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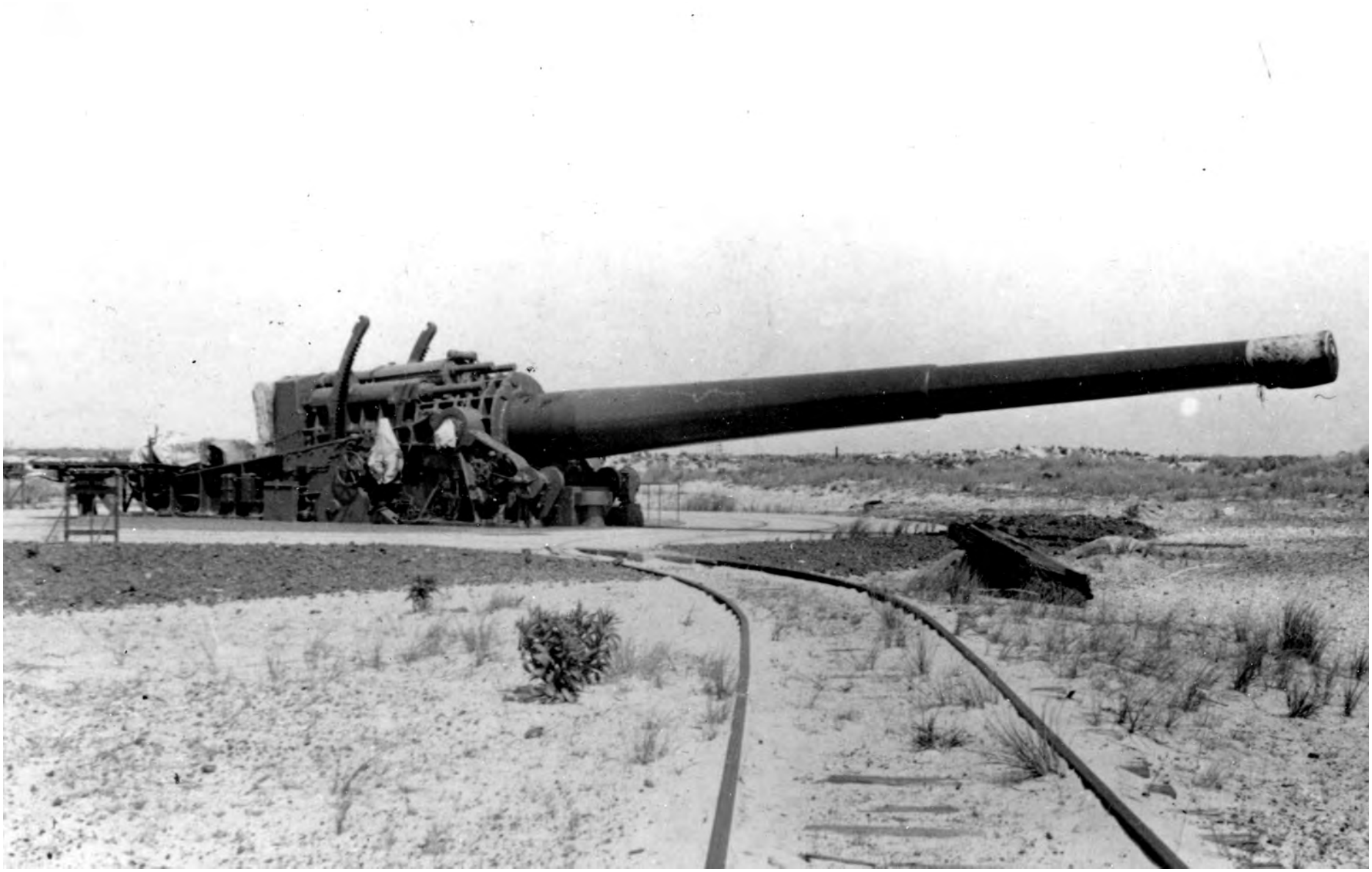

Submarine-mine plotting room, c. 1940-42. *NARA Still Pictures, 111-SC-134274.*

Coast Defense Journal
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M1919MII 16-inch gun on M1919 barbette carriage, Emplacement No. 1
Battery Henry L. Harris, Fort Tilden, NY, 1936.
Photo by Fred Baldwin, Bolling Smith Collection.

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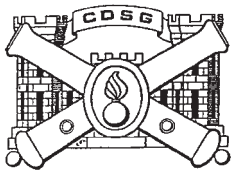

The *Coast Defense Journal* is published quarterly by the Coast Defense Study Group, Inc., 17301 Will Court, Accokeek, Maryland 20607-3445 U.S.A. The purpose of the *Coast Defense Journal* is to disseminate articles and reviews on coast defense topics. Submission of articles to the *Coast Defense Journal* is essential for its continued publication. The *Journal* welcomes additional information on items published. Opinions expressed in the *Coast Defense Journal* are those of the individual authors and do not necessarily reflect the views of the CDSG. Comments on all business matters should be addressed directly to the Chairman of the Board of Directors. Volumes 1 though 6 of this publication were published as the *CDSG News.* Volumes 9 through the current issue of this publication were published as the *Coast Defense Study Group Journal.*

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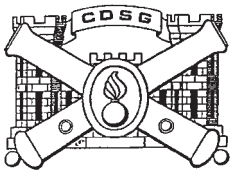
The Coast Defense Study Group is a non-profit corporation formed to promote the study of coast defenses and fortifications, primarily but not exclusively those of the United States of America, their history, architecture, technology, and strategic and tactical employment. The purposes of the group include educational research and documentation, preservation of historic sites, site interpretation, and assistance to other organizations interested in the preservation and interpretation of coast defense sites. Membership in the CDSG is open to any person interested in the study of the coast defenses and fortifications of the United States. The CDSG holds an annual conference, publishes this quarterly journal, and a newsletter. Additional information can be obtained from the Membership Committee Chairman, or by visiting our internet web site at: www.cdsg.org.



CDSG Publication Policies

The CDSG publishes two periodicals, the *Coast Defense Journal* and the *CDSG Newsletter.* Items of lasting value will be printed in the *Coast Defense Journal;* the *Newsletter* will print organizational news and business, and items of a more temporary nature. The editor has final authority and responsibility for all items published in the *Journal.* All *Journal* submissions with accompanying figures and photographs should be sent to the editor.

Articles must relate to some aspect of military coastal or harbor defenses. The scope of interest of the organization is primarily but not exclusively American defenses. The *Coast Defense Journal* and *Newsletter* rely on the submission of articles, reviews, site-visit reports, notes, comments, letters, inquiries, etc., from the membership of the CDSG. Authors are encouraged to contact the editor in advance if there is any question of the appropriateness or relevance of the subject matter. Cover photographs will be determined by the editor.

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The editor would prefer articles be submitted as PC- compatible Word, Rich Text, or ASCII text files on disk or by email, but other formats may be converted. Some typed articles can be converted to text files. Tabular data should be submitted as separate tabbed-text files. Line drawings, figures, photographic prints, and slides should accompany the article but each figure must be submitted as a separate page with the caption attached. Electronic illustrations should be at least 300 dpi resolution. All footnotes and references should be included at the end of the article. Footnote numbers in the manuscript should follow at the end of a sentence in the article itself within parentheses, not as a superscript.

All submissions will be reviewed by the editor for readability, accuracy, suitability, and legality. Authors may be requested to make corrections before the actual publication in the *Journal.* Articles will not be printed with changes without the approval of the author, but the editor may reject articles if the author declines to make the required corrections.

Defending the Hawaii North Shore's Access to Pearl Harbor

John D. Bennett

Prelude

The pre-World War II land and air defense of Pearl Harbor was the responsibility of the army's Hawaiian Department, headquartered at Ft. Shafter in West Honolulu. It relied on the "foursquare" Hawaiian Division garrisoned at Schofield Barracks on the Leileihua Plain, the Hawaiian Air Force with major bases at Hickam and Wheeler Fields, and the Hawaiian Separate Coast Artillery Brigade (HSCAB). This article focusses predominantly on the defenses of Oahu's North Shore, thought to be the most likely place an enemy would attempt a landing, by the HSCAB and its successor command, the Hawaiian Seacoast Artillery Command (HSAC).

It was generally believed that if the Imperial Japanese Navy attacked Hawaii, it would approach from the direction of the Gilbert and Marshall Islands south of the Hawaiian Islands with battleships and heavy cruisers accompanied by aircraft carriers for defense. This theory proved wrong when the Japanese fleet launched carrier aircraft north of Oahu on that fateful December 7, 1941.

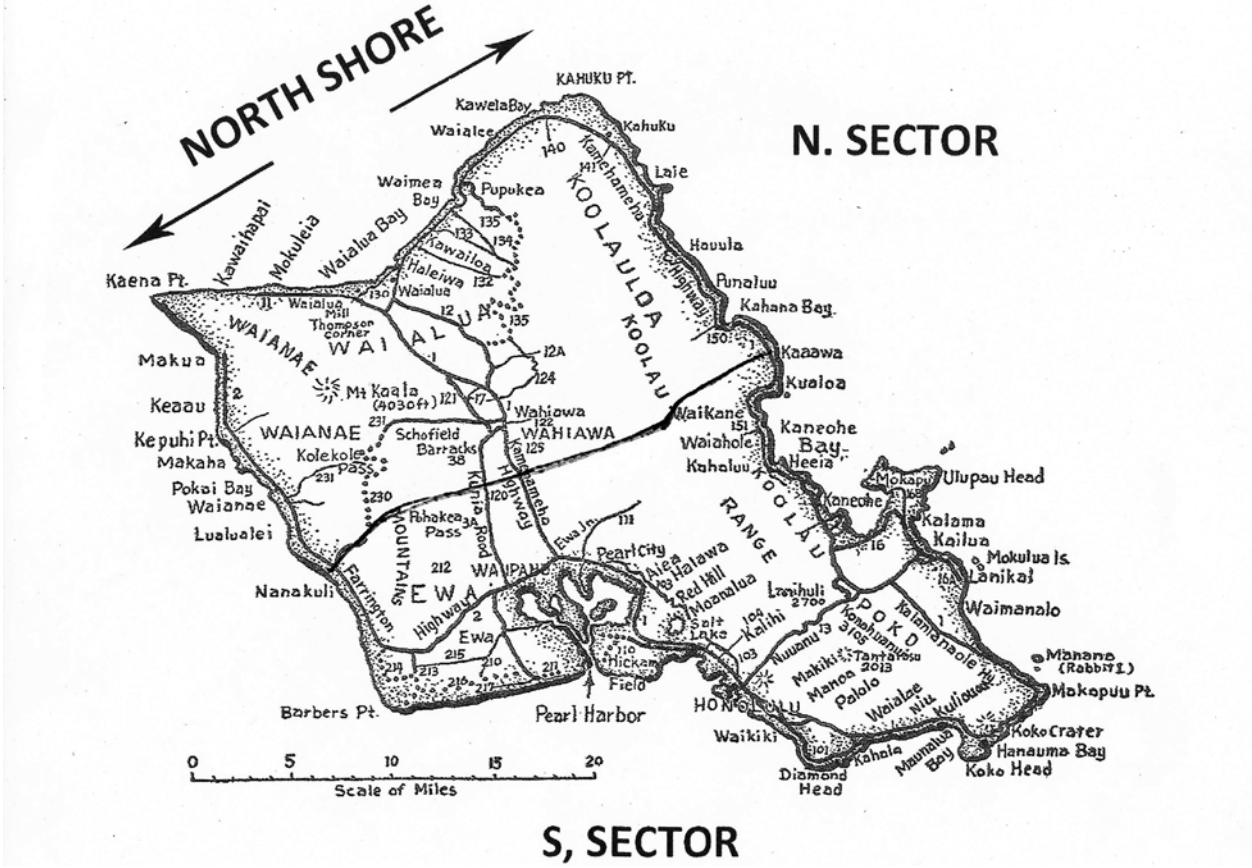
HSCAB fortifications consisted of seven forts strung along Oahu's southern coast from east to west: Ruger, DeRussy, and Armstrong in the Harbor Defenses (HD) of Honolulu Harbor, and Kamehameha, Weaver, and Barrette in the HD of Pearl Harbor. In addition to being a headquarters post, Ft. Shafter housed the mobile 64th Coast Artillery (AA) Regiment and the Hawaiian Ordnance Depot, as well as Signal Corps activities. Schofield Barracks Military Reservation in Central Oahu quartered infantry, field artillery, and associated auxiliary troops of the Hawaiian Division, the major deterrent to an invasion of Oahu.

The Hawaiian Division defended Oahu until October 1, 1941, when was split into the triangular 24th and 25th Infantry Divisions (ID). Oahu was divided into two defense sectors; the 24th ID was tasked with the defense of the North Sector and the 25th ID defended the South Sector, until relieved by infantry divisions that arrived on Oahu for training before deployment to the Pacific Theater.

