report, Part 1(2395),p. 25, 28. [illegible]

5. Chief of Engineers, Brigadier General William P. Craighill to Secretary of War Daniel S. Lamont, Sept. 29,1896, in Report of the Secretary: Being Part of the Messages and Documents Communicated to the Two Houses of Congress at the Beginning of the 2nd Session of the 54th Congress, 3 vols. (Washington,D.C.,1896), Vol. 2, Part 1,p.7.

5

During the period 1887 to June 30,1901 detailed plans for the artillery and submarine mine defenses of 31 key harbors in the Continental United States were prepared by the Board of Engineers, approved by the Secretary of War, and funded by Congress. Those harbors were as follows: On the Atlantic Coast: Penobscot River, Maine; Kennebec River, Maine; Portland, Maine; Portsmouth, N.H.; Boston, Mass.; New Bedford, Mass.; Narragansett Bay, Rhode Island; Eastern Entrance to Long Island Sound, N.Y.; Southern Entrance to New York City, N.Y.; Delaware River(Philadelphia,Pa.); Baltimore, Md.; Washington,D.C. (Potomac River, Md.-Va.); Hampton Roads, Va.; Entrance to Chesapeake Bay at Cape Henry,Va.; Wilmington, N.C.(Cape Fear River); Charleston, S.C.; Port Royal, S.C.; Savannah,Ga.; and St. Johns River, Fla.(Jacksonville). On the Gulf of Mexico Coast: Key West,Fla., Tampa Bay, Fla., Pensacola, Fla,; Mobile, Ala.; New Orleans, La.; Sabine Pass, Texas; and Galveston, Texas. On the Pacific Coast: San Diego, Calif.; San Francsico, Calif.; the Mouth of the Columbia River, Oregon and Washington; and Puget Sound, Washington; and finally, Lake Champlain, N.Y.- Vt. [6]

The first act of Congress based on the Endicott Board Report was approved September 22,1888. It created the Board of Ordnance and Fortification and made the first appropriations for the beginning the manufacture of modern seacoast ordnance, also provided $ 200,000 for the commencement of the submarine mine or torpedo defense program. [7] The first appropriation

6. ARCE, for Fiscal Yeard 1901(Serial 4444),p. 6.
7. ARCE, for Fiscal Year 1889,p. 5, 7

— $ 1,221,000, providing for the construction of the Endicott period coastal gun and mortar ~~batteries~~ emplacement was made in the Act of August 18, 1890.[8]

By June 10,1910, when the construction on the Endicott Batteries had largely come to a halt, the ~~[illegible]~~ Congress had appropriated a grand total of $ 52,673,488.72 for the purpose of building and maintaining the seacoast defenses at 31 ports in the Continental United States, from July 1,1888 to June 30,1910.[9] Of this ~~Total~~, $ 5,196,957.36 was Appropriated for submarine mine ~~[illegible]~~ defenses and $ 47,476,481.04 for the construction, maintenance, and plant operation of the coastal gun and mortar batteries. Of the latter figure, $ 42,527,762 was for the construction of the gun emplacements and their supporting structures and plants, and $ 4,532,500 was for routine maintenance of the forts after completion.[10] In 1909 the Chief of Engineers estimated that additional appropriations of $ 10,531,336 would be required to built the ~~[illegible]~~ gun ~~[illegible]~~ emplacements proposed as necessary to complete ~~[illegible]~~ the defensive systems at 27 ports in the Continental United States.[11]

8. ARCE, for Fiscal Year 1891,pp.4-5.

9. See Appendix No. I, pp. 42-43, also 44-51. Appendix II, 52-56.

10. Ibid.

11. ARCE, For Fiscal Year 1909,p. 11.

Vast Appropriations on

For these ~~expenditures~~ gun and mortar emplacements, 1888-1910, the following work had been accomplished by June 30, 1910: (Chart No. 1)

	Total of emplacments funded by Congress.	Permanent emplacements completed	Permanent emplacements ~~armed~~ with mounted guns	Permanent Emplacements under Construction	Grand Total of Permanent Emplacements
Heavy Guns:	339a	302 b	293 b	2	304
12" Mortars	376	376	376	0	376
Rapid-Fire Guns	521	516 c	433 c	4	520
Totals:	1,236 a	1,194	1,102	6	1,200

	No. of emplacements proposed to be built but not yet funded by Congress.	Grand total of permanent emplacements approved by Sec. of War, 1910
Heavy Guns	55	359 b
12" Mortars	88	464
Rapid Fire Guns	45	565 c
Totals:	188	1,388 guns 12

Chart No 2

No. and Type of Sea Coast Defense Guns available, 1910

12 inch rifles:	105
10 inch rifles:	132
8 inch rifles:	68
Heavy Guns:	305
12 inch mortars:	376
rapid fire guns:	536 d.
Totals:	1,217 (13)

Construction ~~Work~~ on the six funded emplacements listed on Chart No 1 was completed by June 30, 1912. ~~Work~~ on the construction of Endicott additional 11 batteries in the continental United States came to halt, and was not resumed until after World War I had begun.

d. The 536 rapid-fire guns included 191 six-inch guns; 54 5-inch guns, 37 4.7-inch and 4-inch guns, and 254 3-inch guns. In addition and not included in this total, there were 70 2.24-inch (or six pounder) rapid fire guns on moveable mounts that did not require permanent emplacements, making a grand total of 1,287 guns.

a. Includes 36 temporary emplacements built ~~[illegible]~~ as special defense measures during the Spanish American War, 1898-99.

b. Exclusive of 35 heavy guns that were temporarily mounted in temporary emplacements in 1898-99.

c. Exclusive of one rapid fire gun that was mounted temporarily,

12. See Appendix III, pp 58-69, for annual Progress Report of emplacement and Construction program.

13. ARCE, for fiscal Year 1910, p.13.

2. Submarine Mines or Torpedo Defenses of the Continental United States, 1888-1910.

As has been noted, the Act of September 22,1888 appropriated for "torpedoes for harbor defenses," thus marking the beginning of the program to protect important harbors with submarine mines. With the initial funds construction was commenced on three mining casemates, one each located at Forts Schuyler and Wadsworth, New York, and Fort Warren, Boston, Mass. The second appropriation of March 2,1899 provided funds for five more casemates, one each for the Fort at Willets Point and Fort Lafayette, New York, the Fort at Sandy Hook, N.J., and at Alcatraz Island and Point San Jose, the latter two posts in San Francisco Harbor, Cal.[14]

By June 30,1891 nine mining casemates and their cable galleries had been completed: two at Boston, five at New York, and two at San Francisco. Three more were under construction, a total of 17 casemates for eight ports had been funded by appropriations and the Chief of Engineers estimated that a grand total of 30 such mining casemates would be needed.[15] ~~[illegible]~~

~~[illegible]~~

From July 1,1888 to June 30, 1897, a grand total of $ 752,081.08 had been appropriated for torpedo structures (mining casemates, cable galleries, and cable storage tanks, which included 13 and a few torpedo storehouses). ~~[illegible]~~ By the latter date, funding had been provided for 37 casemates and of this total, 31 had been constructed of concrete and brick, located at 22 ports were completed.[16]

14. ARCE, for Fiscal Year 1889, p. 7.

15. ARCE, for Fiscal Year 1891, p. 6.

16. ARCE, for Fiscal Year, 1897, p. 11. Also see Appendix V.

The War with Spain, April 25,1898- April 11,1899, provided a test of the new submarine mine defusive system of the United States. Brigadier General John M. Wilson, the Chief of Engineers reported: "At the outbreak of hostilities there were on hand a considerable number of mine cases and a limited quantity of operating apparatus, but no cable, explosives, search lights, or any of the multitude of miscellaneous minor articles needed to plant and operate the mines. Steps were immediately taken to procure as rapidly as possible all needed material and for placing in position at every important harbor a preliminary line of mines. The total allotments from the [Act of March 9, 1898] appropriation for "National Defense" made by the President for the torpedo defenses of the country aggregated $ 1, 540,000.

In addition, the deficiency act of May 4,1898 appropriated $ 50,000 for the purchase of material and $ 300,000 for planting and maintaining the mine fields." The more important items of torpedo material purchased with these funds, the Chief of Engineers continued: " comprise about 400 miles of single and multiple cable, 1,500 tons of explosives, 1,650 new torpedo cases, 44 electric search lights, 1500 compound plugs for mines, 4,500 circuit closers and regulators, and 17 sets of casemate operating apparatus. All of the above material, excepting the explosives, with a vast amount of minor articles, was purchased and distributed through the [U.S.] Engineer Depot at Willets Point, N.Y. At the close of the fiscal year (June 30,1898) submarine mines to the number of over 1,500 had been planted in 28 different harbors, with all their cables, anchors, junction boxes, and the necessary operating apparatus installed. For the preservation and maintenance of the mine fields it was necessary to enforce special rules approved by the Secretary of War for the navigation of friendly vessels, involving the employment of a large number of tugs and boats, with a

" numerous personnel, at an approximate average daily cost of nearly $ 3,000. In this connection," the Chief of Engineers reported," some assistance was kindly furnished by boats belonging to the Light-House Establishment and to the Revenue-Marine Service, whose cooperation proved of material value."[17]

On June 30,1899, General Wilson again reported: " At the close of the preceeding fiscal year submarine mines had been planted and and were being maintained in 28 harbors of the United States. Funds for the purchase of material and for operation and maintenance of the mine fields were derived the deficiency acts of May 4 and July 7,1898, and from Presidential allotments from the appropriation for " National Defense," (under Act of March 9, 1898) making an aggregate of $ 2,390,749.99 for these purposes. The mine field were maintained until the signing of the peace protocol with Spain (April 11,1899), when they were removed, partly by explosion and partly by raising and unloading, and all material recovered was cleaned and stored for future use.

" The deficiency act of July 7, 1898, appropriated $ 650,000 for the purchase for torpedo material and $ 736,000 for the planting and maintaining of the mine fields, available until January 1,1899. The latter was not required, in consequence of the cessation of hostilities, and the entire amount has reverted to the Treasury by limitation of law. Of the appropriation of $ 650,000 there was a net expenditure of $ 458,189.94, applied to the purchase of 1,400 additional submarine mines, 300 miles of cable, supplies for operating electric searchlight and power plants, and

17. ARCE for Fiscal Year 1898, p. 12.

"sundry accessories. The unexpended balance of $ 191,810.66 has reverted to the TReasury. Of the appropriation of May 4,1898, the sum of $ 60,768.39 also reverted to the Treasury by limitation. ....

Of the general operation, (1898-99) the Chief of Engineers remarked:

"The practical experience gained with the adopted torpedo system during the war with Spain has proved invaluable. In general, the system has fully realized all expectations, and, with the exception of a few minor details, no changes are contemplated. Sufficient mines and cable are now on hand for present needs at all harbors where torpedo defenses are contemplated. A considerable number of minor articles are, however, lacking, some having never been supplied and some having been destroyed or lost as a result of the war operations of last summer... Finally, the Chief of Engineers warned: "For the proper care of torpedo material in store additional cable tanks and storehouses are required at several localities. To provide all the minor articles of torpedo mareriel now lacking, and for the construction of additional casemates and storage facilities, an appropriation of $ 100,000 is requested."[18]

By the Army reorganization act of February 2,1901, the torpedo defense of the seacoast devolved upon artillery troops.[19] The act of June 6, 1902, assigned to the Artillery Corps the task of purchsing torpedo materials proper, such as cables, cases, floating plant, etc., but left the task of constructing the buildings, such as the casemates, cable galleries, cable tanks, and torpedo storehouses, with the Corps of Engineers.[20]

18. ARCE, for fiscal year 1899, p. 15.

19. ARCE, for fiscal year 1902,p.13.

20. ARCE, for Fiscal Year 1903,p.13.

~~By June 30,~~ In 1905, the Chief of Engineers, Brigadier general George L. Gillespie, requested additional appropriations under a new heading: "Preservation and Repair of Torpedo Structures," explaining:

"A large number of these new [wooden] torpedo-~~[illegible]~~ defense structures are now approaching completion or have been completed. In accordance with the views of the artillery authorities, they are in great measure built of timber and corrugated iron, which permits the electrical instruments to be kept in dry, well-lighted rooms, but which makes the structures themselves liable to more rapid deterioration and decay than the more costly structures of concrete and masonry adopted by the Engineer Department [1888-1901] when it had charge of ~~[illegible]~~ torpedo operations ~~[illegible]~~. An estimate of $ 50,000 is therefore submitted for the preservation and repair of these buildings, to be applied to miscellaneous repairs to the more recent timber structures as the necessity therefor may arise, and to the prevention of dampness, etc. in the older concrete and brick structures which are still kept in service. The appropriations made to date for building torpedo structures aggregate $ 1,778,000, and it is believed that the above estimate for maintenance is reasonable when considered in connection with the original cost of the buildings and the character of those recently erected."[21] Beginning with the Act of June 25,1906, Congress began making appropriations ranging from $ 10,000 to $ 20,000 a year for the "Preservation and Repair of Torpedo Structures. The total thus appropriated from 1906 to June 30,1912 came to $ 115,000.[22]

21. ARCE, for Fiscal Year 1905, p. 12.

22. See Appendix I, P. 51.

By June 30,1906 the total amount of money appropriated for the construction of torpedo structures came to $ 1,953,00 and by June 30, 1912 this figure amounted to $ 2,453,000.[23] The first generation of torpedo structures, built 1888-1901, generally speaking, were constructed concrete and brick, and the second generation, built 1901-1912 at the request of the Artillery Corps who now manned these works, were usually built of wood.