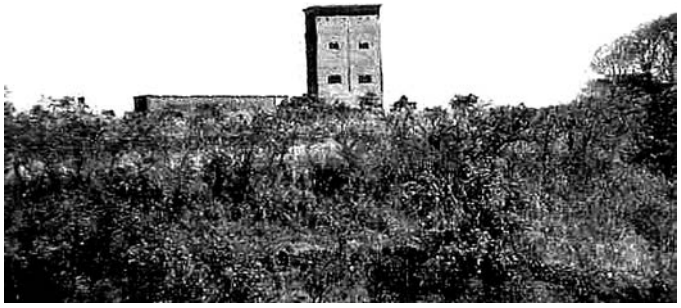
Approaches to Pearl Harbor

Oahu's north shore extends some 22 air miles from Kahuku Pt. in the east to Kaena Pt. in the west. The mountainous Oahu terrain limited any attacker's mobility, but the Leileihua Plain provided a southerly route to Pearl Harbor from the small town of Haleiwa to Pearl City, a distance of about 15.75 air miles. The narrow coastal plain rose 978 feet by two miles NE of Schofield Barracks' McCornack Road, following the path of Kamehameha Hwy.(1) The landscape from Opana Pt. in the east to Kawailoa in the west includes a narrow coastal plain with an escarpment varying between 150-400 feet from Kawailoa to Kahuku. This provided a natural barrier for an enemy to scale, a significant advantage for the defenders.

Before World War II the acreages immediately above the scarp consisted of scrub brush with stream-eroded gulches that ran down the slopes; sugar cane and pineapple were grown on ploughed land in some areas below the higher elevations.(2)



Oahu's two defense sectors and the North Shore.



The top of the scarp is approximately 173 feet in elevation. The former North Shore Groupment CP/Station T is some 1,150 feet beyond. Measurements courtesy of "Google Earth." *Author, 2001*

Two double-lane paved roads provided motor vehicle access to the area via Kamehameha Highway and Kaukonahua Road; the latter afforded direct access to Schofield Barracks and Wheeler Field. The 3'0" narrow-gauge Oahu Railway and Land Company (OR&L) railroad ran from Honolulu to its North-Shore terminus at Kahuku, by way of the west shore (Waianae). A branch ran from Waipahu,

above Middle Loch of Pearl Harbor, up the Leileihua Plain some 7 air miles NNW to Schofield Barracks, then on to Brodie Junction, several miles NW of Schofield Barracks' McCornack Road.(3)

Any enemy marching on Pearl and Honolulu Harbors from the east and west shores of Oahu would be hampered by two natural barriers in the form of two greatly eroded shield volcanoes. The Koolau ran southeasterly on the east and the Waianae ran in a similar direction on the western side of the island. Narrow coastal plains extended from the shore to fingers of the volcanoes, but choke points would enable defenders to stall any enemy march on Pearl Harbor and Honolulu. The Leileihua Plain occupied the landscape between both volcanoes, known as Central Oahu.

Pre-WWII Defenses

Beaches along the North Shore are inundated by 15 to 30 foot waves from December through March, with waves recorded as high as 50 ft. The high winter surf and resultant force of receding waves provided an additional natural deterrent to amphibious landings during that season.

A prime landing beach during the spring and summer are Waimea Bay and other beaches along the North Shore. *Courtesy of Travis Thurston, Wikimedia Commons*

Any enemy landing on the North Shore would require a march south through the Leileihua Plain to the heights that overlook Pearl Harbor. Such a campaign would obviously be met with stiff resistance by defenders.

Prior to America's involvement in World War II, there were no permanently manned seacoast fortifications on the North Shore. Those that existed were to be manned on Mobilization Day (M-Day) as stated in the Hawaiian Defense Plan and its revisions.

Although as early as 1929 the Hawaiian Department Coast Armament Board had recommended that Panama mount type emplacements for 155-mm guns be constructed at locations on the North Shore, no work was undertaken for a decade. Three sites were recommended for the North Shore: One of these was to be located near Ashley Station on the OR&L main line; another was to be located near Kawailoa Camp, and the third on Kalaeokahipa Ridge on the Kahuku Ranch, near the island's northernmost point.

Both Batteries Ashley and Kawailoa were to be built at the edge of the plateau that rose some 250 feet above the shoreline. Both the Ashley and Kawailoa battery sites were to consist of four Panama mounts for 155-mm guns as well as a splinter proof battery commander's station. Work on both batteries was commenced by Captain Vere A. Beers' Company A of the 3rd Engineer Regiment on May 17, 1939, and completed on October 18. In November, it was discovered that erosion was occurring at Battery Ashley and Captain Beers' men returned on November 20, to correct the problem, finishing the work ten days later.

On January 3, 1940, both batteries were formally transferred to the commanding officer at Schofield Barracks. It was not until March 11, 1941, that work was undertaken on the third of the prewar 155-mm gun batteries. Construction of the battery on Kolaeokahipa [sic] Ridge took only a month and the battery was pronounced completed on April 16, 1940. On July 23, 1941, the battery position was transferred to the commanding officer of the Harbor Defenses of Pearl Harbor. Battery Kahuku as it was initially designated was sited some 235 feet above sea level on Kolaeokahipa [sic] Ridge on the property of Kahuku Ranch. Early in 1942, the battery was renamed Battery Ranch as the name Battery Kahuku was assigned to the proposed battery of four 8-inch guns on barbette mounts at the Kahuku Plantation Golf Course.(4)

The following defenses were prescribed by the Hawaiian Defense Project revision of 1940 (HDP-40):

Table 1: Gun and SL Batteries

Type of defense	Location	Notes
155 mm GPF Battery	Kahuku Ranch	Four guns on Panama mounts***
155 mm GPF Battery	Ashley Station	Four guns on Panama mounts**
155 mm GPF Battery	Kawailoa Camp	Four guns on Panama mounts**
60-inch SL	Kahuku Pt.	Two portable SL, Nos. 37–38P*
60-inch SL	Waialee	Two portable SL, Nos. 39-40P*
60-inch SL	Waimea Bay	Two portable SL, Nos. 41-42P*
60-inch SL	Ashley Station	Two portable SL, Nos. 43-44P*
60-inch SL	Mokuleia	Two portable SL, Nos. 45-46P*
60-inch SL	Kaena	Two portable SL, Nos. 47-48P*
60-inch SL	Kaena Pt.	Two portable SL, Nos. 49-50P*

* Manned on M-Day by coast artillery.

** Manned by 11th FA until arrival of the 57th CA from the Continental U.S.

*** Unmanned until the arrival of the 57 CA.

Source: Dept. Engineer Office, HHD, Ft. Shafter, "Hawaiian Seacoast Defense Project 1940: Seacoast Dispositions, Enclosure No. 8 Basic Document," File 10+10M39, Aug. 1939.

Table 2: Observation Posts

Type of post	Location	Notes
AAIS	Kahuku Pt.	No. 5
AAIS	Kaena Pt.	No. 7
Position Finding Station (PFS)	Punamano Hill	Station K
PFS	Pupukea Hts.	Station O
Groupment CP/PFS	Kawailoa Camp	Station T
PFS	Puu Kamananui	Station W
PFS	Puu Pueo	Station S

Source: Dept. Engineer Office, HHD, Ft. Shafter, "OPN Map; Annex No. 1 To Accompany FO 1: Fixed Installations," File 18-1-1814, Sept. 18, 1941.

Table 3: Other Pre-War Defenses

Type	Location	Notes
Airfield	Puaena Pt.	Grassy field*
Airfield	Kawaihapai	Grassy field**

* Aerial gunnery and fighter dispersal field known as Haleiwa Field. Also a pre-war artillery firing point.

** Fighter aircraft dispersal field known as Mokuleia Field. Later provided with the longest paved runway on the island to accommodate bomber aircraft. Beach across the airfield used by FA as a firing point. Later known as "Mokuleia Army Beach."

155 mm GPF guns of the 55th CA at a pre-WWII Oahu firing point. *Author's collection*

Other M-Day defenses included bivouacs, pre-positioned field artillery firing positions, and firing positions for infantry. Proposed static defenses included barbed wire beach entanglements to channel landing craft into fields of fire for machine guns housed in field emplacements and concrete pillboxes, landing craft obstacles, and minefields.

Trail Reconnaissance

Maj. Gen. Briant H. Wells, CG, Hawaiian Department, became interested in Oahu's trail system in 1931. Wells, an avid hiker, and territorial forester Charles S. Judd, formed the "Piko Club" composed largely of army officers and foresters. The club explored various mountain trails which Wells recorded on a map in his office.(5) When territorial funds ran out in 1934, Wells wrote Secretary of the Interior Harold L. Ickes for funds to establish and renovate Oahu trails. Monies were received to

enable the Civilian Conservation Corps to construct four new trails and maintain others under the direction of the territorial forester.(6) A notable army officer, Lt. Col. George S. Patton, Jr., Hawaiian Department G-2 (intelligence) officer, inspected the Kipapa Trail with Forester Judd on December 14, 1935, and later joined the Piko Club along with his wife, Beatrice, in June of 1936.(7)

Battery C, 11th FA, struggling to pull a 155 mm howitzer and prime mover up a North Shore road during a field exercise. *William C. Gaines Collection*

Oahu's North Shore included a network of roads that accessed the lands above the coastal plain from Kawailoa east to Kahuku under the "Road and Trail" proviso of HDP-40 and its predecessors. The majority of the roads were sugar and plantation thoroughfares comprised of compacted dirt and gravel surfaces that became muddy during heavy rainfall. The road system on the east flank of Kamehameha Highway was connected to the Helemano Military Reservation, some 3.5 miles NNE of Schofield Barracks in the Leileihua Plain, by means of Drum Road, named after LTG Hugh A. Drum (1879-1951) who commanded the Hawaiian Department as a major general from 1935-38.(8) The road and trail system enabled men and war materials to be transported from Schofield Barracks to counter enemy landings on the North Shore.

The 3rd Engineers based at Schofield Barracks completed a primitive road around Kaena Pt. in 1937 that connected the North Shore to the west shore, largely utilizing the route of the OR&L.(9) This route enabled defenders access to the North Shore from the Makua area on the west shore of the island.

Communications System Upgraded

The HDP-40 revision and its predecessors included a subterranean landline communications system known as the "Command and Fire Control Project" that crisscrossed Oahu.(10) The cables serviced coast artillery gun batteries, searchlight positions, and PFSs, as well as army posts and airfields, observation posts, infantry and field artillery field positions.

Main cables connected with each other at terminals in splinterproof concrete cable huts from which branch cables emanated to connect with various units. Field wire, typically W-110, connected temporary infantry and coast and field artillery and other positions to branch or main cables via concrete terminal posts.

Cable Hut S[1] across from Dillingham Airfield, formerly Mokuleia Army Airfield and then Dillingham AFB. *Google Earth*

The buried communications cables on the North Shore largely followed the route of the OR&L tracks and Kamehameha Highway just above the shoreline. To safeguard these from saboteurs or enemy troops, an inland cable route was laid from Brodie Junction just north of Schofield Barracks NNE to Kahuku, several years before World War II.

Early Warning Radar

By November of 1941 two of the newly developed transportable SCR-270B radar sets were installed at two North Shore locations, Kawailoa and Opana Point. The radar sets were operated by Signal Company Aircraft Warning Hawaii, based at Schofield Barracks. As with any new equipment, the kinks had to be worked out before they were fully operational. The Opana radar detected the incoming Japanese carrier aircraft on December 7, 1941. Two privates, Joseph L. Lockard and George Elliot, operated the set beyond normal operating hours to gain experience, but what they saw was interpreted by the duty officer, Lt. Kermit Tyler, at the Ft. Shafter information center as a flight of B-17Ds being ferried from Hamilton Field in California to Hickam Field on Oahu.

Manpower Shortages

The HSCAB did not have sufficient troops to man the three 155 mm GPF positions on the North Shore - Batteries Ashley, Kawailoa, and Ranch. The first two were to be manned by the 11th Field Artillery (FA) until the arrival of the 57th CA from the Continental U.S., and the latter position was left unmanned until the 57th CA arrived.

Local artillery defense of Oahu's pre-war North Shore beaches was left chiefly in the hands of the 11th and 13th FA, equipped with obsolescent M1918 240 mm and 155 mm howitzers, and British-pattern 75 mm M1917 field pieces.(11) The 41st CA (RY) Regiment was able to man two of the three 8-inch M1888 railway-gun firing points at Puuiki, Kawailoa, and Laie, which relocated to nearby Kahuku. Heavy coast artillery coverage was provided by two 16-inch/50 gun batteries, Williston and Hatch, located at Forts Weaver and Barrette, with two guns each.

World War II Expansion
North Sector Command Post

With the formation of the 24th ID on October 1, 1941, an urgent need for a forward-echelon command post and message center for the division arose. A site close to the north bank of Poamoho Stream was selected, about 1.63 mi. NNE of Schofield Barrack's Macomb Gate on Wilikina Dr., near 21º 31.124'N – 158º 2.200'W, at 890 ft. above sea level and approximately 260 yds. east of Kamehameha Highway (courtesy of "Google Earth").

Road leading to the former North Shore CP. *Google Earth*

The command post served as the command and control center for all North Sector defense activities, which included the North Shore. Construction began in June of 1942 for a three-level reinforced-concrete splinterproof structure that was completed by January 1943. Windows in the second and third floors were covered by one-inch-thick metal shutters for protection. A separate power building was built to house standby emergency power equipment.