3. GUN AND MORTAR BATTERIES AND RELATED STRUCTURES AND PLANS.,1888-1912

a. Construction of Gun and Mortar Emplacements,1888-1912.

The first act of Congress appropriating money, $ 1,221,000, for the construction of the Endicott period gun and mortar batteries was approved, as has been mentioned, on August 18,1890. This sum was quickly followed by a second appropriation of $ 750,000 on February 23,1891. These funds were utilized to begin the construction of coastal batteries at five ports: Boston, New York City, Washington, D.C., Hampton Roads, Va., and San Francisco.[24] By June 30,1892, construction was underway on 69 emplacements at the five ports. Twentyone of these emplacements were for heavy (8, 10, and 12inch) guns and 48 were for 12-inch mortars. By 1895 work was in progress on 42 emplacments at 22 ports and by 1896 112 emplacements had been funded by appropriations for 22 ports.[25]

Completion and arming of the emplacements, however, proved to be the more difficult task during the first years. By June 30, 1894, only two 12-inch rifles were mounted, or nearly mounted, in their

23. ARCE, for Fiscal Year 1906,p.10 and Appendix No. I, pp50-51.

24. ARCE, for Fiscal Year 1891, 5.

25. See Appendix III pp57-69 for the record of funding, constructing, completing, and arming of the Gun and Mortar Batteries,1888-1912.

emplacements. Chief of Engineers Thomas L. Casey described the situation as follows: " One 12-inch rifle is now mounted and it is expected that this fall a second will be in a completed battery for the defense of New York Harbor. Each of these guns is mounted on a lift, by which the gun may be completely lowered for loading out of sight of an enemy in 26 seconds, and the loaded gun raised for firing in 21 seconds; and the ammunition may be raised by another lift in 17 seconds. The weight of gun and carriage thus lowered and raised is about 108 tons...." But he noted: " The completion of emplacements for 17 10-inch and 8-inch guns, to be mounted on disappearing carriages, is delayed by want of carriages on which to mount the guns, and that of seven emplacements for 12-inch and 10-inch guns is likely to be delayed for the same reason this fiscal year. It is hoped and urged that appropriations may be made for the manufacture of the disappearing carriage which has been invented by the Ordnance Department and has proved itself, from the very first, equal to all the requirements which such a carriage must fulfill..."[26]

By June 30, 1896, 284 emplacements had been funded, construction was underway on 185 at 22 ports, 92 emplacements had been completed, and 72 of these armed with their weapons. The Chief of Engineers also reported: "During the past year a system of fire control for the fortifications of the various ports has been elaborated and has received the approval of the Secretary of War. This system calls for the erection of observation stations in connection with the

26. ARCE for fiscal year 1894, p. 5.

"batteries. This work forms a part of the engineering work of fortifications. Preparations are now being made for the erection of three such stations."[27]

The act of June 6,1896 also provided, in addition to appropriations, "That contracts may be entered into, under the direction of the Secretary of War, for materials and work for construction of fortifications, to be paid for as appropriations may from time to time be made by law, to an additional sum in the aggregate not to exceed to exceed $ 2,500,000."[27a] By June 30,1897, under this authority contracts had been entered into for constructing 78 emplacements. But the Chief of Engineers noted: " The contract system in its application to fortifications is open to grave onjections, chief amongst which is the undue publicity necessarily given to the plans to enable intending bidders to submit proposals intelligently. The character of the work is such that perfect freedom to introduce changes during construction is extremely desirable, a freedom that is seriously harpered by the existence of a contract. A comparison of the results accomplished during the past fiscal year between the contract and hire-labor systems shows that the latter is in every way superior, being more rapid, satisfactory, and equally economical. A continuance of the contract system in connection with the construction of fortifications can not be recommended."[28]

Brigadier General John M. Wilson, the Chief of Engineers, further remarked: " The relatively greater progress made in

27. ARCE for Fiscal Year 1896, 10,11.
27 Ibid., 8-9.
28. ARCE for Fiscal Year 1897, p. 9.

10-inch and 8-inch emplacements is due to the fact that the ...nance Department has been able to supply the carriages for these ...greater numbers. No 12-inch disappearing carriages or rapid-fire ...guns have yet been issued, although a limited number of each are now ...in the process of manufacture. An increase in the number of 12-inch ...and of rapid-fire emplacements, particularly the latter, is at present ...the most urgent need of our seacoast defenses. Rapid-fire guns, by reason ...of their relatively great power and rapidity of fire, constitute a highly ...important element in coast defense. Their emplacements are ...comparatively inexpensive and can be rapidly constructed whenever the ...guns and carriages are available for issue."[29] .....

He further noted of the construction program: "The cost of the more recent emplacements has been materially less than those first constructed, due, in large measure, to the adoption of a design involving a reduction of the quantity of concrete and the substitution of sand or earth instead. The greater experience of the constructing officers and the existence of a cement manufacturing plant purchased for the earlier operations have also been factors affecting the cost of the later works. The economies thus effected, coupled with the adoption of a successful disappearing carriage for the 12-inch gun, which will serve to replace most, if not all, of the lift mountings originally contemplated, warrent the assertion that the ultimate cost of the engineering work connected with the projected scheme of modern defense will be less than at first estimated...."[30]

29. ARCE for Fiscal Year 1897, p. 10.

30. Ibid., p. 11.

The war with Spain had a decided effect on the fortification program. Chief of Engineers John M. Wilson described as follows:

"In consequence of the war with Spain and the possibilities of hostile attacks upon our coasts, urgent and pressing demands were made by Senators, Representatives, and local business interests for the immediate erection of seacoast batteries at numerous points not contemplated in the general scheme of national defense. When it is considered that the aggregate length of the coast of the United States, exclusive of Alaska, is 5,715 miles, and that more than 700 towns and villages on this extensive line can be attacked by ships drawing 10 feet or more of water, the practical impossibility of immediately and adequately defending every vulnerable point become readily apparent. Such an extensive development of works is not contemplated or necessary in a national system of defense which takes cognizance only of points important by reason of their wealth and population or of their strategical situation. In the absence of any available modern armament, the Secretary of War directed the immediate construction of temporary batteries, mounting old-style armament and siege guns, for the defense of a number of exposed localities, including some which are embraced in the scheme of national defense. The localities at which temporary batteries were ordered are Bar Harbor, Me., Stonington, Bridgeport, and New Haven, Conn.; Port Royal and Georgetown, S.C.; Brunswick and Darien, Ga.; mouth of St. Johns River, St. Augustine, Miami, and Tampa, Fla., and Sabine Pass, Tex. In addition to the foregoing temporary batteries, preparations were made against possible hostile attacks, by overhauling, cleaning, and putting in serviceable condition the existing armament, and by temporarily mounting within them additional guns, at the follwing old-type works: Fort Knox, Fort Popham, Fort Trumbull, Fort Monroe,

" Fort Macon, Fort Pulaski, Fort Clinch, Fort Morgan, Fort Jackson, and forts in San Francisco Bay...."[31]

Turning to the effects on the construction of the permanent seacoast fortifications, Brigadier General Wilson reported: "When the diplomatic relations with Spain began to assume a threatening character, orders were given to push work with all possible energy, and to mount every available gun as fast as delievered. Operations were carried on with double, and in some cases, three, shifts, of workmen, and were pushed, regardless of weather and climate. The extraordinary efforts made have resulted in a most gratifying progress, especially in the number of guns mounted and available for service as compared with the previous year...."[32]

The number of guns permanently mounted in permanent emplacements increased from 106 June 30,1897 to 290 by June 30, 1898 and to 390 by the end of the 1899 fiscal year. Ninety-two additional guns were also mounted temporarily in temporary emplacements to make the grand total of all guns available for coastal defense 382 in 1898 and 482 in 1899. (See Chart No 3) Wilson also stated that a considerable number of rapid-fire guns had been mounted during the 1898 fiscal year, and that provision had been made for the manufacture and emplacing of a large additional number...[33]

31. ARCE for Fiscal Year 1898, p. 8.

32. Ibid., p. 10.

33. Ibid., p.8/.

STATUS OF SEA COAST GUN AND MORTAR EMPLACEMENTS DURING THE SPANISH-AMERICAN WAR, April 1898-April 1899

Number of Guns Mounted in Gun and Mortar Batteries

Fiscal Year ending:	12 inch guns	10-inch guns	8-inch guns	HEAVY GUNS	12-inch mortars	Rapid-Fire Guns	Grand Total All Guns	
June 30, 1897 [1]	10	18	5	33	73	0	106	106
June 30, 1898 [2]	16	70 a	35	121	144	26	291	387
June 30, 1899 [3]	27	83 a	59	169	176	46	391	487
2.24 inch (six pounder) rapid-fire guns acquired 18898-99, on movable mounts and not requiring permanent emplacements.						70	70	
8-inch B.L. Rifles (Temporarily Mounted in Temporary Emp.)			26	26			26	b

a. Includes one 12-inch gun temporarily mounted in a temporary emplacement at Fort Washington, Maryland, from May 25 to October 1898 for defensive purposes.

b. 26 8-inch B.L. Rifles temporarily mounted in temporary emplacements as defensive measures, 1898-99.

1. ARCE, for Fiscal Year 1897, p.10

2. ARCE for Fiscal Year, 1898, p.10.

3. ARCE for Fiscal Year 1899, p. 11.

CHART NO. 3

CHART NO. 3

19a

19a

Wilson further reported: "Nearly all of the gun and mortars mounted at the close of the fiscal year have been transferred to the artillery for use and care under the provisions of Army Regulations, 1486. The care and service of this modern armament has largely increased the responsibilities devolving upon the artillery arm of the service, and has developed a defect in its organization which calls for prompt remedy through legislation by Congress. The new batteries either have been or will shortly be equipped with electric-light and power plants for lighting the magazines and passageways, and for operating the ammunition lifts. A still further extension of the application of electrical power is sought by the artillery arm and may be realized in the near future. The plants installed for this purpose by the Engineer Department, while as simple as circumstances will permit, demand for their proper care, preservation, and operation a greater degree of mechanical and electrical intelligence than can ordinarily be supplied by the enlisted men of the artillery. Instances of damage have already occurred where the care and operation of these plants have been intrusted to enlisted men, and it has become necessary to provide temporarily for the employment of a number of civilian electrical and mechanical experts from the limited funds at the disposal of the Chief of Engineers. It is exceedingly desirable that all operations connected with the service of the modern batteries be conducted by men regularly enlisted and amenable to military discipline, and it is earnestly recommended that legislation be obtained providing for the enlistment in each battery of artillery of two or more machinist electricians at a rate of pay which will secure a class of men capable of properly caring for and operating the electric-light and power plants of modern batteries."

General Wilson then pointed to a second problem area:

"As new batteries are being completed and transferred to the artillery, questions of tactics and organization are arising which require careful consideration, in order that the highest efficiency may be realized from the new system of defense. These defenses for any locality comprise not only gun and mortar batteries, usually separated from each other by intervening water areas, but submarine mines, search lights, and position-finding instruments, each separate element demanding a high degree of technical skill and involving the functions of the artillery arm and of the Engineers, (Ordnance) and Signal departments. The complexity and variety of the elements of a perfected modern scheme of seacoast defense strongly suggest the necessity for a single head at each locality, who shall be responsible for the conduct of the defense, and to whom all other shall be subordinate..."[34]

By June 30,1899, Chief of Engineers Wilson could report: "The temporary batteries erected during the war with Spain at various points on the Atlantic and Gulf coasts... were maintained until the close of the war (April 1899). Those erected on private land have since been abandoned and provision made for the storage and care of the armament.." Under the National Defense Act of March 9,1898 a total of $ 306,805.04 had been allotted and expended for these temporary batteries of old-type guns along the Atlantic and Gulf coasts.[35]

34. ARCE for Fiscal Year 1898,p. 11.

35. ARCE for Fiscal Year 1899,p. 10.

"The experience gained with contract work under the act of June 6,1896," he reported," has proved instructive, if not profitable; with few exceptions the character of the work has been poor, necessitiating expensive repairs since completion of the contracts, and in nearly every case have extensions of time been necessity..... "While the act of March 2,1899, for the reorganization of the Army provides for the enlistment of two mechanics in each battery of heavy artillery and of an electrical sergeant at each artillery post, sufficient time has not yet elapsed to procure suitable men to fill these positions. The absence of two regiments on foreign service and the increasing number of posts requiring garrisons have necessitated such a degree of division in available artillery troops that the number at many important posts is entirely inadequate for the proper care of the batteries. By reason of the existing conditions, considerable work, especially that of mounting ordnance, which should ordinarily be performed by the troops, has necessarily devolved upon the Engineer Department, and this state of affairs will probably continue until the artillery personnel is increased to the extent necessary for the new order of things."36

In June 1900 General Wilson informed the Secretary of War: " Stimulated by the larger appropriations of more recent years and the war with Spain, the seacoast defenses of the United States are to-day, ten years after the actual commencement of work, about 50 per cent completed. Twenty-five of the principal harbors of the

36. AREC for Fiscal Year 1899,p. 12.

"United States have now a sufficient number of heavy guns and mortars mounted to permit of an effective defense against naval attack. During the past fiscal year considerable progress has also been made toward the installation of an adequate rapid-fire armament, which is now a matter of the first importance..." [37]

In reviewing the history of seacoast fortifications since 1885, General Wilson commented: " Of the existing projects for the United States.... many have from time to time been revised to keep pace with the changes in ordnance and in ships' armament and construction. Nearly 15 years have elapsed since the adopted scheme of coast defense was formulated by the Endicott Board. At that time the rapid-fire gun was in its infancy and ships were characterized by their extremely heavy armament and great thickness of armor. With the rapid development of the rapid-fire gun and the increase in the resisting powers of armor by means of the Harvey and Krupp processes, there has followed a material change in ship construction, necessitating corresponding changes in the details of coast defenses. In accordance with the recommendations of the Endicott Board, the earlier detailed projects contemplated mounting a considerable number of the heaviest guns (14-inch and 16-inch guns) at the more important harbors in armored works. The tendency toward a reduction in calibers of heavy guns, coupled with the adoption of a successful disappearing carriage for the 12-inch gun, has rendered armored defenses unnecessary up to the present time, and the United States has thus far

37. ARCE for Fiscal Year 1900, p.7. Congress had appropriated a total $ 22,112,212 to June 30,1900 for the construction of gun and mortar emplacments.

" not embarked upon the construction of armored casemates and turrets, to which many European governments stand committed for their land defenses. Although rapid-fire guns were proposed in the earlier projects, no definite numbers or calibers were assigned until 1896, since which time nearly all of the earlier projects have been subjected to one or more revisions, resulting in the incorporation of a definite programme as to the rapid-fire armament, a reduction in the number and caliber of the heavy guns, a reduction in the number of mortars, and the general elimination of armored defenses. These revisions have resulted in marked economies without any sacrifice to the defensive requirements, and they will be continued as changes in ordnance and ships or other causes may render desirable....

"Existing approved projects," General Wilson concluded," for seacoast defenses contemplate the mounting of about 480 heavy guns of 8, 10, 12, and 16 inch caliber, of about 850 rapid-fire guns from 6-pounder (2.24 inch) to 6-inch caliber, and of about 900 mortars, at an approximate total cost for the engineering work excluding the cost of the guns and carriages now estimated at $ 50,000,000."[38]

Ten years later, June 30,1910, Congress had appropriated a grand total of $ 28,998.498.02 for the construction of a total of 1,236 gun and mortar emplacements and Chief of Engineers W. H. Bixby estimated that an additional sum of $ 10,531,336(not including electrical light or power or land for sites) would be required to complete the approved number of 1388 emplacments . By 1910 permanently mounted in permanent emplacments were 300 heavy guns, 376 mortars, and 479 rapid-fire guns,

38. ARCE for Fiscal Year 1900,p. 7.

a grand total of 1,155 guns at 31 ports in the Continental United States.[39] Yet to be built were emplacements for 59 heavy guns, 88 12-inch mortars, and 45 rapid-fire guns, or a grand total of 192 additional emplacements. The last large appropriation for construction had been made on May 27, 1908 and by June 30, 1910 construction on all funded emplacements in the continental United States, including 50 unarmed emplacements, had been completed. The building of gun and mortar batteries in the continental United States was not resumed until World War I had broken out in Europe.

B Coast Artillery, 1901-1950

Reorganization of the Army in 1901 created 30 batteries of Field Artillery and 126 companies of Coast Artillery. Each of the Coast Artillery companies was roughly of a size appropriate to the manning of either a major caliber gun or mortar battery, two or more rapid fire batteries, or a mine battery. In 1907 the number of seacoast units was increased to 170, and the two artillery components were formally established as distinct branches of the Army. These were to remain separate throughout both world wars and until 1950, when the Field Artillery and the Coast Artillery Corps, by that time composed exclusively of antiaircraft units, were reunited into a single Artillery branch.[40]

39 ARCE for Fiscal Year 1910, 13

40. Emanuel R. Lewis, Seacoast Fortifications of the United States, p 95. Also 31 Stat. 748 (February 2, 1901); 34 Stat. 861 (January 25, 1907).

C. Construction of Range and Position Finding Stations at the Gun and Mortar Batteries, 1898-1910

The Endicott period batteries were complex structures and in 1899 the Chief of Engineers noted: "By order of the Secretary of War, the duty of constructing instrument stations for range and position finders and the underground conduits for the communications in the adopted system of fire control has been imposed upon the Engineer Department. The deficiency act of July 7, 1898, appropriated $ 150,000 for installing range and position finders, and this sum was practically exhausted in providing instrument stations for depression position finders on high sites, and in the construction of one experimental tower on a low site and an experimental system of underground conduits at one artillery post."

"Much difficulty," General John Wilson continued," has been experienced in ascertaining the views of the artillery arm of the services respecting the desired features of the proposed fire control system. The question of the type of range finder best adapted for use on low sites does not yet appear to be definitely settled. The use of towers for depression instruments on low sites presents in many cases structural difficulties almost insurmountable, as well as grave tactical objections. Underground conduits also can not be provided in every locality, owing to the nature of the ground and the elevation of its surface. An approximate estimate of the cost of the engineering work connected with the installation of the fire-control system proposed by artillery officers for seacoast forts is well over $ 1,000,000. It has been the policy of the Department to limit expenditures for the range-finding system to those features which have been well established and concerning which there

"are no objections, leaving other matters until the artillery shall have formulated definitely and conclusively its views and wishes. A considerable number of range-finding stations for high sites still remains to be constructed. For these and for underground conduits, where such are feasible and desirable, an estimate of $ 150,000 is submitted."[41]

In June 1900 the Chief of Engineers reported: "The act of May 25,1900, appropriated $ 150,000 for this purpose (the installation of range and position finders), with which it is proposed to construct about 25 additional range-finder stations,..... With stations previously constructed, there will be about 55 main stations available for use out of a total projected number of 175 required for batteries completed and building. Many details of the fire-control system do not yet appear to have been definitely settled, especially the question as to the use of depression position finders upon artifical elevations on low sites, as contemplated by the present approved plans of fire control, and to which considerable objection has been made, an objection which is shared by the Engineer Department..."[42]

Two years later, June 1902, Chief of Engineers George L. Gillespie reported: " During the year satisfactory progress has been made in systematizing the whole matter of fire control. The utmost harmony has existed between the Chief of Engineers, the Chief of Ordnance, the Chief Signal Officer, and the Chief of Artillery, all of whose departments are involved in the work. The Department has taken the position that as the fire control is a purely tactical problem,

41. ARCE for fiscal year 1899,p. 13.

42. ARCE for Fiscal Year 1900,p. 10-11.

"the space required in the observation rooms, the height and degree of protection against projectiles, and the relative order in which the various forts and batteries should be equipped are subjects for the Artillery Corps to determine; that the province of the Engineer Department is to construct the shelters, towers, electric ducts, etc.; and that the Signal Corps is to install the telephones, telautographs, and other means of electrical communication, the power and lighting current used in connection with the telautographs being supplied from the engineer plants installed in the batteries. The Chief of Ordnance, by law, supplies the range-finding instruments themselves. Where the stations are located on naturally high ground there has been no delay in the completion of the engineer work, but where high steel towers are called for, the condition of the steel market has been such as to prevent rapid work. In most cases the towers have to be erected at inaccessible localities, and the total cost of each is so small that large firms will not bid for their construction, while smaller firms can not secure the rolled steel shapes from the mills without long delays.

"At the present time 9 fire commanders' and 45 battery commanders' stations have been completed and turned over to the (artillery) troops for use and CARE ; 12 fire commanders' and 30 battery co-manders' stations are under construction."[43] These 96 fire control systems had been funded with a total of $ 450,000 that had been appropriated from July 7,1898 to March 1,1901.

43. ARCE for fiscal year 1902, p. 11-12. See Appendix I, p 45.

By June 30,1903 11 fire-commanders' and 55 battery commanders' stations had been completed and turned over to the troops for use and care; an additional 22 fire commanders' and 55 battery commanders' station were under construction, making a grand total 143 such stations of the projected total of 175 under construction or completed.[44] In June 1904 the Chief of Engineers reported: "The horizontal-base system of position finding has recently been adopted by the Artillery, and Boards consisting of two traveling artillery members associated with the local artillery commanders district engineer officers at each fortified harbor on the Atlantic and Gulf coasts have prepared the necessary schemes of base-end stations. When finally approved by the Chief of Artillery, the installations of the stations, instruments and cables will be conjointly prosecuted by the Chief of Engineers, the Chief Signal Officer, and the Chief of Ordnance.

"Based on the plans of these Boards, it is estimated that the engineer work of installing fire-control stations and supplying the necessary electric light and power plants to operate them in batteries, which are now complete in all other respects, will require an appropriation of $ 500,000."[45]

In March 1905 Congress appropriated $ 1,000,000 for fire control at the seacoast fortifications and also give the Secretary of War the authority to distribute this money among the Engineer and Ordnance Departments and the Signal Corps at his discretion.

44. AnCE for Fiscal Year 1903,p. 12. See Appendix IV, p. 70.

45. AnCE for Fiscal Year 1904,p. 8 . During the 1902-1903 an extensive experimental system of position finding using long horizontal bases had been tested at Pensacola

The Secretary assigned $ 590,000 of this appropriation to the Engineer Department to begin the task of installing permanent fire-control systems at six selected harbors. The Chief of Engineers then remarked: "Tentative fire-control schemes for existing batteries have been adopted by the Chief of Artillery for almost all of the harbors now defended and corresponding detailed plans covering the engineer part of the work have been prepared. A few of these schemes have received the approval of the Secretary of War. The estimates for the work yet required of the Engineer Department to put into execution these schemes of the Artillery and Signal Corps, as they now stand, aggregate $ 4,263,364.47. While the general principles of the fire-control system have been satisfactorily determined and adopted, the actual details on which costs largely depend are still in a condition of experimental development by the Artillery, and it is anticipated that the cost of actual construction will probably largely exceed the above sum when such development is complete."[46]

Work began at New York, Boston, and Portland, Maine.[47] During the 1907 fiscal year the Secretary of War alloted an additional $ 650,416.18 to the Engineer Corps to carry on their part of the task.[48] During the 1909 fiscal year the Engineers received additional allotments of $ 211,555.00 to carry on the program.[49]

48. ARCE for Fiscal Year 1907, p. 8.

49. ARCE for Fiscal Year 1909, p. 13. ARCE for Fiscal Year 1910, p. 15.

46. ARCE, for Fiscal Year 1905, p. 9.

47. ARCE for Fiscal Year 1906, p. 7.

The grand total of Congressional appropriations for the construction and installation of range and position finding stations at the gun and mortar batteries in the continental United States from July 7, 1898 to June 30,1912 was $ 4,740,811.00. Work was still in progress on this program in 1912.[50]

D. Searchlights and Electrical Plants,1900-1912:

In June 1901 the Chief of Engineers reported:

"The construction of the national seacoast defenses has now reached a point where most of the heavy guns are in position, a considerable portion of the light rapid-fire emplacements and some of the rapid-fire guns are completed, and it is becoming important to inaugurate the systematic installation of searchligh apparatus for night defenses. Experience in New York Harbor and elswhere has shown that economy in installation and the keeping of the electric plants in good order in time of peace are promoted by habitually using the fortification plants for post illumination also. Efficiency and economy demand that the mains and conduits for both defensive and post lighting should be planned and supplied by the same department. For this reason, and with the concurrence of the Quartermaster-General, an estimate for the post mains and conduits in included in the estimate of the Chief of Engineers. The Quartermaster's Department will submit estimates for the wiring inside of the post buildings, for house fixtures and lamps, and for the outdoor lamps. As the

50. See Appendix I, p 45

31

"proper coordination of the operation of two separate departments, as well as the comfort of the troops, is involved in the systematic installation of these plants, and as the security of the several harbors against night attack depends on prompt and effective work, the appropriation of the total sum estimated, $ 500,000 for installation of searchlights and $ 500,000 for the installation of post mains and conduits, is urgeantly recommended. These sums will, it is estimated, fully equip four more of the most important harbors with complete searchlight systems, and will connect these searchlight plants and a number of already existing fortification electric plants with the electric lamps in the barracks and quarters already furnished by the Quartermaster's Department."[51]

From June 6,1902 to March 3,1905, Congress appropriated an $ 650,000 for this program. In June 1905 the Chief of Engineers reported: "... a number of 36-inch portable searchlight outfits are under construction for distribution to as many forts as the funds ($ 200,000) will permit. Successive joint maneuvers of the Army and Navy against the Defenses of Washington,D.C.- Fort Washington, Md. and Fort Hunt, Va., during the summer of 1905 have emphasized the need at all defended harbors of an adequate supply of powerful searchlights. The Chief of Engineers and the Chief of Artillery are entirely in accord in the view that systematic installation of such apparatus for night defense should continue."[52]

51. ARCE for Fiscal Year 1901,p. 13. The act of March 1,1901 appropriated $ 150,000 for the purchase and installation of searchlights for the defenses of New York Harbor

52. ARCE for Fiscal Year 1905,p. 10.

In June 1906 Chief Engineer, Brigadier General George L. Gillespie, remarked: " With the appropriation of $ 125,000 contained in the fortification act approved June 25,1906, it is proposed to procure by contract a number of 60-inch searchlight outfits for distribution to as many forts as the funds will permit. The specifications for these outfits are now in course of preparation....

" The National Coast Defense Board (or the Taft Board), constituted by Executive order of January 31,1905, estimated the cost of sufficient searchlights for the coast of the United States as $ 2,987,700, without any provision for reserves..." [53]

The National Coast Defense Board also estimated that $ 5,216,031 would be required to furnish the necessary electrical equipment for the defenses of the United States in addition to the required for searchlights, or a great total of $ 8,205,731 for the two programs.[54] The fortification act of May 27,1908 provided $ 348,888 for electrical installations, in addition to the searchlight program.

The Chief of Engineers also reported in June 1908;" a number of generating sets [for searchlights] have been contracted for and deliveries have commenced. Eight projectors of a new type developed abroad and two of a new type of domestic manufacture have been purchased and issued to the troops for the test of actual use, and two others, also of domestic make, have been obtained from the Navy Department for remodeling. All these projector are being subjected to trials under actual service conditions, in comparison with the lights heretofore purchased, with an idea to developing

53. ARCE for Fiscal Year 1906,p. 8.

54. ARCE for Fiscal Year 1907, 8-9.

" the very best forms of searchlight for the use of the troops..." [55]

In June 1910 the Chief of Engineers reported: "After much experimental work and the practical test of use under regular service conditions, a satisfactory type of searchlight has been developed and a number, with generating sets therfor, have been delievered during the fiscal year." [56]

The total of money appropriated for the searchlight program from March 1,1901 to June 30,1912 was $ 1,680,000 and that for Electrical Installations, May 27,1908 to June 30,1912, $ 498, 888. [57]

B. Modernizing the Older Endicott Batteries, 1904-1912

In 1904 Chief of Engineers George L. Gillespie introdueed a new problem in the following manner:

"At the present time emplacements have been provided at most of our harbors for enough high-power armament of 8-inch, 10-inch, and 12-inch caliber to afford an effective defense, and it is not contemplated to construct many more of these emplacements until an adequate rapid-fire armament to supplement the heavier guns has been installed. The construction of high-power batteries was commenced in 1890, and has been in progress ever since. All of these emplacements permit reasonably effective service of their guns, but when the earlier batteries were built there was very little known as to the speed at which modern high-power guns could be safely fired, and less as to the actual artillery methods of handling them. With experience improved methods of construction were developed, and target practice with smokeless powder, invented after many

55. ARCE for Fiscal Year 1908,p.13.

56. ARCE for Fiscal Year 1910, p. 15.

57. See Appendix I, P. 48.

"of the batteries were completed, has shown the desirability of certain additions and modifications. As rapidly as the needs were recognized they were met by changes which were incorporated in the plans for all subsequent/[redacted] emplacements. The latest batteries leave little to be desired; the bulk of the emplacements require only moderate additions to bring them up to full efficiency; a few of the very earliest require extensive changes and additions. The principal improvements proposed consist in widening the loading platforms to avoid accidents to the gunners and confusion in ammunition service, as well as to furnish additional storage rooms for projectiles where they are less exposed to condensation and dampness; in providing latrines in the vicinity of the emplacements; in providing adequate water supply at each emplacement, and in providing additional means of lighting gun platforms, carriages, and sights for night practice. For these improvements, divided among [redacted] 1,297 emplacements, an estimate of $ 942,500 is submitted. The average cost per emplacement is seen to be only about $ 725."[58]

The fortification Act of March 3,1905 made the first appropriation,— $ 450,000, for this new program. The Chief of Engineer in 1905 further elaborated on the modernizing program as follows: " It is believed to be wise, as a rule, to restrict changes to such as are evidently and decidely necessary for proper service— that is, to let well enough alone. Where a battery is capable of doing effective service it should be utilized in its existing condition to as great

58. ARCE for Fiscal Year 1904,p. 8.

"an extant as practicable; where changed conditions have made a battery obsolete it should be abandoned. It hardly ever pays to remodel an emplacement to receive a more powerful gun than that for which it was originally built, for such changes in batteries cost as much as, if not more than, the construction of entirely new works for such new guns. For these reasons the proposed remodeling is limited in character and amount...[59]

In June 1907, after noting the Chief of Engineers that a total of $700,000 had been appropriated by Congres since March 3,1905, then reported:" In the annual estimates submitted to the Secretary of War for transmission to Congress, authority has also been asked to apply the sum of $ 165,261.36, formerly appropriated (May 25,1900) for the construction of pneumatic dynamite batteries(now remaining unspent, due to the abandonment of that form of ordnance), to the intiation of mechanical powder service, the need for which has developed since the estimate of $ 942,500 was prepared."[60]

By the act of May 27,1908, authority was granted to apply the sum of $ 165,261.36 to the initiation of mechanical powder service, as requested. The Chief of Engineers also reported: " The experimental development of apparatus for this purpose has been practically completed, and

59. ARCE for Fiscal Year 1905,p. 9

60. ARCE for Fiscal Year1907,p. 8. These dynamite pneumatic batteries were located at San Francisco Harbor, Sandy Hook, N.J., and Fisher Island,N.Y.; a fourth one was proposed at Port Royal,S.C., but never started.

"arrangements for the manufacture and installation of the [Powder Service] machines are now in progress.

"A considerable amount of work remains to be done to place the batteries in a thoroughly satisfactory condition for efficient operation, including powder hoists in gun emplacments, widening loading platforms, electric wiring of emplacements, to place fire-control-communiction instruments on the gun carriages, and platform lighting. Detailed estimates have been prepared for the work of the above classes required at all emplacements in the the United States; the aggregate of the estimates is $ 1,066,100."[61]

The final appropriation prior to June 30,1912 - act of March 3, 1909 of $ 100,000, ~~March 3, 1909~~, was "applied in continuing the installation of mechanical devices to facilitate the supply of ammunition from the magazines to the loading-platform level, such mechanical devices being considered absolutely necesary by the artillery to permit the utilization of the full possibilities of the rapid rate of fire possessed by modern ordnance."[62]

The total of money allotted for the modernizing of older emplacements from March 3,1905 to June 30,1912 was $ 965,261.36.[63] To complete the program, the Chief of Engineers estimated in 1910 that an additional $ 966,100 would be required.

61. ARCE for Fiscal Year 1908, p. 12.

62. ARCE for Fiscal Year 1909, p.13.

63. See Appendix I, p. 45.

64. See ARCE for Fiscal Year,1910,p. 14-15.

F. The Taft Board, 1905-06:

On January 31,1905, President Theodore Roosevelt organized a board, with Secretary of War William Howard Taft as president, to review the seacoast defense projects for the United States and for the insular possessions, (the Hawaiian and Philippine Islands) to indicate the localities where defenses were most urgently needed, and to determine the character and general extent of the defenses, with their estimated cost. This Board then known as the National Coast Defense Board and now referred to as the Taft Board, submitted its final report February 1,1906.

By June 30,1906, the approved list of 31 harbors in the Continental United States had been reduced from 31 to 26. Permanent seacoast defenses had been installed and retained at the following 26 localities in the United States.

1. Kennebec River, Maine.
2. Portland, Me.
3. Portsmouth, N.H.
4. Boston, Mass.
5. New Bedford, Mass.
6. Narragansett Bay, R.I.
7. Eastern entrance to Long Island Sound.
8. N.Y. City, N.Y.
9. Delaware River (Philadephia).
10. Baltimore, Md.
11. Washington, D.C.
12. Hampton Roads, Va.
13. Cape Fear River (Wilmington), N.C.
14. Charleston, S.C.
15. Port Royal, S.C.
16. Savannah, Ga.
17. Key West, Fla.
18. Tampa Bay, Fla.
19. Pensacola, Fla.
20. Mobile, Ala.
21. New Orleans, La.
22. Galveston, Tex.
23. San Diego, Cal.
24. San Francisco, Cal.
25. Columbia River, Oregon and Wash.
26. Puget Sound, Wash.

The Taft Board also recommended that additional defenses should be constructed at some of these points and ~~[illegible]~~ at a 27th site, the entrance to Chesapeake Bay at Cape Henry, Va., as soon as funds are provided by Congress.[65]

Gon from the approved list of 31 seacoast fortifications, as ~~[illegible]~~ stood in 1901, ~~[illegible]~~ are ~~[illegible]~~ Penobscot River, Maine. 2. St. Johns River, Fla., 3. Sabine Pass, Tex., and 4. Lake Champlain, N.Y.-Vt.

On recommendation of the the Taft Board, seacost ~~[illegible]~~ defenses were begun at five ports in our " insular possessions" during the period 1904-1912, namely at Guantanamo Bay, Cuba, Honolulu and Pearl Harbor, Hawaii, and Manila and Subic Bay in the Philippine Islands.[66] From April 21, 1904 to June 30, 1912, Congress appropriated a grand ~~[illegible]~~ total of $ 10, 771,304.00 to construct these fortifications.[67] Of this amount $ 2,423,000 was for all three possession, $ 2,186,519 earmarked for the Hawaiian Islands and $ $ 6,161,785 for defenses in the Philippine Islands.

65. ARCE for Fiscal Year 1909, p10.
66. ARCE for Fiscal Year 1908, p. 16.
67. Appendix VIII, p.

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9. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year ending June 30,1896 (Washington,D.C.1896) (Serial No. 3479). Appendix no. H 3, pp. 490-492.

10. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year ending June 30,1897(Washington,D.C,1897)(Serial No. 3631).Appendix 3 I, pp.650-656.

11. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year ending June 30,1898 (Washington,D.C.1898)(Serial No. 3746). Appendix No. 4H, pp. 667-678.

12. Annual Report of the Chief of Engineers, U.S.Army, for the Fiscal Year Ending June 30,1899(Washington, D.C.,1899), Appendix 4H, 822-834. (Serial No. 3905).

13. Annual Report of the Chief of Engineers, U.S. Armory, for the FIScal Year Ending June 30,1900(Washington,D.C.1900)(Serial No. 4089)Appendix 31, 876-886.

14. Annual Report of the Chief of Engineers, U.S. Army,for the Fiscal Year ending June 30,1901(Washington D.C.1901) (Serial No. 4279) Appendix 3I, p.791-801.

15. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year Ending June 30,1902 (Washington, D.C.1902)(Serial No. 4404), Appendix 2 I, p.704-710

16. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal YEar Ending June 30,1903(Washington,D.C.,1903) (Serial No. 4636).

17. Annual Report of the Chief of Engineers, U.S.Army, for the Fiscal Year Ending June 30,1904 (Washington,D.C., 1904) (Serial No. 4785).

18. Annual Report of the Chief of Engineers, U.S. Army for the Fiscal Year Ending June 30,1905(Washington.D.C.,1905)(Serial No. 4946).

19. Annual Report of the Chief of Engineers,U.S. Army, for the Fiscal Year Ending June 30, 1906(Washington,D.C. 1906)(Serial No. 5114)

20.(Taft Board Report,) Coast Defenses of the United States and the Insular Possessions, Dated February 27,1908, Senate Document 248, 59th Congress, 1st Session.(Serial No. 4913)

21. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year Ending June 30,1907(Washington,D.C.,1907)(Serial No. 5283

22. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year Ending June 30,1908(Washington,D.C. 1908)(Serial 5431)

23. Annual Report of the Chief of Engineers, U.S. Army, for the Fiscal Year Ending June 30,1909(Washington,D.C., 1909)(Serial 5726).

24. Annual Report of the Chief of Engineers,U.S. Army, for the Fiscal Year Ending June 30,1910(Washington,D.C.,1910)(Serial No. 5956). Coastal Guns and Mortars:

25. Report of the Board on Fortifications or Other Defenses Appointed by the President of the United States Under the Provisions of the Act of Congress Approved March 3,1885(The Endicott Report) House Executive Document 49, 49th Congress, 1st Sess., 1886. (Serials No. 2395, 2396.) (2 vols., Washington,D.C.,1886)

26. Index to Annual Reports, Chief of Engineers, U.S. Army, 1866- June 30, 1912(2 vols., Washington,D.C. ,1913)(Serial No. 6617 and 6618), Vol. I., 1809-1815.

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27. 12th Report of the Board of Ordnance and Fortifications, House Document 2, 57th Congress, 2nd Sess.(Serial No. 4449). (Washington,D.C.)

28. Bruff, Lawrence L., A Text Book of Ordnance and Gunnery Prepared for the of Cadets of the U.S. Military Academy(New York,1896).

29. Manucy, Albert, Artillery Through the Ages: A Short Illustrated History of Cannon, Emphasizing Types Used in America (National Park Service Interpretative Series History No. 3)(Washington, D.C., 1949).

Submarine Mines or Torpedoes

30. Bunker, Paul D., "The Mine Defense of Harbors: Its History, Principles, Relation to the Other Elements of Defense, and Tactical Employment", Journal of the United States Artillery, Vol. 41, No. 2 (March-April 1914), pp. 129-170.

GENERAL(BOOKS):

31. Lewis, Emanual Raymond, Seacoast Fortifications of the United States: An Introductory History(Smithsonian Institution Press, Washington, D.C.,1970).

APPENDIX I

APPROPRIATIONS FOR SEACOAST FORTIFICATIONS IN THE CONTINENTAL UNITED STATES AT 31 HARBORS DURING THE ENDICOTT PERIOD, SEPTEMBER 22, 1888 to JUNE 30, 1912

From Index to Reports of the Chief of Engineers, U.S. Army 1866-1912. (Washington D.C. 1915) (Serial No. 6617) pp. 1809-1815.
and
Annual Reports of the Chief of Engineers, U.S. Army, 1888-1912.

SUMMARY STATEMENT OF APPROPRIATIONS FOR SEACOAST DEFENSES FOR 31 Ports IN THE CONTINENTAL UNITED STATES DURING THE ENDICOTT PERIOD, September 22,1888 to June 30,

Appropriations for	Amount
1. Construction of Gun and Mortar Batteries.....	$ 29,008,664.80.
additional (Estimated amount, June 30,1912, required to complete construction of all proposed batteries: $ 10,531,336.00)	
2. Modernizing Older Endicott Batteries.....	$ 965,261.36.
3. Range and Position Finder Stations for the Batteries.....	$ 4,740,811.00
4. Electrical Plants at Batteries.....	$ 2,213,888.00
Plant, Electric Power.....$ 25,000.00	
Plant, Electrical Installation..... 498,888.00	
Plant, Searchlights and Electrical Connections...$ 1,680,000.00	
Plant, Reserve Lights..... 10,000.00	
$ 2,213,888.00.	
5. Supplies for Sea Coast Defenses (Tools & materials for operating electric power and light plants at the batteries).....	$ 474,500.00
6. Construction of Seawalls and Embankments....	$ 883,450.00
7. Preparing Plans for Fortifications.....	$ 55,000.00
8. Purchase of lands for sites at Sea Coast Defenses.....	$ 4,495,948.00
9. Batteries, Pneumatic.....	$ (134,738.64) *
10. Preservation and Repair of Fortifications, (Routine maintenance of completed batteries)..	$ 4,058,000.00
11. Contingencies for Fortifications.....	$ 78,049.24
12. Equipment of Coast Artillery, armories, Organized Militia, 1911.....	$ 338,170.00
Subtotal for Gun and Mortar Emplacements:	$ 47,476,481.04

* The ammount of money actually expended in fortifying the pneumatic dynamite batteries, the balance of the original appropriation of $ 330,000 was used to modernized ~~X~~ -the old ~~Endicott~~ Endicott batteries.

SUMMARY STATEMENT OF APPROPRIATIONS FOR SEACOAST DEFENSES, 1888-June 30,1912(Continued):

Carried Forward:

I. Subtotal for Gun and Mortar Emplacements or Batteries, 1888-1912..... $ 47,476,481.04

II. Appropriations for Submarine Mines or Torpedo Defenses in the Continental United States: $ 5,196,957.36

1. For submarine mines, apparatus, and materials..... .....$ 2,628,957.36.

2. For construction of torpedo structures.....$ 2,453,000.00.

3. For preservation and repair of completed torpedo structures....$ 115,000.00

Subtotal, 1888-1912..... $ 5,196,957.36

GRAND TOTAL FOR SEA COAST DEFENSES,1888-1912: In The Continental United States. $ 52,673,488,72

During the period April 21,1904 to July 30,1912, Congress appropriated an additional $ 10,771,304.00 for construction the Taft Board for Seacoast Defenses in our "Insular Possessions", the Hawaiian and Philippine Islands. Of the total, $ 2,186,319 was for the Hawaiian Islands, $ 6,161,785 for the Philippine Islands, and $ 2,423,000 for general(both possessions).

Appropriations for the construction of Gun and Mortar Batteries at 31 Ports in the Continental United States, June 30,1885 to June 30,1912

Under Act of	Total
1. August 18,1890.....	$ 1,221,000.00
2. February 23,1891.....	750,000.00
3. July 23, 1892.....	500,000.00
4. February 18, 1893.....	50,000.00
5. August 1,1894.....	500,000.00
6. March 2,1895.....	500,000.00
7. June 6,1896.....	2,400,000.00
8. March 3,1897	3,841,333.00
9, Appropriation for "National Defense, Act of March 9, 1898- Spanish American War.....	3,827,842.80 (or 3,817,676.02)
10. May 7,1898	3,000,000.00
11. July 7,1898.....	2,562,000.00
12. March 3,1899.....	1,000,000.00
Subtotal:	$ 20,152,175.80 (or 20,150,923.9
13. May 25,1900.....	2,000,000.00
14. March 1,1901.....	1,615,000.00
15. June 6,1902.....	2,000,000.00
16. March 3,1903.....	2,236,425.00
17. April 21,1904.....	700,000.00
18. May 27,1908.....	300,000.00
19. March 3,1909.....	5,064.00
20. To June 30.1912.....	0
GRAND TOTAL:	$ 29,008,664.80
	(or $ 28,998,498.02)

Appropriations made for the Modernizing of older gun and Mortar Batteries at 31 Ports in the Continental United States, 1905-June 30,1912.

Act of		
1. March 3,1905.....	$ 450,000.00	
2. June 25,1906.....	150,000.00	
3. March 2,1907.....	100,000.00	
4. May 27,1908.....	165,261.36	(New application of funds appropriated for pneumatic-dynamite batteries).
5. March 3,1909.....	100,000.00	
Total to June 30,1912:	$ 965,261.36.	

Range and Position Finders Appropriations, 1898-June 30,1912

1. Act of July 7,1898.....	$ 150,000.00	
2. May 25,1899.....	150,000.00	
3. March 1,1901	150,000.00	
4. June 2,1902.....	325,000.00	
5. March 3,1903.....	223,500.00	
5. April 21,1904.....	225,000.00	$ 1,223,500.00
6. March 3,1905.....	$ 1,000,000.00	
7. June 25,1906.....	700,000.00	
8. March 2,1907.....	900,000.00	
9. May 27,1908.....	270,256.00	
10. March 3,1909.....	247,055.00	
11. June 23,1910	200,000.00	
12. March 4,1911.....	100,000.00	
13. June 6,1912.....	100,000.00	
Grand Total:	$ 4,740,811.00	0.

Appropriationsmade for the Purchase of Land to Provide Sites for Seacoast Defenses:, September 22,1886 to June 30,1912:

Act of	
1. August 18,1890.....	$ 500,000.00
2. February 24,1891.....	5009000.00
3. July 23,1892.....	500,000.00
4. February 18,1893.....	175,000.00
5. August 1,1894.....	150,000.00
6. June 6,1896.....	500,000.00
7. March 3,1897.....	300,000.00
8. May 7,1898.....	300,000.00
9. March 3,1899.....	300,000.00
Subtotal:.....	$ 3,225,000.00
10. May 25,1900.....	200,000.00
11, March 1,1901.....	200,000.00
12. June 6,1902.....	200,000.00
13. March 3,1906.....	200,000.00
14. April 21,1907.....	100,000.00
15. May 27,1908.....	121,048.00
16. March 3,1909.....	250,000.00
Total to June 30,1912:	$ 4,495,948.00.

Appropriations for the Preservation and Repair of Fortifications in the Continental United States September 1888 to June 30,1912.

1.	September 22,1888.....	$ 100,000.00	(Routine Maintenance of Existing Fortifications).
2.	March 2,1889.....	100,000.00	
3.	August 18,1890.....	80,000.00	
4.	February 24,1891.....	80,000.00	
5.	July 23,1892.....	60,000.00	
6.	February 18,1893....	45,000.00	
7.	August 1,1894.....	45,000.00	
8.	March 2,1895.....	45,000.00	
9.	June 6,1896.....	50,000.00	
10.	March 2,1897.....	100,000.00	
11.	May 7,1898.....	100,000.00	
12.	March 3,1899.....	100,000.00	Subtotal: $ 905,000.00 (1888-18
13.	May 25,1900.....	100,000.00	
14.	March 1,1901....	100,000.00	
15.	February 14,1902.....	3,000.00	
16.	June 6,1902.....	300,000.00	
17.	March 3, 1903.....	300,000.00	
18.	April 21,1904.....	300,000.00	
19.	March 3, 1905.....	300,000.00	
20.	June 25,1906.....	200,000.00	
21.	March 2, 1907.....	200,000.00	
22.	May 27,1908.....	225,000.00	
23.	March 3,1909.....	225,000.00	
24.	June 23,1910.....	300,000.00	
25.	March 4,1911.....	300,000.00	
26.	June 6,1912.....	300,000.00	($125,000.00 reappropriated from balances of other funds.
TOTALS.		$ 4,058,000.00	

Appropriations for Electrical Plants at Batteries:

Plant- Electric light and power:

Act of May 25, 1900..... $ 25,000.00.

Plant-Electrical Installation:

1. May 27, 1908.... $ 348,888.00
2. March 3, 1909... 100,000.00
3. March 4,1911... 50,000.00

Total to June 30,1912: $ 498,888.00 ..

Plant- Searchlight and electrical connections at the batteries and Barracks:

1. March 1, 1901 (New York Harbor)...	$ 150,000.00
2. June 6,1902	150,000.00
3. March 3,1903.....	150,000.00
4. April 21,1904.....	150,000.00
5. March 3,1905	200,000.00
6. June 25,1906.....	125,000.00
7/ March 2,1907.....	210,000.00
8. May 27,1908.....	210,000.00
9. March 3,1909.....	210,000.00
10. June 23,1910.....	50,000.00
11. March 4,1911.....	50,000.00
12. June 6,1912(reappropriated from balances of other funds)....	25,000.00
TOTALS:	$ 1,680,000.00

Plant- Reserve Lights:

1. Act of March 3,1909-----$ 10,000.00.

Grand Total of Electrical Plants 1900-June 30,1912:

$ 2,213,888.00.