The North Shore Groupment, constituted in 1922, operated as a sub-command of the Harbor Defenses of Pearl Harbor until 1940. Administration of the groupment then passed to the Harbor Defenses of Honolulu, with tactical command and control provided by the HSCAB until August 1941,

when the Hawaiian Coast Artillery Command (HCAC) assumed command and control. Subsequent to the December 1941 Japanese attack, the groupment command structure consisted of a provisional command of coast artillery and field artillery officers under the overall command of the HCAC, until the arrival of the 57th CA (TD) Regiment in January 1942, when that regiment assumed direct command and control of the groupment. In March 1942, the HSAC was organized and assumed direct command and control of all seacoast artillery on Oahu. The North Shore Groupment operated the coast artillery defenses of Oahu from Kahana Bay northward to Kahuku Pt., thence down the North Shore to Kaena Point.(12)

Initially, the North Shore Groupment operated two groups from its command post at Kawailoa: the Kahuku and Haleiwa Groups of mobile 155 mm guns, as well as a separate 8-inch railway gun battery. In the summer of 1942, a third group, the Saratoga Group, composed of the two newly completed naval turret batteries on the North Shore and the 8-inch railway battery, was created. A fourth group, the Center Group, also composed of 155 mm gun batteries on the North Shore, was added in 1943. The numerous reservations of the North Shore Groupment were mostly relatively small tracts containing fire control stations, seacoast and antiaircraft gun batteries, radar installations, and various similar facilities.(13)

With the arrival of troops and equipment on Oahu on December 21, 1941, and January 7 and 8, 1942, coupled with the US Navy offering the Hawaiian Department the temporary loan of several types of obsolescent guns for use in coast defense, the defenses of the North Shore saw an unprecedented expansion.(14)

Construction began in the spring of 1942 for two emergency batteries of 4-inch/50 cal. naval pedestal-mount guns that covered the northwest coastline. Batteries Kaena and Dillingham were located on both flanks of Mokuleia Airfield, which was in use seven days after the Pearl Harbor attack and evolved from a grassy landing field to a 9,500 ft. runway used as a fighter and heavy-bomber training base.(15)

Three pre-war batteries (Ashley, Kawailoa, and Ranch) continued to be manned during the war with the following additions:(16)

Table 4: New 155 mm GPF Battery Construction

Battery	Type of Position	Location
Pupukea*	Alternate firing site	4 mi. inland from Waimea Bay
Waimea**	do	3 mi. inland from Waimea Bay
Pine***	Fallback position	3 mi. inland from Waialua Bay
Mokuleia****	Withdrawal site	2 mi. inland from coast
Dillingham+	Active site	Dillingham Ranch
Kaena+	do	Near shoreline

* The position was not manned on a regular basis until 1944, when it was used for target practice by the batteries in the North Sector.

** Three of four 180º Panama mounts were completed. The site was not planned as a primary battle position; therefore no battery commander's station was constructed.

*** The position was used by various CA batteries in 1944 for annual service target practice.

**** Located at 500 ft. elevation of the Waianae Mt. Range.

+ Emergency 4-inch NP battery reequipped in spring of 1943 with two 155 mm GPF.

8-inch Batteries

Construction commenced in the spring of 1942 on two medium-caliber batteries, each equipped with two 8-inch/45 MkIXM2 two-gun naval "turret" mounts, each some five miles in from the coast east and west of Kamehameha Highway respectively. Both batteries flanked the highway routes to Pearl Harbor from the North Shore.

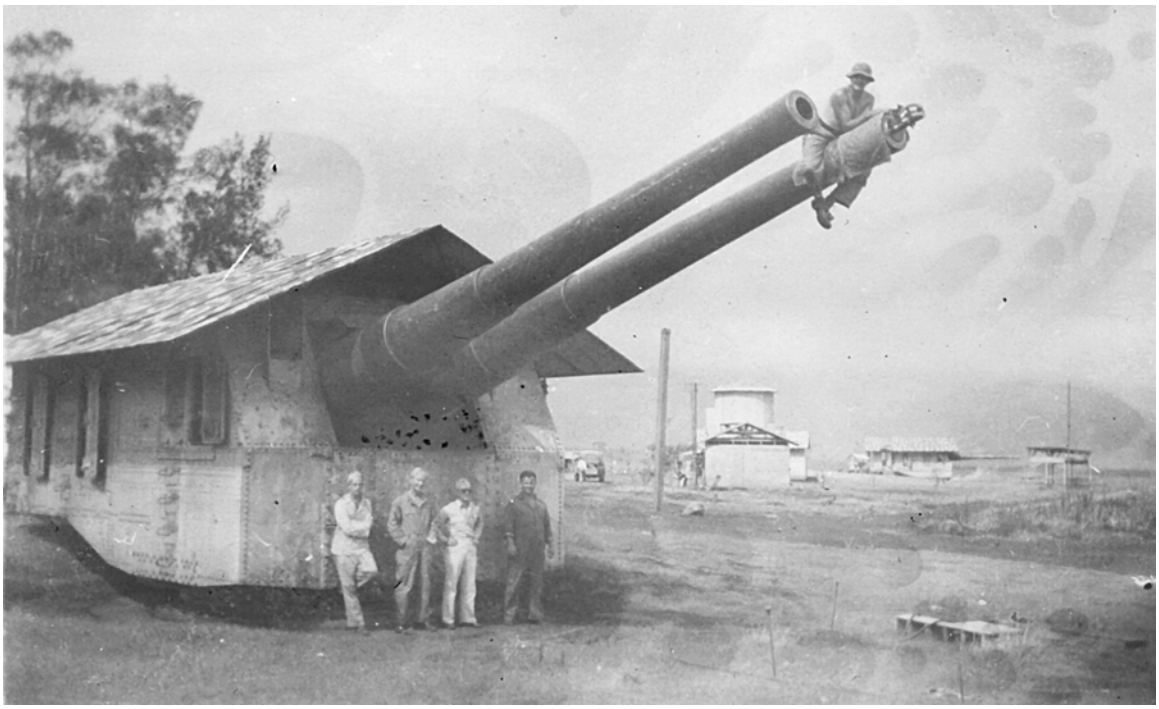
Batteries Brodie/Ricker and Opaeula/Riggs were similar in design and featured reinforced-concrete generator, powder/projectile, and plotting rooms built by cut and cover. These batteries significantly increased the firepower of Oahu's North Shore defenses.

In addition to both naval turret batteries, two 8-inch M1888 railway batteries with four guns apiece were located at Kawailoa (Battery Haleiwa) and Kahuku (Battery Kahuku). The latter battery's guns were eventually dismounted from their M1918 railway cars and emplaced in concrete for better firing stability.(17)

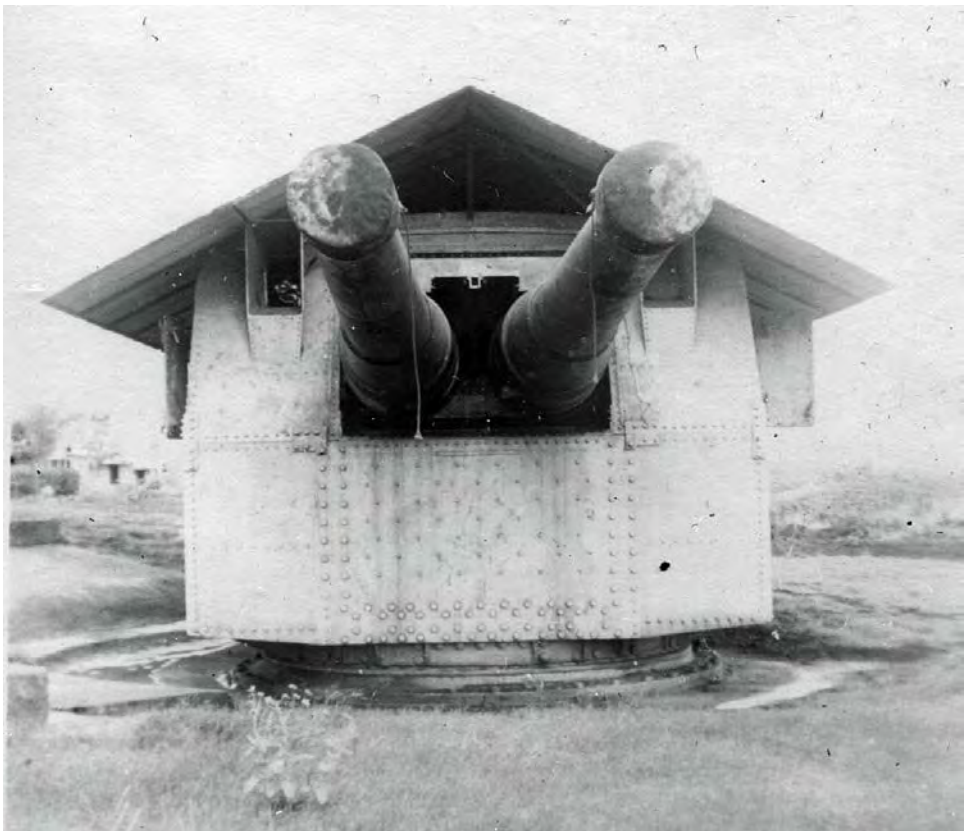
Two 1940-project batteries, each armed with a pair of 8-inch MkIIM3A2 guns, originally were to be built on the North Shore during World War II.

Battery Construction No. (BCN) 408 was to be built at Waialee, some 3.75 miles WSW of the newly built Kahuku Army Air Base and BCN 409. MG Henry T. Burgin, chief of artillery, Hawaiian Department, believed BCN 408 could be effectively replaced with two 155 mm M1 "Long Toms" at a considerable savings in dollars and manpower. As a result, the project was cancelled in the design stage.

Kaena Point's Puu Pueo was the site of BCN 409, its support rooms in tunnels bored into the mountain slope. Construction began in 1943, but was cancelled before the tunnels were lined with concrete and support rooms built; it was first thought that they should be completed and two 155 mm M1 guns placed at the site. All work on the battery was halted with the end of the war.



Battery Brodie's Gun Mount No. 2, with its artificial roof that resembled a house. The battery commander's station with the SCR-296A radar antenna covered by a false water tank-like structure is visible in the background. *Hal Stickney collection via Bolling Smith*



Business end of one of the 8-inch naval turret mounts of Battery Brodie.
Hal Stickney collection via Bolling Smith

One of Battery Haleiwa's 8-inch M1888 RY guns.
Jeff Livingston Collection, used with permission.

Maj. Gen. Henry T. Burgin, chief of artillery, Hawaiian Department. *U.S. Army Museum of Hawaii #5475 (US-AMH), cropped from original*

Another view of the 8-inch M1888 RY gun at Battery Haleiwa, showing the makeshift revetment to protect the emplacement. *Jeff Livingston Collection.*

240 mm M1918 howitzer, one of two at Anahulu Flats. *USAMH*

240 mm Batteries

Both pre-war 240 mm howitzer battery positions at Laie and Pupukea had been abandoned before the advent of World War II. Two new locations were built for a pair of 240 mm M1918 howitzers on circular concrete emplacements at Anahulu Flats in upper Kawailoa and the Quadrupod survey marker near Paalaa Peak. The weapons were kept in ordnance storage, to be transported to the battery sites by trucks on M-Day.

14-inch NT Batteries Proposed

In early 1943, consideration was given by the Hawaiian Department to emplacing two 14-inch/45 turrets from the capsized battleship USS *Oklahoma* (BB-37) at Pearl Harbor should the guns and turrets become available from the US Navy. A site near Kahuku at Paumalu was to receive a two-gun turret and another location at Kaena Pt. was selected for a triple-gun turret. The 14-inch/45 Mk. 1-5 gun was capable of hurling a 1402 lb. AP shell a maximum distance of 23,000 yds. at 15º elevation, but the proposals were abandoned when the guns were determined to be unsalvageable.(18)

16-inch MkIIM1 Battery

Plans were developed and land acquired in 1936 for a battery of two 16-inch/50 MkIIM1 naval guns on BC at "Anahulu Flats" in upper Kawailoa, but the battery was not approved for construction. The site was developed for a battery of two 240 mm M1918 howitzers (Battery Anahulu). With the advent of war with Japan, plans to build a 16-inch battery on the North Shore were briefly resurrected but not carried out.(19)

16-inch Battery Williston at Fort Weaver, near Pearl Harbor, could reach the water off the North Shore. *Bolling Smith Collection*

Battery Williston (2 x 16-inch/50 M1919MII on BC) completed on September 19, 1824, at Ft. Weaver on the southwest portion of the island, while not a World War II construction, remained uncasematted with the express purpose of providing 360º fire capable of covering the North Shore beaches. Its two guns fired a 2,700 lb. projectile to a maximum distance of 49,100 yds. (27.89 mi.). The battery remained in service throughout the war. Battery Hatch (2 x 16-inch/50 MkIIM1 on BC) situated at Ft. Barrette west of Ft. Weaver, eventually phased out 360º coverage when casematting of its two guns began in 1942, and no longer covered the north shore.

Permanent Radar Stations Constructed

Starting in 1942, construction began at two North Shore locations for bombproof early warning (EW) stations equipped with SCR-271 fixed radar sets. LTG Delos C. Emmons, CG, Hawaiian Department, ordered all new early warning radar stations bombproofed to protect the operating equipment and personnel, leaving only the antenna vulnerable.

Consequently, all new fixed EW radar station constructed in the Hawaiian Islands included a minimum of 40 feet of earth and rock cover. The Opana radar was built at Opana Pt., close to the SCR-270B transportable radar. The slope of Puu Pueo at Kaena Pt. was tunneled for the new radar station.