Seawalls and embankments, Continental United States, September 1888 to June 30,1912

Sept. 22,1888 to June 30,1912: $ 883,450.00. (Total)

Supplies for seacoast defenses(tools and electrical and engine supplies to maintain and operate light and power plants in the gun and mortar batteries).

ACT OF	
1, May 25,1900.....	$ 25,000.00
2. March 1,1901...	25,000.00
3. June 6,1902...	25,000.00
4. March 3,1903...	35,000.00
5. April 21,1904	35,000.00
6. March 3,1905.....	40,000.00
7. June 25,1906	30,000.00
8. March 2,1907.....	40,000.00
9. May 27,1908	44,500.00
10. March 3,1909	40,000.00
11. June 23,1910	45,000.00
12. March 4,1911	45,000.00
13. June 6,1912	45,000.00
Total:	$ 474,500.00.

For Fortification, plans of

August 18, 1890 to May 25,1900: $ 55,000.00.

total to June 30,1912: $ 55,000.00.

Batteries, Pneumatic *

July 7,1898 — $ 150,000.00

May 25,1900- 180,000.00

TOTAL: $ 330,000.00

For Contingencies of Fortifications:

1890- 1900: $ 78,049.24.

Equipment of Coast Artillery, armories, Organized Militia:

March 3,1911- $ 338,170.00.

* Under the acts of September 22,1888 and March 2,1889, "Dymanite Batteries" were constructed under the Ordnance Department, at San Francisco Harbor, California, and at Sandy Hook, New Jersey. The 1898 appropriation was to erect parapets and magazines for the battery at San Francisco. The works at San Francisco were completed by June 30,1899. On June 1,1905, the Board of Ordnance and Fortification reported that the pneumatic dynamite gun batteries had become obsolete. Work on the Sandy Hook Battery had been abandoned, but work on the proposed batteries at Fishers Island N.Y. and

APPROPRIATIONS FOR SUBMARINE MINES OR TORPEDO DEFENSE
September 22,1888- June 30,1912

Act of	Construction of structures	Purchase of mines, material	Other	Totals
1. September 22,1888		.....		$ 200,000
2. March 2,1889	$ 272,000.00	$ 250,000.00	$ 80,000.00	602,000
3. Aug. 18,1890.....	100,000.00	100,000	30,000	230,000
4. Feb.24,1891.....	66,000.00	50,000	0	116,000
[Minus funds returned to Treasury----------				(- $ 29,708.54]
5. March 2,1895.....20,000		20,000	0	40,000
6. June 6,1896				100,000
7. March 3,1897.....				150,000
8. March 9,1898 (Nat.Defnse ACT).....		250,000.00	1,309,181.71	1,559,181.71
9. May 4,1898...		50,000	300,000	350,000
10. May 7,1898.....				150,000
11. July 7,1898.....		650,000	736,000	1,386,000.
(Not spent April 2,1898-July 7,1898 and returned to Treasury-----				1,166,522.87)
12. March 3,1899.....				50,000.00.
Subtotal:,1888-1899:				$ 3,736,950.50
13. May 25, 1900.....				50,000.00
14. March 1,1901.....				50,000.00
15. February 14,1902.....				2.68
16. June 6,1902.....	33,000-	.....		33,000.00
17. July 1,1902				4.38
18.March 3,1903.....50,000.00		.....		50,000.00
19. April 21,1904	87,000.00	.....		87,000.00
20. March 3,1905.....400,000.00		.....		400,000.00
Subtotal of:	$ 1,778,000.00 appropriated to build structures.	$ 2,628,957.36		$ 4,406,957.36.

(Appropriated but not spent and returned to Treasury: $ 1,196,231.41)

APPROPRIATIONS FOR SUBMARINE MINES AND TORPEDO DEFENSE(CONTINUED) 2

Act of	Structures	Material,mines.	Other	Total
21. June 25,1906	175,000.00.....			175,000.00
22. March 2,1907	175,000.00.....			175,000.00
23. May 27,1908.....	175,000.00.....			175,000.00
24. March 3,1909....	100,000.00.....			100,000.00
25. March 4,1911.....	50,000.00.....			50,000.00
Total to June 30,1912:	$ 2,453,000 appropriated 1888 to 1912 to build Torpedo Structures	$ 2,626,957.36		$ 5,081,957.36

Appropriations for the Preservation and Repair of Torpedo Structures

1. June 25,1906.....	$ 10,000.00
2. March 2,1907.....	10,000.00
3. May 27,1908.....	15,000.00
4. March 3,1909.....	20,000.00
5. June 23,1910.....	20,000.00
6. March 4,1911.....	20,000.00
7. June 6,1912.....	20,000.00
Total: 1888-1912:	$ 115,000.00.

APPENDIX II

APPROPRIATIONS BY FISCAL YEAR FOR SEA COAST FORTIFICATIONS, CORPS OF U.S. ARMY ENGINEERS, 1889 to 1910

Compiled by Charles W. Snell

from the Annual Reports and Index(1866-1912)

of the Chief of Engineers.

Yearly Appropriations for FORTIFICATION, July 1,1888 to June 30,1899

CORPS OF ENGINEER PROJECTS

Fiscal Year ending June 30:	Preservation & Repair	Torpedo Defenses	Gun & Mortar Batteries	Purchase of Land	Plans for Forts.	Seawalls & embankments	Range & Position Finder	Contingencies
1889	200,000	802,000	0	0	0	117,000.00	0	0
1890	0	0	0	0	0	0	0	0
1891	160,000	216,291.46	1,971,000	1,000,00	5,000	0	0	77,491.27
1892	0	0	0	675,000	5,000	0	0	0
1893	105,000	0	550,000	0	5,000	0	0	429.19
1894	0	0	0	0	5,000	0	0	0
1895	90,000	40,000	1,000,000	150,000	5,000	0	0	0
1896	50,000	100,000	2,400,000	500,000	5,000	17,975	0	0
1897	100,000	150,000	3,841,333	300,000	5,000	33,000	0	0
1898	100,000	2,059,181.71	6,827,842.80	300,000	5,000	55,000	150,000	0
1899	100,000	269,477.13	3,562,000	300,000	5,000	2,500.00	150,000	2.22
Sheet Total	905,000	3,736,950.30	20,152,175.80	3,225,000	$50,000.00	225,475	300,000	77,923.28

Yearly Appropriations for FORTIFICATIONS, July 1,1888 to June 30,1899

CORPS OF ENGINEER PROJECTS

Fiscal Year ending June 30:	Modernizing Batteries	Electrical Plants	Searchlight	Electrical Supplies	Preservat of Torpedo Structures			Grand Total
1889	0	0	0	0	0			1,119,000.00
1890	0	0	0	0	0			0
1891	0	0	0	0	0			3,429,783.33
1892	0	0	0	0	0			680,000.00
1893	0	0	0	0	0			665,429.19
1894	0	0	0	0	0			5,000.00
1895	0	0	0	0	0			1,285,000.00
1896	0	0	0	0	0			3,072,975.00
1897	0	0	0	0	0			4,429,333.00
1898	0	0	0	0	0			9,497,024.52
1899	0	0	0	0	0			4,388,979.36
GRAND TOTAL	0	0	0	0	0			28,572,524.30

Yearly Appropriations for Fortifications, July 1, 1888 to June 30, 1910.

Fiscal Year ending June 30:	CORPS OF ENGINEER PROJECTS							
	Preservation & Repair	Torpedo Defenses	Gun & Mortar Batteries	Purchase of Land	Plans for Forts	Range & Position Finders	Seawalls & embankments	Contingencies
1900	100,000	50,000	2,000,000	200,000	5,000	0	50,000	54.79
1901	100,000	50,000	1,615,000	200,000	0	150,000	100,000	0
1902	303,000	33,002.68	2,000,000	200,000	0	325,000	100,000	0
1903	300,000	50,004.38	2,236,425	200,000	0	223,500	89,575	0
1904	300,000	87,000	700,000	0	0	225,000	99,000	0
1905	300,000	400,000	0	0	0	1,000,000	19,400	0
1906	200,000	175,000	0	200,000	0	700,000	50,000	0
1907	200,000	175,000	0	100,000	0	900,000	25,000	0
1908	225,000	175,000	300,000	121,048	0	270,256	50,000	0
1909	225,000	100,000	5,064	250,000	0	247,055	50,000	0
1910	300,000	0	0	0	0	200,000	0	0
Grand Total 1888-1910	3,458,000	5,031,957.36	29,008,664.00	4,495,948	$ 55,000	4,540,811	$858,450.00	78,049.24

Yearly Appropriations for FORTIFICATIONS, July 1, 1888 to June 30, 1910.

CORPS OF ENGINEER PROJECTS

Fiscal Year ending June 30:	Submarizing Batteries	Electrical Plants	Searchlight Plants	Electrical Supplies	Preservat of Torpedo Structures			Grand Total
1900	0	$ 25,000	0	25,000	0			2,455,054.75
1901	0	0	150,000	25,000	0			2,390,000.00
1902	0	0	325,000	25,000	0			3,311,002.66
1903	0	0	223,500	35,000	0			3,58,004.38
1904	0	0	225,000	35,000	0			1,671,000.00
1905	450,000	0	1,000,000	40,000	0			3,209,400.00
1906	150,000	0	700,000	30,000	10,000			2,215,000.00
1907	100,000	0	900,000	40,000	15,000			2,450,000.00
1908	165,261.36	348,888	270,256	44,500	1,5000			1,985,209.36
1909	100,000	110,000	247,055	40,000	20,000			1,394,174.00
1910	0	0	200,000	45,000	20,000			765,000.00
GRAND Total 1888-1910	965,261.36	483,888	4,240,811	384,500	75,000			$53,776,369.59

Proposed Total Number of Guns Carried by the Plans of the National Coast Defense Board.

	1886	1899	1902	1905	1908	1910	Money for 1910	No Money 191
16 inch guns	14				1	1	0	1
14 inch guns	6				19	19	0	19
12 inch guns	203			125	138	136	105	31
10 inch guns	222			169	139	138	132	6
8 inch guns	102			71	72	70	68	2
HEAVY GUNS :	577	500	356	365	369	364	305	59
12-inch Mortars	724	1,000	544	524	464	464	376	88
Rapid-Fire Guns	0	800	1,294	839	566	565	520	45
TOTals;	1301	2,300	2,194	1,728	1,399	1,393	1,201	192
No. of Ports	27	30	31	31	27	27	26	

SEA
COASTAL DEFENSES OF THE UNITED STATES, 31 Ports, 1888-1912.

ED

REQUEST TOTAL NUMBER OF GUNS CARRIED BY U.S. PLANS OF THE NATIONAL COAST DEFENSE BOA

RAPID FIRE GUNS:	1886	1899	1905	1908	1910	Actually provided for by Congress, 1910	No. money provided for, June 30, 1910
6 inch guns	0		353	191	191	175	16
5 inch guns	0		106	53	53	54	0
4.7 inch guns	0		38	38	37	37	0
3-inch guns	0		342	284	284	254	30
TOTALS:	0	800	839	566	565	520	46
NO. of Ports	27	30	31	27	27	26	31

SEA COAST DEFENSES OF THE UNITED STATES, 31 PORTS, 1888-1912.

Number of Emplacements Provided for by appropriations by Congress, 1890-1912

	1892	1893	1894	1895	1897	1898	1899	1900	1902	1905	1910
16 inch guns	0	0	0	0	0	0	0	0	0	0	0
14 inch guns	0	0	0	0	0	0	0	0	0	0	0
12 inch guns	3	4	10	14	24	74	85	93	105	105	107
10 inch guns	14	20	19	21	82	102 a	118 a	122 a	130 a	133 a	133 a
8 inch guns	4	5	5	7	33	80 b	94 b	94 b	96 b	70	99 b
HEAVY GUNS	21	29	34	42	139	256	297	309	331	308	339
12-inch Mortars	48	64	64	80	232	312	344	372	376	376	376
Rapid-Fire Guns	0	5	5	5	16	62	308 c	368	483 c	516 c	521 c
TOTals;	69	98	105	127	387	630	949	1,049	1,190	1,200	1,236
No. of Ports	5	6	8	11	22	30	30	30	31	31	26

SEE COASTAL DEFENSES OF THE UNITED STATES, 31 Ports, 1888-1912.

a. Includes 1 10-inch experimental gun mounted temporarily in a temporary emplacement, May 25,-)ct.1898 at Fort Washington, Md. as a Spanish War Measure.

b, Includes 26 8-inch rifles temporarily mounted in temporary emplacements as Spanish War measure.

c. Included 70 six-pounder rapid fire guns on moveable mounts not requiring permament emplacements, also Spanish War measure. (2.24 inch guns).