Kaena Pt. SCR-271D radar antenna, known as the "bedspring" model, c. 1948. *15th AW History Office*

The Opana Pt. tunneled station (6QN) began operating on July 10, 1942. The Kaena Pt. station replaced the SCR-270B transportable unit located above the shoreline at Kawailoa and assumed its call sign (VF7) when it began operating on October 7, 1942, with an SCR-271 set. The need for another early warning radar station on the North Shore resulted in the old SCR-270B transportable unit that operated at Kawailoa being established on Monument Hill, Kahuku, on February 15, 1943, with call sign 6JI.(20)

In 1943, all EW radar platoons on the North Shore came under the command of Captain Hutchins, commanding Co. E, 580th Signal Aircraft Warning Bn, VII Fighter Command, 7th Air Force, headquartered at Kahuku Army Air Base.(21) On July 1, 1943, the three EW radar stations were manned by platoons of Co. E as follows: 1st (Opana), 2nd (Kaena Pt.), and 3rd (Monument Hill).(22)

Three new radar stations were added to the North Shore defenses: 2OF, an SCR-588 CHL ground control intercept (GCI) unit at Punamano Hill across from company headquarters, which started operating on December 8, 1943; 2KF at Puu Pueo, Kaena Pt., which began operating on January 10, 1944; and 9JI, a British TRU (transportable radar unit) that went on the air on February 22, 1944.

In addition to the new EW and GCI radar provided to the Signal Corps, the HSAC received SCR-296A fire control radars at Batteries Kahuku, Haleiwa, Opaeula/Riggs, and Brodie/Ricker. Target data acquired by these radars could be shared with adjoining batteries.

Base camp for Co. E, 580th SAWB, at Kahuku AAB, c. 1949. *15th AW History Office*

Airfield Construction

Three days after the Pearl Harbor attack, construction began on a new dispersal airfield in the sand dunes and marshland at Kahuku Pt. Two asphaltic-concrete runways accommodated B-17 and B-24 bombers and other aircraft that trained at the air base before transferring to the war zone or returning to the Zone of Interior. Kahuku Army Air Base became operational on June 20, 1942; it was capable of housing 5,000 men. The base shut down in 1946 after suffering extensive damage from the April 1, 1946, Tsunami.

The Signal Corps built a radio station at the air base housed in an 1130 ft. by 20 ft. tunnel at depths ranging from 30 ft. to 95 ft. in the sand dunes on the east side of the NW to SE runway.

Haleiwa and Mokuleia pre-war airstrips received improvements after the Pearl Harbor attack. Haleiwa Field was enlarged to 4800 ft. by 150 ft. and received 800 feet of asphaltic-concrete paving with 4000 ft. covered by "Irving mat," a diamond-grid steel mat.

Punamano Air Force Station equipped with AN/CPS-1 radar (foreground) and PFS "Station K" complex (background), July 1949. *15th AW History Office*

B-24 "Liberator" transitioning through Mokuleia Field during WWII.
Hawaii Aviation Preservation Society

Mokuleia airfield was built during World War II by army engineers of the Honolulu District Engineer's Field Area 13, headquartered in the former R.C.A. building at Kahuku Air Base. Field Area 13, created to construct Haleiwa and Kahuku Fields, was later assigned to improve Mokuleia Field.

Mokuleia Field was one of a number of dispersal aircraft landing fields built on Oahu and the neighbor islands for the Hawaiian Air Force, predecessor of the 7th Air Force, headquartered at Hickam Field, Oahu.

Army engineers built the longest paved runway on Oahu, about 9,500 by 75 feet (Runway 8/26) and a shorter cross-runway, (4/22) ± 3,700 feet, connected to aircraft revetments at the south boundary of the reservation. The main runway was filled with rocks quarried from the hillside just west of the field and paved with asphaltic-concrete.

Heavy bombardment and fighter groups trained at Mokuleia before being posted to the Central Pacific war zone; air groups returning to the Zone of Interior also staged out of Mokuleia.

Plans for the development of military airfields on the outer Hawaiian Islands went back to proposals in the 1920s and 1930s for the construction of bases on Hawaii and Kauai. Construction began in June of 1940 for dispersal fields on the outer Hawaiian Islands using Works Progress Administration (WPA) funds. By June of 1941, the War Department approved new construction for heavy bomber fields on Kauai and Hawaii and for fighter planes to operate from fields on Molokai and Lanai. Although the newly constructed airfields were built to allow dispersion of fighter and bomber planes from Hickam and Wheeler Fields, they also accommodated flight and maintenance crews of bomber and fighter air groups that passed through the Hawaiian Islands to and from the Central and Southwest Pacific Theaters.

Antiaircraft and Other Airfield Defenses

Antiaircraft and base defenses of the Haleiwa and Mokuleia airfields on Oahu's North Shore were initially provided by elements of the 95th Coast Artillery (AA) Regiment, the majority of which was posted to Windward Oahu. The regimental Headquarters Battery and Batteries I and K were sent to the north shore in February 1942. Regimental HQ and HQ Battery set up an AAA CP at Camp Kawailoa, the location of the North Shore Groupment CP. Battery I, armed with 37 mm automatic weapons, remained in the Mokuleia Airfield area until late May of 1942, when it was transferred to the recently built Kualoa Airfield at the Kualoa Ranch north of Kaneohe Bay. Battery K provided the air defense of Haleiwa Airfield until May 17, 1942, when it was relocated to Ford Island in Pearl Harbor. Headquarters and Headquarters Battery, 95th CA, established an antiaircraft command post for the

North Shore Groupment at Camp Kawailoa, which it operated through most of 1942. The regiment's 37 mm automatic weapons were replaced by newer 40 mm guns in 1944.(23)

An unusual type of machine gun pillbox used for ground defense at Mokuleia Field was the P-2A steel pillbox, armed with twin .30 cal. M1919A4 Browning machine-guns. Other P-2As were found at various airfields and military installations around the Hawaiian Islands.

P-2A pillbox uprooted from its buried position at former Mokuleia Field. Rear end shows circular entryway. *Author*

Business end of P-2A pillbox at the Chevron refinery at Kalaeloa, former site of AAA Camp Malakole. *Author*

Artillerymen of the 369th CA man their 3-inch AA gun in an Oahu sugarcane field during WWII. *Author's collection*

.50-caliber AAMG manned by 2nd Bn., 369th CA. *Author's collection*

The 369th Coast Artillery (AA) (Colored) Regiment, a former New York National Guard outfit, arrived on Oahu on June 21, 1942, and was posted to the North Shore to protect the Opana Radar Station, Kahuku Army Air Base, as well as Haleiwa and Mokuleia Airfields. It was initially two battalions armed with 3-inch AA guns, 37 mm automatic weapons, and .50-caliber antiaircraft machine-guns, but was soon rearmed with newer 90 mm AA guns replacing the 3-inch guns.

Housing at Haleiwa Field for the security force was eventually provided under Engineer Work Order No. 4.81, with the dormitories being built from April 6 to July 6, 1943, at a cost of $20,694.00. (24)

AAA Units Reorganized

Headquarters Hawaiian Department received a letter from the adjutant general, "Reorganization of the HAAC (Hawaiian Antiaircraft Artillery Command)," dated November 4, 1943. The HAAC was redesignated "Antiaircraft Artillery Command" (HAW). All the coast artillery antiaircraft regiments on Oahu were reorganized in accordance with new TO/E established in March 1943. Most regimental headquarters were redesignated AAA group headquarters, regiments were disbanded, and firing batteries were assigned to separate battalions in the groups.(25)

PFS and SL Controller Booths

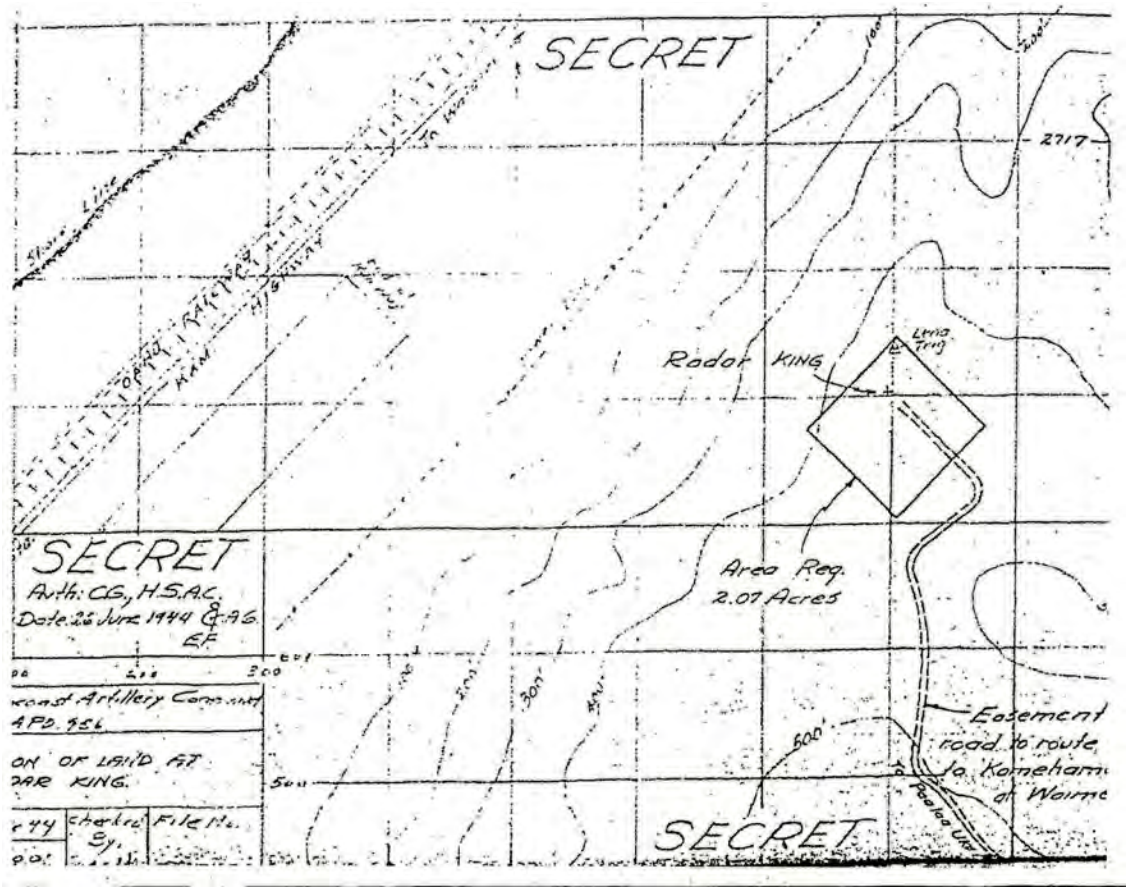
Several additional PFS and searchlight controller booths (SLCB) were built during the war to support the new batteries. Several new battery commander stations (BCS) functioned as PFS for other batteries on the North Shore. "DPF Kaena" was constructed on the slope above and west of Battery Kaena. It was a concrete, single station equipped with one DPF instrument; one octagonal raised concrete mounting platform was found on its floor. The exterior walls were camouflaged with basalt rock, which blended in with the slope. This station probably served Battery Kaena and the 155 mm gun batteries on the North Shore.

"DPF Kaena" showing its basalt-rock façade. *Author*

Table 5: New PFS and SL Controller Booths

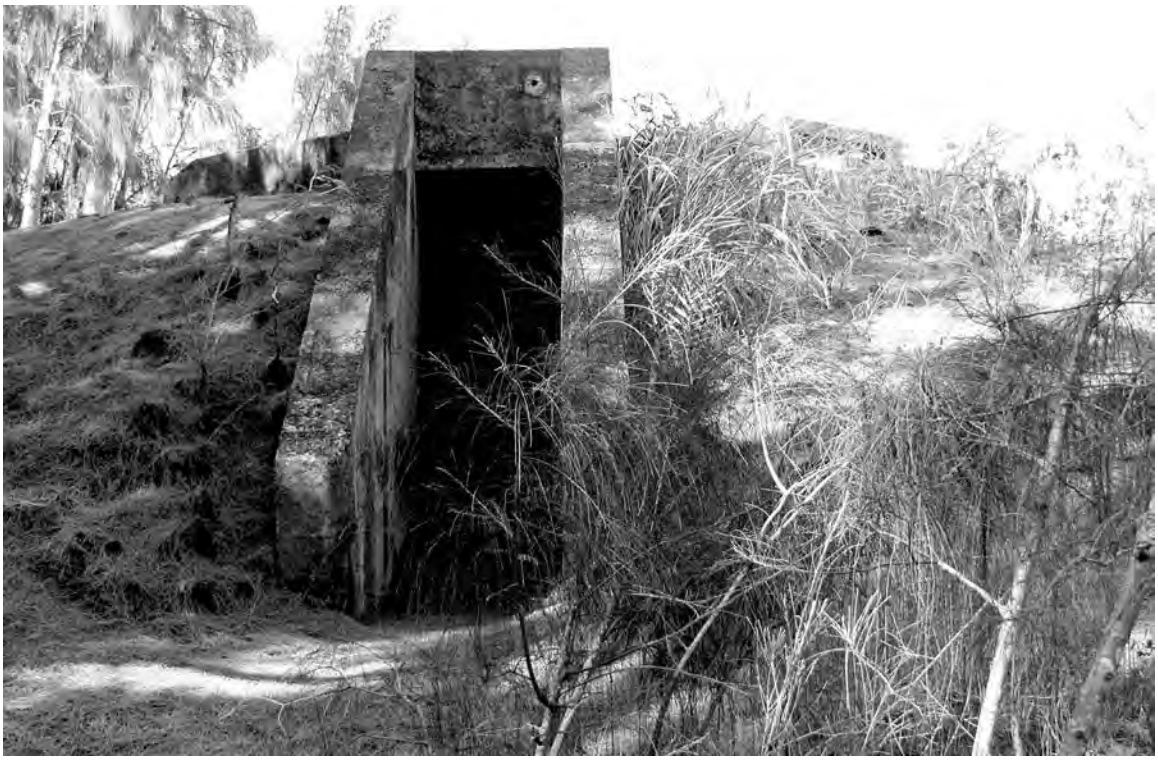
Station Name	Location
BCS Kahuku/Monument 305	Monument Hill
Station K (New)/Kahuku Gp. CP	Punamano Hill
Station Lena/Radar King	Paumalu-Pupukea Hts.
BCS Waimea*	Upper Waimea Valley
Station Y	Chain Gate, Kawailoa Hts.
Station Reservoir*	Waimea Reservoir
BCS Opaeula/Riggs	Opaeula Reservoir
DPF Opaeula Tower	do
BCS Brodie/Ricker	Brodie Camp No. 4
DPF Brodie	do
Station Pine	Three miles inland from Waialua Bay
Station Puu Iki	Puu Iki Hill, 3.25 miles S. of Waialua Bay
DPF Kaena	Two miles E. of Kaena Pt.
Unknown SL Controller Booth	Monument Hill
do	Pupukea Hts.
do	Kawailoa Hts.
do	Mokuleia 1.6 miles S. of Waialua Bay.

* No evidence this station was built.



"Radar King" at Station Lena, c. 1944. USAMH

Three unusual features of Station" Lena" are the elongated observation room, the concrete table-like structure on the roof, and the raised object at the left-rear, which is the top of a double-walled entryway. *Terrance McGovern ©2009*



Double-walled protected entryway of Station "Lena." *Author's collection*

Arrow points to T-bracket that separated an unusual amount of cables for a PFS, probably indicative of it being also used as a GCI radar station operations room. *Author's collection*

Remains believed to have been a generator shed. Note the T-bracket on the left. *Author's collection.*

Platform some 54 yards SSW near the edge of the bluff. *Author's collection*

Concrete MG pillbox some 216 yards NNE of Station "Lena." *Author*

All three observation stations of the Station "K" complex are shown in this 2009 photograph. *Terrance McGovern ©2009 (cropped from original)*

Top arrow points to the middle observation station; middle arrow indicates the Kahuku Group observation station; and the lower arrow points to the roof of the attached plotting and observation room. The round objects on the roof are ventilators. *Terrance Mc Govern ©2009 (cropped from original, emphasis added)*

SLCB below crest of Monument Hill, Kahuku. The three box-like structures on the roof are air vents. *Terrance McGovern ©2009*

SLCB at crest of Pupukea Hts. Atop roof is a 3-inch/50 naval AA gun installed postwar by a wealthy former property owner. *©William C. Gaines 1999*

SLCB at Kawailoa Hts. Structure was "L" shaped, as were all the others. This example sported a larger attached room, possibly to house the soldiers that maintained the equipment. *Author*

Rear of Kawailoa Hts. SLCB showing large attached room. *Author*

SLCB at Mokuleia, some 1.6 mi. south of Waialua Bay.
D. Fahrenwald ©2014 (used with permission)

Station "Lena," an elongated single-story, concrete PFS, was built near the edge of the bluff of the Pupukea-Paumalu Heights accessed by the Kaunala Trail just west of world-famous Sunset Beach. Although thought to service the North-Shore 155 mm batteries, the location also served for an SCR-588 GCI radar unit known as "Radar King."(26)

The exterior of the observation station exhibited three remarkable features: its elongated shape, the double-walled protective entryway at the left rear, and the table-like concrete structure atop the roof. It appeared that structure was built to support and house the components of a SCR-588 GCI radar.

The remains of a small steel building believed to have housed a generator were found about 26 yards SSE of the PFS. A T-bracket mounted on one wall, similar to the one at Station "Lena," separated several cables.

Another unusual finding was two round raised-concrete platforms with vertical galvanized pipes in the center, believed to have mounted machine guns for perimeter defense. One platform was near a jeep trail and the other was near the top of the bluff. A concrete machine-gun pillbox covered the left flank of Sunset Beach, some 215 yards NNE of Station "Lena." These added defenses highlighted the importance of the facility.

SCR-588 radar antennas were mounted on 25-foot towers, and the components were powered by three PE-198 diesel-powered generators. Twenty-four hour operation required 54 men.(27)

Punamano Hill in Kahuku was the location of the Station "K" complex of two separate PFS. A third structure (Station "K-New") was built above the top-most station to house the Kahuku Group. The new station was a two-level concrete structure; the lower level housed a plotting room and operations center and the top (observation) level was forward of the lower level and equipped with two pedestals for DPFs.

Battery Kahuku's (4 x 8-inch M1888 guns) battery commander's station was relocated from a steel tower at the battery site near the Kahuku Sugar Mill to nearby Monument Hill shortly after the September 21, 1942, inscription found on the roof during a site survey by the writer.

Several new concrete SL controller booths were built for the North Shore defenses during World War II, equipped with distant electric controller apparatus that electrically controlled a pair of 60-inch portable searchlights some 200 feet apart.

Concluding Remarks

The World War II coast defenses of Oahu's North Shore provided a formidable deterrent to any enemy attempt to land on its beaches, whether by landing barges or small raiding parties from submarines. The two 16-inch/50 guns of Battery Williston, along with four 240 mm howitzers and sixteen 8-inch guns in four batteries (two naval turret batteries, one railway gun battery, and one dismounted railway gun battery) sited from Kahuku to Brodie Camp No. 4 in the west, along with no less than sixteen 155 mm guns in five batteries provided defense against light cruisers, destroyers, submarines, and landing craft. These batteries were supplemented by 60-inch searchlight batteries, position finding stations, and four SCR-296A fire control radars that could share target information with adjoining gun batteries.

Two airfields, Kahuku and Mokuleia, provided facilities for heavy bombardment groups of B-17 and B-24 aircraft transitioning to and from the Central Pacific Theater. These provided off-shore and anti-submarine patrols during their short stays at the airfields. North Shore air defense was bolstered by coast artillery antiaircraft regiments that were divided into AA gun and automatic weapons battalions by the end of December 1943, supplemented by P-39, P-40, and P-47 fighter aircraft that operated out of Kahuku, Haleiwa, and Mokuleia Fields, directed by aircraft controllers at SCR-588

GCI radar stations at Punamano Hill, Radar King (Station Lena), and Puu Pueo (Kaena Pt.). Permanent EW tunneled SCR-271 radar stations were constructed at Opana Pt. and Puu Pueo (Kaena Pt.), supplemented by an SCR-270 transportable unit atop Monument Hill at Kahuku.

Ground defense of the North Shore was initially provided by units of the old Hawaiian Division, followed by the new triangular 24th ID and subsequent infantry divisions that garrisoned Oahu while in training for combat in the Central and Southwest Pacific Theaters, supplemented by divisional field artillery, tank, and other auxiliary units. Concrete machine-gun pillboxes were sited to defend beaches most likely to be invaded. No shots were fired in anger by any of the defenders during the war.

Acknowledgements

The author wishes to acknowledge former CDSG member, the late William C. Gaines, for his mentorship, which greatly assisted my ability to write about Hawaii's coast artillery history. Further gratitude goes to Editor Bolling W. Smith, who made available data archived at NARA II, College Park, MD, as well as numerous vintage photographs pertaining to coast artillery in the islands which further enhanced my research. Lastly, thanks to members Terrance McGovern and William Lyles for their contributions to this manuscript.

Notes

1. Distances determined by "Google Earth" *©2014 Google.*
2. Sugar cane is no longer grown on the islands of Hawaii, Kauai, and Oahu, only on Maui. Pineapple fields are also dwindling in size on Oahu.
3. The railroad connection from Brodie Junction to join Waialua Agriculture Company's tracks was not completed at the time.
4. William C. Gaines, "Guarding Oahu's Back Door: The History of the Harbor Defenses of Kaneohe Bay and the North Shore Groupment 1914-1946," CDR, Champaign, IL, 2004, pp. 48-49. Major Davis Jones and Sgt. W.C. Addleman, *Dictionary of Hawaiian Place Names, s.v. Kalaeokahipa (ka-la'ay-o-ka-he-pa; rocky cape)*, (Schofield Barracks: Hawaiian Division, 1937, revision of May 1945,) p. 9.
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6. Ho'okuleana, "Civilian Conservation Corps (CCC)," http://totakeresponsibility.blogspot.com/2013/10/civilian-conservation-corps-ccc.html, Dec. 23, 2014.
7. Ball, "The Piko Club," 2003, pp. 192-93.
8. "FY05/FY06 Drum Rf. Upgrades, Phase I and II, Helemano, Oahu, Hawaii," http://www.dgmarket.com/tenders/np-notice.do?noticeId=1172085, Jan. 28, 2015. Wikipedia, "Hugh Aloysius Drum," http: en,wikipedia.org/wiki/Hugh_Aloysius_Drum, Jan. 28, 2015.
9. Gaines, "Guarding Oahu's Back Door," p. 46.
10. John D. Bennett, "Oahu's Command and Fire Control Cable System," CDJ, Vol. 16, No. 4 (Nov. 2002), pp. 42-54. Department Engineer Office, HHD, Ft. Shafter Revisions, Island of Oahu, "Hawaiian Defense Project 1940, Command and Fire Control Project," Aug. 1939, File 10+10M39.
11. Dept. Engineer Office, HHD, Ft. Shafter Revisions, "Hawaiian Defense Project 1940, Inclosure No. 5, Basic Document: Beach and Mobile Defense," File 10+10M29, Aug. 1939.
12. William C. Gaines, "Installations and Organizations of the Coast Artillery Corps, U.S. Army, on the Island of Oahu, Territory of Hawaii, 1905-1946," Champaign, IL, SCARP Associates, ©2007, pp. 438-39.
13. Ibid.

14. Stetson Conn, et al. *Guarding the United States and its Outposts*, in: *The United States Army in World War II, The Western Hemisphere***:** http://www.ibiblio.org/hyperwar/USA/USA-WH-Guard/index.html#index, accessed on Jan. 29, 2015.

15. William H. Dorrance, "The 4-Inch Navy Guns that Protected Hawaii," *CDSGJ,* Vol. 9, No. 4 (Nov. 1995), p. 43. John D. Bennett, "Kaena Point Military Reservation," *CDJ,* Vol. 12, No. 2 (May 2005), pp. 82-88. Gwenfread Allen, Hawaii's War Years 1941-1945 (Honolulu: Univ. of Hawaii Press, 1999), pp. 226-27.

16. William C. Gaines, "155 mm Gun Employment and Emplacements on Oahu, T.H., 1921-1945," *CDJ,* Vol. 13, No. 2 (May 1999), pp. 77-78.

17. John D. Bennett, "Kawailoa Battle Position, 8-inch Railway Guns," *CDJ,* Vol. 28, No. 4 (Nov. 2014), pp. 4-13; "Kahuku's Defenses," *CDJ,* Vol. 26, No. 4 (Nov. 2012), pp. 22, 23, 28-33.

18. Gaines, "Guarding Oahu's Back Door," pp. 214-15. "United States of America 14"/45 (35.6 cm) Marks 11, 2, 3 and 5," http://navweaps.com/WNUS_14-45_Mk1.htm, Feb. 2, 2015.

19. Gaines, "Guarding Oahu's Back Door," p. 215.

20. Co. E, 580th Signal Aircraft Warning Hawaii, VII Fighter Command, 7th Air Force, "Organizational History," microfilm, Air Force Historical Research Agency, Maxwell, AFB, AL.

21. Ibid., p. 2.

22. Ibid., p. 5.

23. William C, Gaines, e-mail to writer on Sept. 18, 2004.

24. "Historical Review, Corps of Engineers, United States Army, Volume 1, Covering Operations During World War II, Pacific Ocean Area," RG 494, Entry 118, NARA, College Park, MD. Karl C. Dod, *The Corps of Engineers: The War Against Japan* (Washington: CMH, 1987), p. 348.

25. William C. Gaines, "Antiaircraft Defense of Oahu 1921-1945," *CDJ,* Vol. 15, No. 2 (May 2001), p. 52.

26. HQ, HAW, Seacoast Artillery Command, APO 956, "Acquisition of Land at Radar King," map, dated 19 June 44, archived at the U.S. Army Museum of Hawaii, Ft. DeRussy, HI.