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Number of Emplacements Provided for by Appropriations by Congress, 1888-1912.

RAPID FIRE GUNS:	1892	1893	1895	1897	1898	1899	1905		1910
6 inch guns	0			4			171		175
5 inch guns	0			12			53		54
4.7 inch guns	0			0			38		37
3-inch guns	0			0			254		254
TOTALS:	0	5	5	16	62	308	516		520

SEA COAST DEFENSES OF THE UNITED STATES, 31 PORTS, 1888-1912.

F.Y.ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1902	1905	1908	1910
16 inch guns	0	0	0	0	0	0	0	0	0	0	0	0	0
14 inch guns	0	0	0	0	0	0	0	0	0	0	0	0	0
12 inch guns	3	4	10	14	15	10	4	8	9	15	2	2	0
10 inch guns	14	20	19	21	50	35	4	8	9	15	0	0	0
8 inch guns	4	5	5	7	14	24	38	10	3	2	0	0	0
HEAVY GUNS :	21	29	34	42	79	69	73	37	25	26	2	2	0
12-inch Mortars	48	64	64	80	92	120	108	108	48	24	0	0	0
Rapid-Fire Guns	0	5	5	5	14	10	20	122	81	146	30	4	0
TOTals;	69	98	103	127	185	199	201	267	154	196	32	6	0
No.of Ports	5	6	8	11	22	22	30	30	30	31	31	27	27

SEA
COASTAL DEFENSES OF THE UNITED STATES, 31 Ports, 1888-1912.

EMPLACEMENTS UNDER CONSTRUCTION:

Number of Gun and Mortar Emplacements complete, 1888-1912

	1897	1898	1899	1900	1902	1905	1908	1910	1912
16 inch guns	0	0	0	0	0	0	0	0	0
14 inch guns	0	0	0	0	0	0	0	0	0
12 inch guns	14	43	66	96	96	105	105	107	107
10 inch guns	47	98	110 [a]	113 [a]	115 [a]	131 [a]	133 [a]	133 [a]	133 [a]
8 inch guns	9	42	81 [b]	91 [b]	94 [b]	70 [b]	100 [b]	99 [b]	99 [b]
HEAVY GUNS :	70	183	260	284	305	306	338	339	339
12-inch Mortars	112	204	236	312	352	376	376	376	376
Rapid-Fire Guns	6	42	161 [c]	242 [c]	337	586 [c]	517 [c]	521 [c]	521 [c]
TOTals;	188	429	657	850	994	1,168	1,231	1,236	1,236
Number Armed	106	291	391	530	686	885	1,007	1,186	

SEA COASTAL DEFENSES OF THE UNITED STATES, 31 Ports, 1888-1912.

a. Includes 1 10-inch experimental gun temporarily mounted in a temporary emplacement at Ft. Washington, Md., May 25-October 1898 as a Spanish War Measure.

b. Includes 26 8-inch rifles mounted in temporary emplacements as Spanish War measure.

c, Includes 70 six-pounded(2.24 inch) rapid fire guns on moveable mounts not requiring permament emplacements, also acquired as a Spanish War measure.

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Total Number of Gun and Mortar Emplacements with Guns MOUNTED, 1888-1912

	1897	1898	1899	1900	1902	1905	1908	1910
16 inch guns	0	0	0	0	0	0	0	0
14 inch guns	0	0	0	0	0	0	0	0
12 inch guns	10	16	27	57	80	101	105	105
10 inch guns	18	70a	83	105	112	119	126	129
8 inch guns	5	35b	59	75	89	68	94	96
HEAVY GUNS :	33	121	169	237	281	288	325	330
12-inch Mortars	73	144	176	240	297	367	376	376
Rapid-Fire Guns	0	26c.	46	53	108	230	406	480
TOTals;	106	291	391	530	686	885	1,007	1,186
Total No. of Emplacements Complete	188	429	657	850	994	1,168	1,231	1,236

SEE

COASTAL DEFENSES OF THE UNITED STATES, 31 Ports, 1888-1912.

a. Includes one 10 inch experimental gun mounted temporarily for defense during Spanish War, May 25-Oct.1898 at Fort Washington, Md., mounted in temeporary emplacement.

b. Includes 26 8 inch rifles temporarily mounted in temporary emplacements as Spanish War measure.

c. ~~Includes~~ 70 six-pounder rapid fire guns on moveable mounts not requiring permament emplacements, Spanish War measure. (2.24 inch rapid fire guns

YEAR ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1905	1908	1910
EMPLACEMENTS FUNDED	69	98	105	127	284	387	630	949	1,049	1,088	1,190	1,200	1,236	1,201
UNDER CONSTRUCTION	69	98	105	125	185	199	201	267	154	179	196	32	6	0
EMPLACEMENTS COMPLETED	0	0	2		92	188	429	657	850	919	994	1,168	1,230	1,236
EMPLACEMENTS ARMED WITH GUNS MOUNTED	0	0	2		73	106	291	391 a	530 a	621 a	686 a	885 a	1,107 a	1,186 a
NO. OF PORTS FORTIFIED	5	6	8	11	22	22	30	30	30	31	31	31	26	26

SEA COAST DEFENSES OF THE CONTINENTAL UNITED STATES, SEPTEMBER 1888 to JUNE 30,1910.

GRAND TOTAL OF EMPLACEMENTS FOR ALL SEA-COAST GUNS:

Heavy, Mortars, and Rapid-Fire Guns.

a. Includes one 10-inch gun and 26 8-inch guns temporarily mounted in temporary emplacements during Spanish American War, also 70 six pounder(2.24 inch) rapid fire guns on moveable mounts not requiring permament emplacements. 97 guns total, mounted temporarily in temporary emplacements, 1898-1899.

SUMMARY SHEET

YEAR ENDING JUNE 30:	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
EMPLACEMENTS FUNDED	1,276	1297	1,200	1,300	1,300	1,236	1,236	1,201						
UNDER CONSTRUCTION	218	174	32	2	2	6	6	0						
EMPLACEMENTS COMPLETED	1,058	1,118	1,168	1,298	1,298	1,230	1,230	1,236						
EMPLACEMENTS ARMED WITH GUNS MOUNTED	806	910	885	1,149	1,152	1,107	1,138	1,186						
NO. OF PORTS FORTIFIED	31	31	31	26	26	26	26	25						

SEA COAST DEFENSES OF THE CONTINENTAL UNITED STATES, SEPTEMBER 1888 to JUNE 30,1910.

TOTAL OF ALL EMPLACMENTS:

SUMMARY SHEET

YEAR ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1905	1908	1910
EMPLACEMENTS FUNDED	21	29	34	42	112	139	257	297	309	325	331	308	339	305
UNDER CONSTRUCTION	21	29	34	40	79	69	73	37	25	34	26	2	2	0
EMPLACEMENTS COMPLETED	0	0	2	0	26	70	183	260	284 a	301a	305a	306a	338a	339 a
EMPLACEMENTS ARMED WITH GUNS MOUNTED	0	0	2	0	9	33	121	169a	237a	270a	281a	288a	325 a	330a
NO. OF PORTS FORTIFIED	5	6	8	11	22	22	30	30	30	31	31	31	26	26

SEA COAST DEFENSES OF THE CONTINENTAL UNITED STATES, SEPTEMBER 1888 to JUNE 30,1910.

HEAVY ('8, 10 and 12 inch) GUNS:

SEA COAST DEFENSES OF THE UNITED STATES, SEPTEMBER 22,1888 to JUNE 30,1910

a. Figures include 1 10-inch experimental gun mounted temporarily at Fort Washington, Md., May 25-Oct. 1898 and 26 8-inch guns were temporiarly mounted in temporary emplacements elsewhere as Spanish-American War measures.

SUMMARY SHEET

YEAR ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1905	1908	1910
EMPLACEMENTS FUNDED	48	64	64	80	156	232	312	344	372	376	376	376	376	376
UNDER CONSTRUCTION	48	64	64	80	92	108	108	48	24	48	0	0	0	0
EMPLACEMENTS COMPLETED	0	0	0		64	112	204	236	312	328	352	376	376	376
EMPLACEMENTS ARMED WITH GUNS MOUNTED	0	0	0		64	73	144	176	240	263	297	367	376	376
NO. OF PORTS FORTIFIED	5	6	8 *	11 **	22	22	30	30	30	31 ***	31	31	26	26

SEA COAST DEFENSES OF THE CONTINENTAL UNITED STATES, SEPTEMBER 1888 to JUNE 30,1910.

12 INCH MORTARS:

SUMMARY SHEET

* Fortification work in progress at: 1895:

1. Portland,Md.
2. Boston,Mass.
3. N.Y.N.Y
4. Philadelphia
5. Washington,D.C.
6. Hampton Roads,Va.
7. Pensacola,Fla.
8. San Francisco,Col

** Work started at: 1895:

9. Charleston,S.C.
10. Mobile,Ala.
11. New Orleans,La.

*** Work started, 1901
31. at entrance Chesapeake Bay at Cape Henry,Va.

YEAR ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1905	1908	1910
EMPLACEMENTS FUNDED	0	5	5	5	16	16	62	308	368	387	483	516	521	521
UNDER CONSTRUCTION	0	5	5	5	14	10	20	122	81	97	146	30	4	0
EMPLACEMENTS COMPLETED	0	0	0	0	2	6	42	161 a	242 a	290 a	337 a	586 a	517 a	521 a
EMPLACEMENTS ARMED WITH GUNS MOUNTED	0	0	0	0	0	0	26	46	53	88	108	230	406	480
NO. OF PORTS FORTIFIED	5	6	8	11	22	22	30	30	30	31	31	31	26	26

SEA COAST DEFENSES OF THE CONTINENTAL UNITED STATES, SEPTEMBER 1888 to JUNE 30,1910.

RAPID-FIRE GUNS (2.24 inch, 3-inch, 4-inch, 4.7 inch, 5-inch, and 6-inch guns).

a. Figures include 70 six pounder(2.24 inch) rapid fire guns on moveable mounts not requiring permanent emplacements. These were acquired in 1898 as defensive measures during the Spanish American War.

SUMMARY SHEET

APPENDIX IV

DATA ON THE ANNUAL RATE OF CONSTRUCTION OF RANGE AND POSITION FINDING STATIONS AT THE COASTAL GUN AND MORTAR BATTERIES IN THE CONTINENTAL UNITED STATES, 1898-1903

Compiled from the Annual Reports

of the Chief of Engineers

by

Charles W. Snell

RANGE AND POSITION FINDING STATIONS, GUNS AND MORTAR BATTERIES OF THE SEA COAST DEFENSES OF THE CONTINENTAL U.S.

FISCAL YEAR ENDING JUNE 30	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
FIRE COMMANDERS STATIONS UNDER CONSTRUCTION	0			1	12	22							
FIRE COMMANDERS STATIONS COMPLETED	0				9	11							
TOTAL NUMBER OF FIRE COMMANDERS STATIONS	0				21	33							
BATTERY COMMANDERS STATIONS UNDER CONSTRUCTION	0				30	55							
BATTERY COMMANDERS STATIONS COMPLETED	0				45	55							
TOTAL NUMBER OF BATTERY COMMANDERS STATIONS	0				75	110							
TOTAL OF F.C. & B.C. STATIONS UNDER CONSTRUCTION:	0		30		42	66							
TOTAL OF F.C. & B.C. STATIONS COMPLETED:	0		25		54	77							
GRAND TOTAL OF RANGE & POSITION FINDING STATIONS	0	30	55		96	143							
PROJECTED TOTAL NUMBER OF SUCH STATIONS	0		175										
No. of Ports	30	30	30	31	31	31	31	31	26	26	26	26	26

APPENDIX V

DATA ON NUMBER AND RATE OF CONSTRUCTION OF SUBMARINE MINE OR TORPEDO DEFENSE STRUCTURES, 1889- 1900

Compiled from the Annual Reports of the Chief of Engineers, 1889-1900

by

Charles W. Snell

TORPEDO OR SUBMARINE MINES* SEACOAST DEFENSES OF THE CONTINENTAL UNITED STATES, 1888-1910

FISCAL YEAR ENDING JUNE 30:	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904
Mining Casemates under Construction	5	?	6	3	1	6							
Mining Casemates Completed	12	17	20	25	28	31							
Total of Mining Casemates Funded	17	19	26	29	32	37							
Torpedo Storehouses under Construct.									All harbors equipped				
Torpedo Storehouses Built	2			2		2							
Mine Fields Laid No. of harbors							28						
Searchlight Plants purchased for mine fields.							44						
SEARCHLIGHT PLANTS CONS TRUCTED	0	0	0	0	0	0	0	0	0	N.Y. Harbor			
For Gun Batteries, Number of Ports Fortified	5	6	8	11	22	22	30	30	30	31	31	31	31

Completed by June 30,1891 9 mining casemates: 2 at Boston, 5 at New York, and 2 at SanFrancisco. Under construction June 30,1891: 5; 2 at Narragansett Bay, R.I., and one at Philiadelphia, also being planeded. Total of 17 funded, estimated 30 casemates will be needed.