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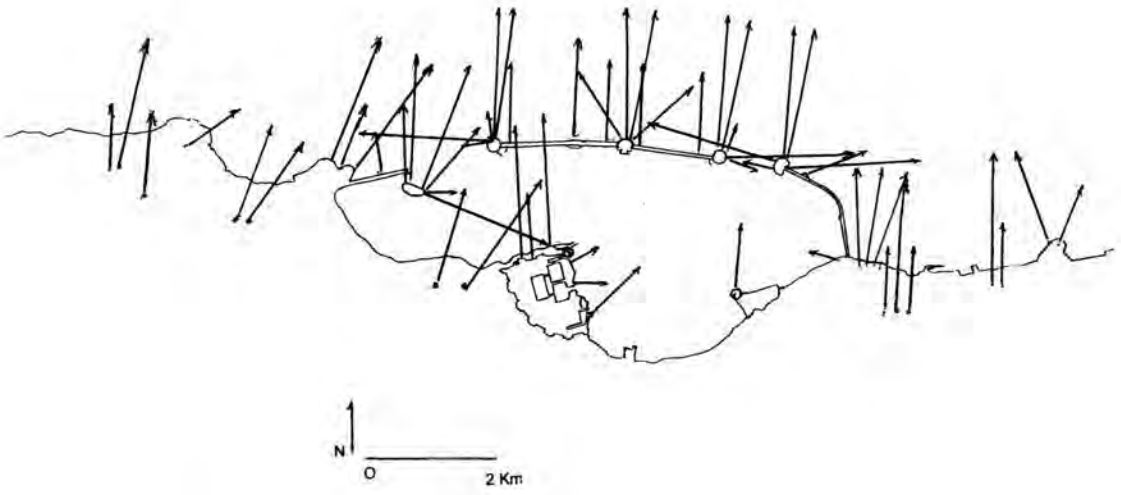
The Early-Modern Seacoast Defenses of Cherbourg

D.P. Kirchner

This is the second in a series of articles describing the pre-WWI seacoast defenses of France.

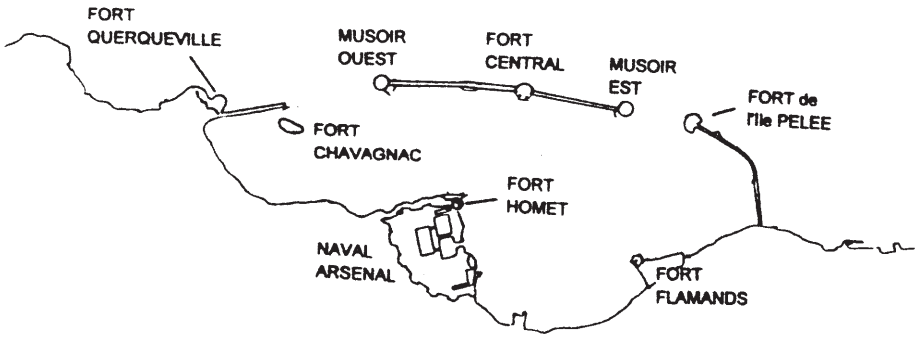
The Defenses

In 1912, Cherbourg was defended by 243 guns and mortars in 65 batteries, an array of armament probably unmatched anywhere in the world. Map C1 shows battery positions and capitals. The calibers and types of weapons involved are shown in subsequent maps.



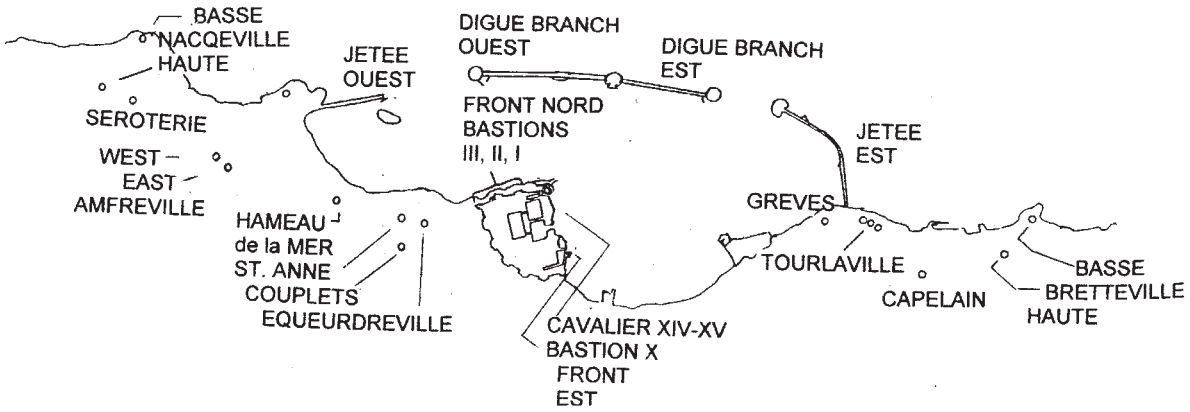
Map C1 – Seacoast batteries at Cherbourg, 1912

The two maps that follow show forts, batteries, and other points of tactical importance in the Cherbourg defenses.



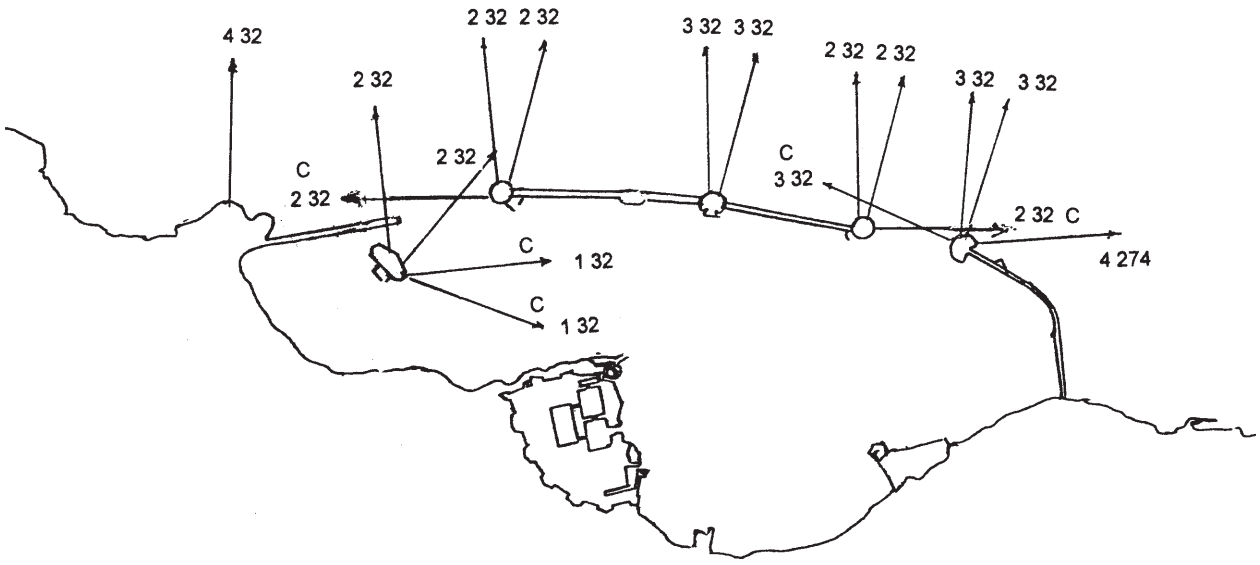
Map C2 - The defenses of Cherbourg, 1912, points of major defensive importance.

To reduce congestion, two maps are used to show points of major defensive importance.



Map C3 – The defenses of Cherbourg, 1912, points of major defensive importance.

The following maps show the various categories and calibers of armament in the defenses.



Map C4 – The defenses of Cherbourg, 1912, the heavyweights: The 37 - 32 cm and four 274.4 mm guns that provided the main power of the defenses.

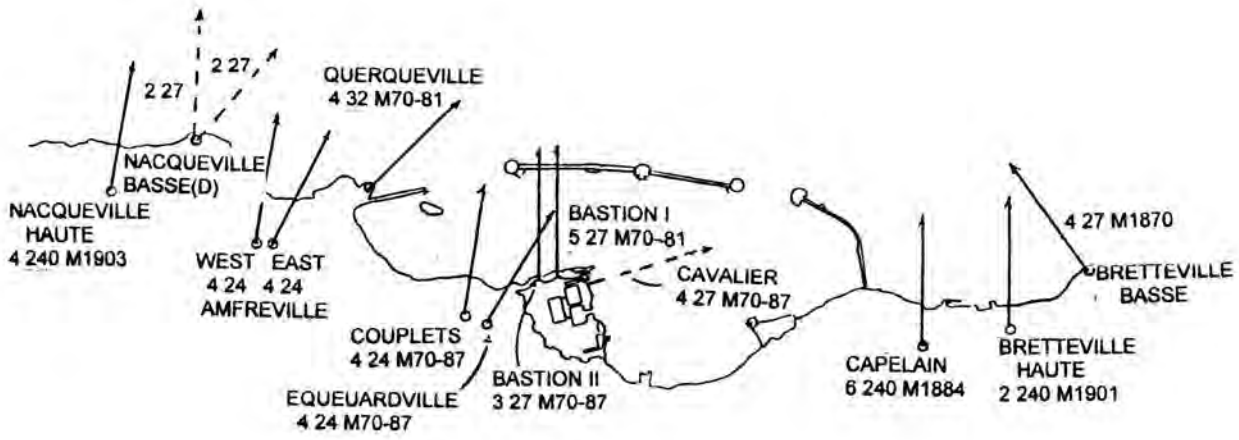
The main strength of the defenses was provided by 27 - 32 cm guns in the breakwater forts. These were augmented by six 32s in Fort Chavagnac, and by two other batteries, one to the west, on the mainland - four 32s M70-81 at Fort Querqueville - and one to the east, a battery of four formerly-shipboard steel 274.4 mm M1881 guns in Fort Ile Pelee.

In this map, the number of guns in each battery is shown. Casemated batteries are indicated by "C." The casemated guns had no traverse.

Armament data are tabulated as follows:

Caliber	32 cm	32 cm	32 cm	274.4 cm
Model	M70-81	M70-84	M70-93	M1881
Fort Querqueville	4	-	-	-
Fort Chavagnac	2 (2 casemated)	4	-	-
Musoir Oest	-	6 (2 casemated)	-	-
Fort Central	-	6	-	-
Musoir Est	-	6 (2 casemated)	-	-
Fort Ile Pelee	--	1	8 (3 Casemated)	4
Totals	6	23	8	4

Total 32 cm: 37
Total 274.4s: 4



Map C5 – The defenses of Cherbourg, 1912: The heavy reinforcing and flank gun batteries. Dashed lines show batteries that had recently been dismounted. Mortar batteries are shown on the next map.

Reinforcing the 32s were 15 additional heavy gun batteries on the mainland, mounting 68 guns. In addition, two four-gun batteries recently had been dismounted:

Heavy Gun Batteries on the Left and Right Flanks

Battery	Left flank	Right flank
Nacqueville Haute	4 - 240 mm M1903*	
Bretteville Haute		4 - 240 mm M1901
Bretteville Basse		4 - 27 cm M1870M**
Amfreville West	4 - 24 cm M1870	
Amfreville East	4 - 24 cm M1870	
Capelain		6 - 240 mm M1884
Querqueville	4 - 27 cm M70-81***	

Heavy Gun Batteries Covering the Inner Harbor

Battery	To the left of the naval arsenal	On the ramparts of the naval arsenal****
Couplets	4 - 24 cm M70-87	
Equeurdreville	4 - 27 cm M70-87	
Bastion I		5 - 27 cm M70-87
Bastion II		3 - 27 cm M70-87

19 cm Guns Reinforcing the 32s on the Main Breakwater

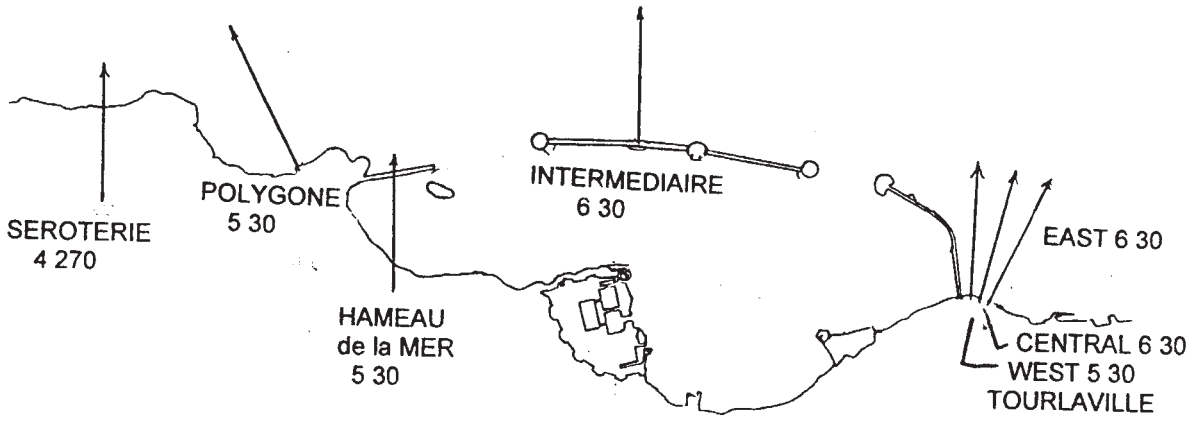
19 cm Bat. No. 1 (beside Musoir Est)	5 - 19 cm M70-93
19 cm Bat. No. 2 (to the right of Ft. Central)	5 - 19 cm M70-93
19 cm Bat. No. 3 (to the left of Ft. Central)	5 - 19 cm M70-93
19 cm Bat. No. 4 (beside Musoir Oest)	5 - 19 cm M70-93

* The M1903 was the most modern pre-WWI French heavy gun in the defenses. The Nacqueville M1903s and the Bretteville M1901s were the only 20th century heavy guns in the Cherbourg defenses.

** Nacqueville Basse Battery was the left-flank counterpart of Bretteville Basse Battery. The four 27s at Nacqueville Basse had recently been dismounted around 1910. Presumably Bretteville Basse Battery, with the oldest guns in the defenses, was also scheduled for deactivation.

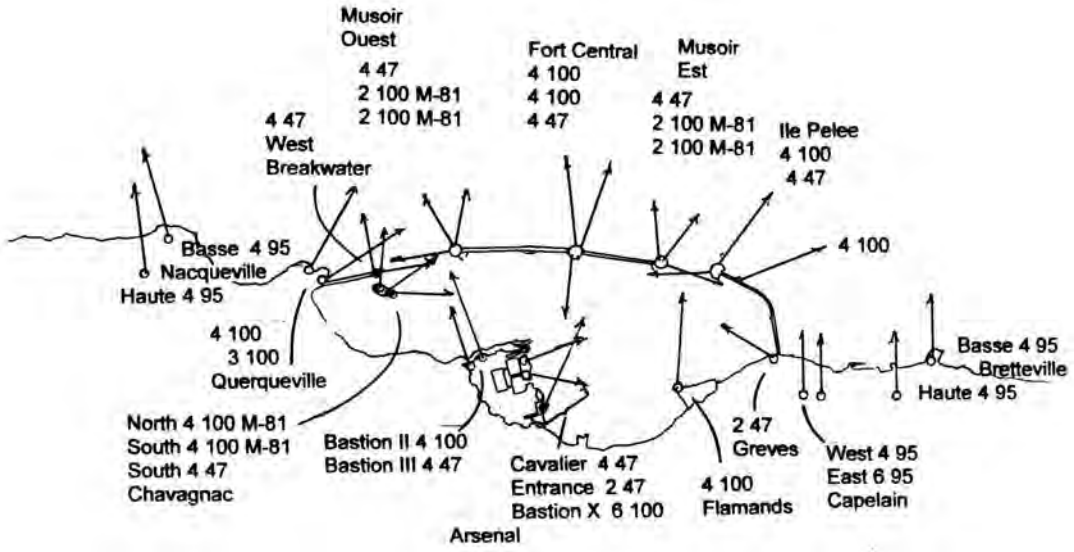
*** The four Querqueville 32s also were shown on the previous map.

**** Four 27 cm M70-81s had recently been dismounted from Cavalier Battery.



Map C6 – The defenses of Cherbourg, 1912: The mortars.

All mortars were 30 cm except the four 270 mm M1889 at Battery Seroterie. Batteries Hameau and Tourlaville Centre were dismounted between 1904 and 1912.



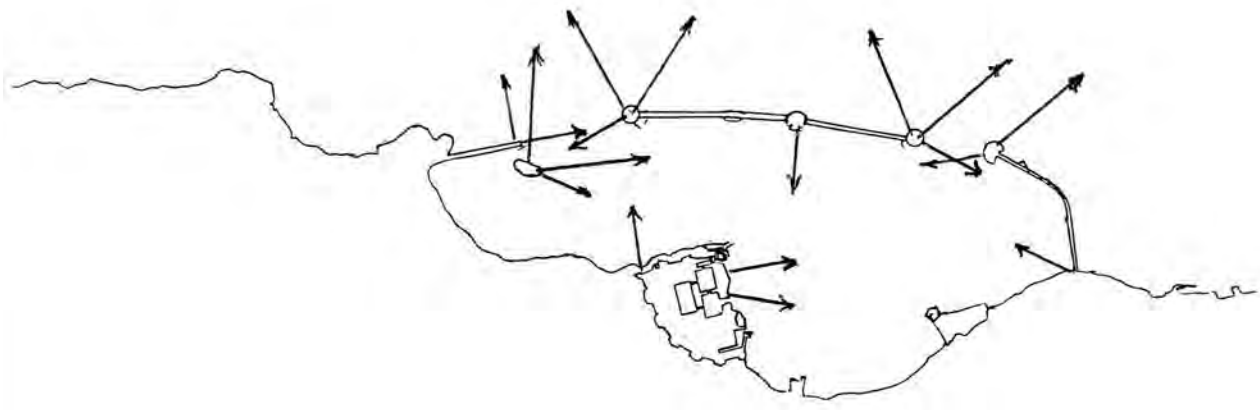
Map C7 – The defenses of Cherbourg, 1912: The rapid-fire batteries.

Just as Cherbourg was guarded by an incredible number of heavy guns, so was it defended by remarkable quantities of smaller-caliber rapid-fire batteries. Their primary role was to oppose enemy torpedo boats, which became a serious threat around 1880. Forty-nine 100 mm M1881 guns were installed in the coast defenses in the early 1880s, followed over the next few years by 199 - 47 mm M1885 guns.

These eventually were reinforced by 408 - 95 mm M1888 guns, which were followed by 20 - 100 mm M1897 guns plus 77 - 100 mm M1889-T-97 guns. The T-97 conversion provided a new breech-block to an older gun, giving it the same characteristics as the M1897.

Most of the many 240 mm M1884 batteries installed in the late 1880s and early 1890s were accompanied by 95 mm *batteries annexe*. Cherbourg had only one M1884 battery, and it was accompanied by not one but two *batteries annexe,* one with six 95s and the other with four. The two other 240 mm batteries at Cherbourg, of later models, also had 95 mm *batteries annexe*.

The 65 mm anti-torpedo boat (ATB) gun was introduced in 1904, but none was provided to Cherbourg.



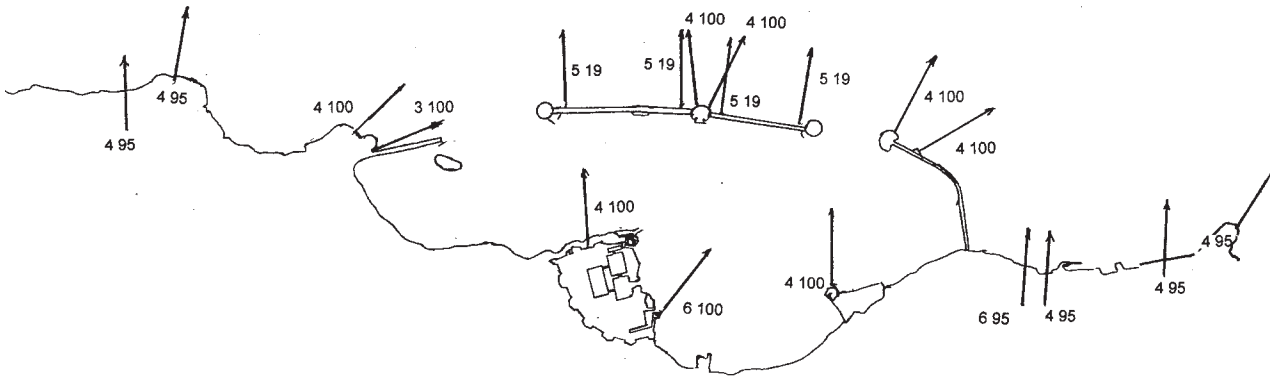
Map C8 – The defenses of Cherbourg, 1912: The 47 mm and 100 mm M1881 batteries.

It is important to differentiate between the 100 mm M1881 gun and the later M1897 and T-97 100 mm guns, because the newer guns were much more powerful than the older pieces.

The 47s were fast-firing, and dangerous to torpedo boats at short ranges, but had much less range and hitting power than the M1897 100s, and they began to be dismounted around the turn of the century. This array of rapid-fire batteries is further analyzed, by caliber, in the following maps.

The longer arrows represent 100 mm M1881 batteries, and the shorter arrows represent 47 mm M1885 batteries. All 100 mm batteries had two guns, except the battery of Fort Pelee, which had four. The 47 mm batteries had four guns, except the Fort Pelee Battery, which had six guns, the Greves and Flamands Batteries, which had two guns, and a two-gun battery on the cavalier covered the arsenal entry. The battery at the end of the western breakwater had four guns in two pairs, which had fields of fire 90 degrees apart.

The following map shows the 95 mm and 100 mm M1897 and M1889-T-97 batteries:



Map C9 – The defenses of Cherbourg, 1912: The 95 mm and 100 mm M1897 and M1889-T-97 batteries.

The following table shows the numbers and types of rapid-fire guns in the various batteries at Cherbourg, ca. 1912. A later map shows how the ATB defense was intended to evolve. The later plans envisioned only 100 mm guns in the ATB role.

Caliber	100	47	95	100
Model	M1881	M1885	M1888 (de cote)	M1897or T-97
Nacqueville				
Basse			4	
Haute			4	
Querqueville				
Ouvrage 4				4
Ouvrage 2*				
West Breakwater				
East		2		
North		2		
Chavagnac				
Left	2			
Right	2			
South		4		

Caliber	100	47	95	100
Model	M1881	M1885	M1888 (de cote)	M1897or T-97
Musoir Ouest				
Left	2			
Right	2			
West		4		
Fort Central				
Left				4
Right				4
Harbor		4		
Musoir Ouest				
Left	2			
Right	2			
East		4		
Naval Arsenal				
Bastion II				4
Bastion III		4**		
Cavalier XIII-XIV	4			
Entrance		2		
Bastion X				6
Ile Pelee				
Northwest				4
West		6		
Breakwater				4
Flamands				4
Greves		2		
Capelain				
West			4	
East			6	
Bretteville				
Basse			4	
Haute			4	

* Three 100s M1897 armed this position for a few years after about 1900.

** Recently dismounted.

Mission

The mission of the Defenses of Cherbourg was to protect the naval arsenal and the port of Cherbourg.

Background

It should be remembered that Cherbourg, as a major fortified naval base, arrived late to the game. Since medieval times, the narrow seas between England and France had been, almost continuously, maritime battlegrounds, and in those long-sustained struggles, the British had one important advantage: their ports. Although both sides of the channel were rimmed with small, exposed, harbors, none suitable as shelters for substantial fleets, there were in addition, on the English side, five well-protected harbors of considerable size. Over the years, the British developed these harbors as strong bases for their fleets. The French had no such advantage.

The British fleet support bases - "dockyards" - were at Woolwich, Chatham, Sheerness, Plymouth, and, most importantly, Portsmouth. From 1495, with the construction of the first British drydock, at Portsmouth, the British had developed these ports as their need to keep wartime fleets at sea expanded. Over three centuries, the fleets and the ships themselves had grown continuously larger, and the matter of fleet support involved not only providing sheltered and defended anchorages, but at the same time creating the shipyard organizations necessary to repair and maintain warships in large numbers, to replenish and rearm them, and to hospitalize their sick and wounded, while also building and outfitting new vessels. By 1750, the dockyards of the Royal Navy at home and overseas formed by far the largest industrial organization in the world. The thoughts of this paragraph are distilled from Jonathan G. Coad, *The Royal Dockyards, 1690 – 1850*, Scolar, Aldershot, 1989.

On the French side, the ports along the channel upon which their fleets relied were Dunkerque, Boulogne, Calais, and Le Havre. Medieval they may have been to begin with, but into the 20th century they were still in use and well-armed. The common pattern was that at each port a river entrance had been dredged, widened, and canalized, while just inward from the beach, basins and docks had been scraped out and wharves constructed.

La Hougue, also on the channel, and of interest in this study, did not adhere to the common pattern. It was a fishing village, not a fleet-support base. Its military role was to shelter French ships seeking protection from enemy ships. It offered defenses, and little else, and not much of those. The harbor of Cherbourg, shallow and exposed, was of trivial importance until, as described herein, the end of the 18th century, when its development as a military port began.

In each case, the French harbors were small. Mooring space was tightly constrained. These harbors simply did not have water area for fleet anchorages. Each harbor had its defenses, which were tested from time to time by British, Dutch, or Spanish assailants.

The primary French base was at Brest. At Brest, an abundantly spacious anchorage flanked the entrance to a river, the Penfeld, along the well-defended banks of which the French created their primary naval arsenal. Both the anchorage and the arsenal could be approached only through a three-mile-long channel, one mile wide, lined from early times with forts and guns. The Brest area was designed by nature to be a secure naval base; a generous gift from the Gods of Geography to the navies of France.

Brest was, however, three days brisk sailing from the Channel. A strong base nearer the scene of action was strategically and tactically essential to France. Official interest in creating a powerful base nearer England had been expressed at least as early as 1686, by Vauban. At that time, Cherbourg was a walled city with a medieval citadel, on the left bank of the entrance to a small river. It was at the head of a wide bay, open to the sea. As a port, Cherbourg was small, exposed, and uninviting. An antiquated fort on a rocky outcropping, Ile Pelee, guarded the eastern portion of the bay and another ageing fort, Fort Artoise (rebuilt later as Fort Homet) protected the left flank. The distance between the western point, at Querqueville, and Ile Pelee, was more than four miles – 7,000 meters. To create a sheltered

harbor, a substantial portion of that distance would have to be walled off by a breakwater. The base itself – the naval arsenal - then could be created.

There the matter rested until 1756, when a commission was appointed to study the question of establishing a *port militaire* on La Manche (the sleeve, or, to the English, the English Channel). This commission proposed that La Hougue be developed as the needed base. A commission in 1776 evaluated Cherbourg, Boulogne, and Ambletuese, ten miles north of Boulogne, and another in 1777 concentrated on Dunkerque and Gravelines, 15 miles southwest of Dunkerque. Some time later, Louis XVI called for further analysis, including consideration of the advisability of developing Le Havre, La Hougue, or Cherbourg. The final decision was to create a massive breakwater, and build the arsenal at Cherbourg.