APPENDIX VI

List of the

Chief of Engineers, July 6,1888 to June 30,1912

U.S. ARMY

Brigadier Generals:	Date of appointment:
1. Thomas Lincoln Casey	July 6,1888
2. William P. Craighill	May 10,1895
3. John M. Wilson	February 1,1897
4. Henry M. Robert	April 30,1901
5. John W, Barlor	May 2,1901
6. George L. Gillespie	May 3,1901
7. Alexander Mackenzie	January 23,1907
8. W. L. Marshall	July 2,1908
9. W. H. Bixby	June 12,1910 to

* * * *

APPENDIX VII

Notes on the Development of the Third (Modern) American Navy, 1881-1901

In 1880 the American Navy, comprised of 22 wooden and four iron-clad ships, was inferior to the navy of every principal European country, about that of Chile and Japan. In 1881 Secretary of the Navy William H. Hunt took the first small step toward launching a new naval building program by appointing a board of officers to study needs and make recommendations. His successor William E. Chandler carried on the campaign and the Act of March 3, 1883 authorized the construction of the first steel-hulled steamers in the American Navy: the cruisers Atlanta, Boston, and Chicago, and the "dispatch boat" Dolphin. Two more cruisers, the Olympia and Baltimore, and two gun boats, the Concord and Petrel, also of steel, were authorized in 1885. The first five cruisers were known "protected cruisers", with displacements up to 5,000 tons. They carried an armored deck several inches thick, intended to protect "vital parts", but had no side armor and were armed with from two to four 8-inch guns and up to 14 5-inch guns. Their maximum speed was about 20 knots. Although built as steel steamers, they were still provided with masts and rigging for sails. The gunboats, averaging about 1,000 tons, were armed with 4-inch and 6-inch rapid-fire guns and were intended for use on inland waters and in rivers.

In 1886 Congress appropriated funds for the Maine (6,680 tons) and the Texas (6,315 tons). Originally called second-class battleships, they were later more properly classified as "armored cruisers." Funds for a third armored cruiser, the New York, were provided in 1888. Armored cruisers had their decks and sides protected with armor plate and carried a main battery of six or eight 8-inch guns and a number of

smaller rapid-fire guns.

Naval Secretary Benjamin F. Tracy called for the construction of the first " first-class battleships" or capital ships in 1889. The act of June 30,1890 provided for three "seagoing coastal battleships," the Indiana, Massachusetts, and Oregon, each displacing 10,288 tons. Each vessel was armed with four 13-inch, eight 8-inch, and four 6-inch guns, had a draft of 24 feet, and a speed of about 16.2 knots. Also added in the 1890's were the battleship Iowa(11,336 tons), begun in 1893, and the armored cruiser Brooklyn.

The war with Spain spured on the construction program. In May 1898 three battleships and 29 smaller ships, including 16 destroyers-the first of this type in the U.S. Navy, were voted by Congress. In March 1899 three more battleships and three armored cruisers were authorized, as were two more battleships and three armored cruisers in 1900. Money was also voted in 1900 to construct the Navy's first submarine, the Holland.

The appearance of the British Dreadnought, in December 1906, armed with a main battery of ten 12-inch guns, rendered all existing battleships obsolete. The Delaware and commissioned in 1910, voted in 1907, was the first U.S. battleship to reflect the Dreadnought influence

Brayton Harris, The Age of the Battleship, 1890-1922 (New York,1965).

United States Army and Naval Forces, 1898-1899

1898 Peacetime Strength

Regular Army

Officers:	2,134
Men:	26,040
Total:	28,174

Navy

Officers:	1,232
Men:	11,750
Total:	12,982

Grand Total Armed Forces, March 1898: 41,156

1898-1899 Wartime Strength

Regular and Volunteer Army

Regular Army:	62,597
Volunteer Army:	125,000
Total:	187,597

Navy

Officers:	2,088
Men:	24,123
Total	26,211

Grand Total Armed Forces, 1898-99: 213,808.

APPENDIX NO. VIII

APPROPRIATIONS FOR TAFT PERIOD SEACOAST DEFENSES IN CUBA, THE HAWAIIAN ISLANDS, AND THE PHILIPPINE ISLANDS, APRIL 21,1904 to JUNE 30,1912

SUMMARY SHEET, APPROPRIATIONS FOR SEACOAST FORTIFICATIONS, INSULAR POSSESSIONS, 1898- June 30,1912

Project:	General	Hawaii	Philippines	Grand Total
1. GUN & MORTAR BATTERIES:	$ 1,400,000.00	$ 1,517,200	$ 5,823,000	$ 8,740,200.00
2. PLANT, SEARCH-LIGHTS:	30,000	153,600	319,000	502,600.00
3. PLANT-ELECTRICAL INSTALLATION:	0	34,469	420,785	455,254.00
4. Preservation & Repair of Fortifications:	0	500	22,000	22,500.00
5. Preservation & Repair of Torpedo Structures	0	0	2,500	2,500.00
6. Fire Control at Batteries:	793,000	-	-	793,000.00
7. Purchase of Land	0	350,000	17,000	367,000.00
8. Supplies for Seacoast Defenses	0	1,750	7,500	9,250.00
9. Submarine Mine Defenses:	200,000	129,000	150,000	479,000.00
GRAND TOTALS: 1898-1912:	2,423,000	$ 2,186,519	6,161,785	$ 10,771,304.00

For Fortifications at the following five ports:

1. Guantanamo Bay, Cuba.
2. Honolulu, Hawaii.
3. Pearl Harbor, Hawaii.
4. Manila, Philippine Island.
5. Subic Bay, Philipines. -1-

1. APPROPRIATIONS, BATTERIES, GUN AND MORTAR, INSULAR POSSESSIONS

TAFT BOARD PERIOD, 1904-June 30,1912

	Act of	General	Hawaii	Philippines	Total
1.	April 21,1904	700,000.00	0	0	$ 700,000.00
2.	March 3,1905	700,000.00	-	-	700,000.00
3.	June 25,1906	-	260,000.00		260,000.00
4.	March 7,1907	-	200,000.00	500,000.00	700,000.00
5.	May 27,1908	-	400,000.00	954,000.00	1,354,000.00
6.	March 3,1909	-	337,200.00	1,000,000.00	1,337,200.00
7.	June 23,1910	-	0	800,000.00	800,000.00
8.	March 4,1911	-	150,000.00	1,169,000.00	1,319,000.00
9.	June 6,1912	-	170,000.00	800,000.00	970,000.00
	TOTALS:	1,400,000	1,517,200	5,223,000	8,140,200.00

2. PLANT, SEARCH LIGHTS, INSULAR POSSESSIONS:

	Act of	General	Hawaii	Philippines	TOTAL
1.	March 2,1907	$ 30,000			$ 30,000.00
2.	May 27,1908	-	47,500	180,000	227,500.00
3.	March 3, 1909	-	66,000	0	66,000.00
4.	June 23,1910	-	-	139,000	139,000.00
5.	March 4,1911	-	40,100	0	40,100.00
	TOTALS:	30,000	153,600	319,000	$ 502,600.00

3. APPROPRIATIONS, PLANT-ELECTRICAL INSTALLATIONS, INSULAR POSSESSIONS

Act of	Hawaii	Philippines	Total
1. May 27,1908	$ 20,000	$ 115,000	$ 135,000.00
2. March 3,1909	14,469	88,823	103,292.00
3. June 23,1910	0	45,000	45,000.00
4. March 4,1911	0	171,962	171,962.00
TOTALS: 1904-1912:	34,469.00	420,785.00	$ 455,254.00

4. PRESERVATION AND REPAIR OF FORTIFICATIONS, INSULAR POSSESSIONS

Act of	Hawaii	Philippines	Total
1. June 23,1910	0	7,000	$ 7,000.00
2. March 4,1911	0	7,000	7,000.00
3. June 6,1912	500	8,000	8,500.00
TOTALS: 1904-1912:	$ 500.00	$ 22,000.00	$ 22,500.00

5. PRESERVATION AND REPAIR OF TORPEDO STRUCTURES, INSULAR POSSESSIONS

Act of	Hawaii	Philippines	Total
1. June 23,1910	0	1,000.00	$ 1,000.00
2. March 4,1911	0	1,000.00	1,000.00
3. June 6,1912	0	500.00	500.00
TOTALS, 1904-1912:	0	2,500.00	$ 2,500.00

6. APPROPRIATIONS FOR FIRE CONTROL AT BATTERIES, INSULAR POSSESSIONS

ACT OF	Assigned to Engineer Dept.	Total Appropriation
1. March 2,1907	75,000.00	$ 100,000.00
2. May 27,1908	75,000.00	243,000.00
3. March 3,1909	222,427.00	250,000.00
4. June 23,1910	13,150.00	200,000.00
TOTALS: 1904-1912:	$ 385,577.00	$ 793,000.00

7. APPROPRIATIONS TO PURCHASE LAND FOR SITES, INSULAR POSSESSIONS:

Act of	Hawaii	Philippines	Total
1. April 21,1904	$ 200,000	0	$ 200,000.00
2. June 25,1906	150,000	0	150,000.00
3. May 27,1908	0	5,000	5,000.00
4. March 3,1909	0	12,000	12,000.00
TOTALS: 1904-1912:	$ 350,000.00	$ 17,000	$ 367,000.00

8. APPROPRIATIONS FOR SUPPLIES FOR SEACOAST DEFENSES, INSULAR POSSESSIONS

Act of	Hawaii	Philippines	Total
1. June 23,1910	0	2,500	$ 2500.00
2. March 4,1911	1,000	2,500	$ 3,500.00
3. June 6,1912	750	2,500	3,250.00
TOTALS: 1904-1912:	1,750.00	7,500.00	$ 9,250.00

9. APPROPRIATIONS FOR SUBMARINE MINES, INSULAR POSSESSIONS

Act of	General	Hawaii	Philippines	Total
1. June 8,1898 (for Manila Harbor	0	0	$ 150,000	$ 150,000.00
2. March 2,1907	$ 200,000	0	0	200,000.00
3. May 27,1908	0	129,000	0	129,000.00
TOTALS, 1898-1912:	$ 200,000	$ 129,000	$ 150,000	$ 479,000.00

From Index to Reports, Chief of Engineers, U.S. Army, 1866-June 30,1912 (Serial No. 6617) pages 1809-1815.

Taft Board Report, of February 1,1906:
Fortifications at Manila and Subic Bay, Philippine Islands. 1904-05

" at Honolulu and Pearl Harbor, Hawaii 1904-05.

" at Guantanamo Bay, Cuba,1904-05.

CHARACTERISTICS OF PRINCIPAL SEACOAST WEAPONS 1890-1920

Weapons	Weight(lb) Gun(only)	Weight(lb) Projectile	Maximum Range Yards	Maximum Range Miles	At.Elev.	Muzzle Velocity(fps)	Average Cost, Gun & Carriage
Endicott Period, 1890-1910:							
12-inch rifled gun:	116,000	1,070	13,000	8	10 degrees	2,250	$ 90,000
12-inch rifled mortar:	29,000	700	15,200	9	45 degrees	1,500	23,000
6-inch rifled rapid-fire gun:	19,000	108	16,000	9	15 degrees	2,600	21,000
Taft Period, 1907-1920							
14-inch rifled gun:	138,000	1,560	24,000	14	20 degrees	2,370	$ 165,000
12-inch rifled mortar:	33,000	700	19,300	11	45 degrees	1,850	24,000
1917-1936:							
16-inch Rifled Gun, Army:	385,000	2,340	49,100	28	53 degrees	2,700	$ 600,000
12-inch Rifled Guns	118,000	975	30,100	17	35 degrees	2,350	145,000

From Emanuel Raymond Lewis, Seacoast Fortifications of the United States, An Introductory History (Washington,D.C.,1970),p. 142.