One concept was to fill hulks with stone and sink them along the desired trace, a proposal reminiscent of the Arromanches breakwater of June 1944. The hulks were then to be surrounded by stone. Another plan was to build two stone breakwaters, forming a long line, with the harbor entrance between the two, and with a third breakwater farther seaward, protecting the entrance. One plan put forward in 1781 was to build huge baskets or cribs of wood, install them in a long line across the bay, and fill them with stone, and then fill the space between with stone. Whatever the design to be selected, it was clear that no breakwater of comparable scope had ever been constructed. It would be a task equivalent to building the great pyramids at Giza. Together with the enormous new breakwater, a naval arsenal of the first order would be constructed, to sustain and increase the French fleet on the Channel. The new base at Cherbourg was to be France's "advanced bastion" against England.

For our purposes, the project had three fundamental elements:

Construction of the breakwater,
Development of the naval arsenal
Installation of the defenses

Construction of the Breakwater

The breakwater project began in 1783. The chosen approach was to install 90 enormous "cones," huge wooden frameworks, filled with stones and positioned on the sea bed in a line stretching from near Ile Pelee westward to Point Querqueville, that is, roughly along the line of the central and western breakwaters as eventually built. Each cone was made of scores of squared tree trunks lashed together by chains. Weighing 500 tons, each of the cones was an immense engineering undertaking. Each had a 19.5 m/64 ft. opening at the top. On the sea floor the base was 45.5 m/149 ft. wide. Each was adjacent to the base of its neighbor. A space was left near Ile Pelee as an entry, and another was to be provided about halfway along the line of cones.

The wooden structures were built on land and floated to their intended locations, where they were positioned on the bottom. Then they were filled with stones. Three to four hundred small ships were used in the stone-moving work. The first prototype cone was built and tested in November 1783 at Le Havre, disassembled and towed to Cherbourg, and installed June 6, 1784, the second in July. The cones at first seemed serviceable, but the second soon failed, and by the time the 9th was in place, three had collapsed under the battering of the sea, spilling their stones onto the sea floor. The installation of the ninth cone was witnessed by Louis XVI on June 23, 1786. The king was an enthusiast for the Cherbourg project; this was his only foray outside Paris and Versailles during his reign. By the time the 18th had been installed on June 11, 1788, four years after the first, it was clear that the project had failed, and work on the cones was halted.

The decision was then made, in 1789, to create a breakwater of loose stones piled on the bottom. The seafloor along most of the trace was about 18 m (60 ft.) deep. As built, the pile of stones sloped upward to the surface, over a span of about 100 m (330 ft.), that is, at a gradient of about one to five. Just below the surface it was crowned by a 10 m (31 ft.) vertical wall. The wall formed a parapet, the top of which was 7 m (23 ft.) above mean low water. Behind the parapet was an 8 m (26 ft)-wide walkway long the length of the breakwater. The walkway was 5.4 m (17.7 ft.) above sea level where it joined the parapet and 5.3 m (17.3 ft.) at the outer (rear) edge. This breakwater, as eventually built, was 3712 m (12,178 ft./2.3 miles) long. It has been calculated that 10,974,280 tons of stone went into its construction. It formed the world's largest artificially-sheltered roadstead until the completion of the Los Angeles breakwater in the 1930s.

Construction of the breakwater took 70 years, including years when work was halted due to lack of funding, which usually accompanied regime changes. Work was suspended during most of the revolutionary era, after 1792, and re-started by Napoleon in 1803. Work was again halted after Waterloo, until 1832. Even so, the construction program has to be regarded as a long-sustained national effort, carried out under the Bourbons, into the Revolution, through the Empire, through the Restoration, and eventually into the Second Empire.

In the early stages a central section of the new breakwater was raised to form the base of a fort. This 20-gun fort on the breakwater formed a narrow oval. It had a small tower on either end. It was competed in 1807 and christened "Battery Napoleon." On February 12, 1808, the fort was swept away by a storm that drowned all the people on the breakwater - the total construction force as well as the garrison of the fort and their families; 246 lives were lost.

The main body of the breakwater began to reach the surface in 1838 and the structure was completed in 1853. The forts on the ends of the breakwater - "Musoirs" - were completed in 1851 and the fort at the center in 1859. The two breakwaters to the east and west of the central breakwater were installed in the late 1890s.

Development of the Naval Arsenal

Napoleon ordered construction of the naval arsenal at Cherbourg on April 15, 1803. A vital feature of the arsenal was its sturdy ramparts. Cherbourg had been raided by the British in 1692, 1758, 1779, and 1783, leaving the town devastated and substantial numbers of ships burned. There was to be another raid, of limited effect, in 1804. The trace incorporated 10 bastions, plus outerworks, along the 2200-meter (2400-yard) length of the curved land side. The seaward sides were defended by ramparts that were somewhat less strong, but nevertheless formidable. They incorporated at their northeast corner the three-tiered casemated Fort Homet, rebuilt 1779-1785. The bastioned walls of the arsenal were completed in 1810.

The arsenal's defenses were by no means intended simply to fight off a light-weight, perhaps swift, commando-style, land attack. The ramparts were designed to withstand a full-scale siege. The arsenal was of considerable size: 120 hectares (almost 300 acres) in area. Its maximum dimensions, behind its curved landward walls, which were 2.3 km (1.5 mi.) long were:

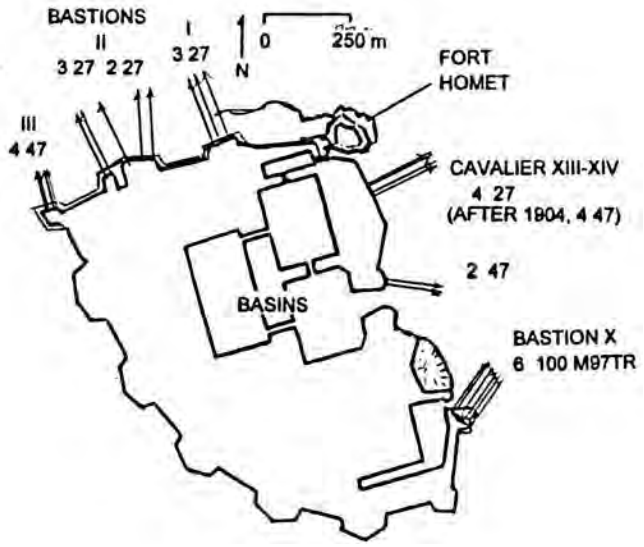
N to S, 1280 m (1400 yds.)
E to W, 915 m (1000 yds.)

The design incorporated three large basins, each a port suitable for harboring or fitting out dozens of ships. The three basins were remarkable engineering achievements; each 50 feet deep, hacked and blasted out of solid rock. Two of these basins, each more than 290 m (950 ft.) long and 250 m (700 ft.) wide, lined the eastern rim of the dockyard, behind the eastern ramparts.

Ship construction had already begun when the first of these, the "Basin Napoleon I," was opened on August 27, 1814, the occasion of the formal commissioning of the arsenal. The ceremonies were conducted, it will be noted, by Bourbon royalty, Napoleon having been on Elba at that moment for four months. Because ships entering the other two basins had first to transit through the Napoleon I basin, that basin was also known as the *avant-porte*.

At the time of commissioning, work on the second basin was in progress. That basin was completed in 1829 and named for Charles X, then the reigning king of France. The third basin, "Napoleon III," even larger than the others at 420 x 200 m (1378 ft. x 656 ft.), was completed August 7, 1858.

Eleven building slips, four of which were covered by massive sheds, and eight drydocks opened off the basins. The arsenal was crowded by huge barracks, headquarters, and administrative buildings, storage yards, warehouses, and construction shops. Among the world's 19th century naval installations, the Cherbourg naval arsenal was the premier model of a modern fortified shipyard.



Drawing C1 – The Cherbourg naval arsenal

The arsenal built two line-of-battle ships, a 74 and an 80, before Waterloo, but for the next several years, into the 1820s, there was essentially no construction of new ships. Thereafter, with the reconstruction and modernization of the navy, and the adoption of steam power and iron hulls, the Cherbourg naval arsenal became a powerhouse of French naval construction.

Installation of the Defenses

As is seen in Maps C1 through C3, the seaward defenses of Cherbourg formed two lines – one along the breakwaters and one along the mainland shore. Through circumstances, the Cherbourg defenses did not receive the normal liberal allocation of First-Period armament. This occurred because the forts on the breakwaters, plus Forts Chavagnac, Flamands, and Querqueville, were all designed for smoothbores. But the smoothbore age was ending and the casemated forts were not designed to mount the increasingly larger guns that followed.

For explanation of the armament of the three periods, see the first article of this series, "The Early-Modern Seacoast Defenses of France, Part I," *Coast Defense Journal*, Vol. 29, No. 1 (February 2016), p. 1. For more detail, see also D.P. Kirchner and C.B. Robbins, "Early Modern French Seacoast Ordnance," *Coast Defense Journal*, Vol. 24, No. 1 (February 2010), p. 4. It is important to understand the

evolution of the armament over the time period covered by this article (1870-1914); therefore, a brief summary is appended as Attachment 1.

For the first decades after their completion, the new forts were armed initially with smoothbores, then with rifled muzzle loaders, then with muzzle loaders converted to breech loaders and finally with the smaller early models of First-Period guns. The problem was that the First-Period guns were larger than their predecessors, and the Second-Period pieces were even larger. The casemates, built for smoothbores, could not accommodate the larger guns.

Except for Fort de l'Ile Pelee, we do not know how many First-Period pieces were mounted in the forts, but the forts individually probably mounted fewer than Pelee. For Pelee, in 1892, the number was 16. Eight of those weapons (four 19s and four 24s, all long-obsolete, pre-First-Period M1864-66 pieces) were oriented landward or fired inward, into the harbor. Only five 24 cm M1870s – guns of moderate caliber - were positioned to deal with enemy ships to seaward. In addition to these five, there were three obsolete 27 cm M1864-66s.

Presumably the other harbor forts mounted even fewer first period pieces than did Pelee. The other breakwater forts had two tiers of casemates. The only place to mount guns too large to fit into the casemates would have been the barbette tier, but the ability of the upper levels of those masonry forts to sustain firing shocks of larger guns undoubtedly prevented the employment of the more powerful First-Period guns *en barbette*. Pelee had only one tier, on its seaward side. Trunnion height and other data suggest that the seaward guns either were in casemates or atop a single tier of casemates, and that the rearward-facing pieces were in open emplacements, not in or atop casemates.

With the technology of armament and armored ships advancing rapidly, the guns that were needed were new, powerful, Second-Period 32s, but what the forts mounted was a small number of museum-vintage antiques.

To reinforce the feeble First-Period firepower of the forts, 60 First-Period 19 cm guns were lined up on the breakwater around 1880 in 12 five-gun batteries, forming a line of batteries unmatched anywhere else in the world. These batteries, without flank or rear protection, with limited traverse where wide traverse was needed, and lacking adequate magazines and crew shelters, highlighted the deficiencies of the late 19th century armament of the outer line. The forts, and the batteries along the breakwaters, simply could not be adequately armed as the era of the large-caliber breechloading rifle proceeded. By the mid-1880s it was clear that the breakwater forts had to be rebuilt.

In the 1890s, the breakwater forts were razed to the lower casemate deck level, strengthened by massive walls and parapets of concrete on their seaward sides, and armed with new, powerful, 32 cm main batteries plus other supporting armament. Whatever they lacked in firepower through the first period, they more than counterbalanced in the second. Fort Chavagnac was not razed, but encased in a massive shell of stone and concrete. Fort Flamands was not modernized, and was employed thereafter in its seacoast defense role first to mount a First-Period 19 cm battery on its barbette tier, and then to mount a 100 mm Third-Period ATB battery. It chiefly functioned as a magazine. Fort Querqueville was not rebuilt; all the Querqueville batteries were outside the fort's walls. For further explanation of the evolution of the breakwater armament, see "Les Batteries de Rupture, Part II," *Coast Defense Journal*, Vol. 26, No. 4 (November 2012), p. 71.

Meanwhile, the second line, on the mainland, received a small number of First-Period pieces, and then a substantial quantity of Second-Period armament.

In summary, Cherbourg was formidably defended after around 1900, but was defended only modestly until Second-Period armament could be mounted in the rebuilt breakwater forts.

Armament by Time Periods

The armament in place in 1912, categorized by time periods, was as listed below. No new armament was installed before 1914.

Battery	First-Period The 1870s	Second-Period The 1880s	Third-Period 1890 to /1914
Batteries on the left (West) flank			
Batteries de Nacqueville			
Bat. Haute			4 - 240 M1903TR
Bat. Haute Annexe		4 - 95 de cote	
Bat. Basse 95		4 - 95 de cote	
Bat. de la Seroterie		4 - 270 Mortars M1889	
Bats. d' Amfreville			
West Bat.	4 - 24 M1870		
East Bat.	4 - 24 M1870		
Batteries on the mainland near the West Breakwater, and on the West Breakwater			
Bat. de la Butte du Polygone			5 - 30 Mortars
Bats. de Querqueville			
32 cm Bat.		4 - 32 M870-81	
27 cm Bat.			3 - 27 M1870-93
TR Bat.			4 - 100 1897TR
Ouest Digue (West Breakwater) Battery			4 - 47 M1885TR
Batteries on the mainland, to the west of the naval arsenal			
Bat. des Couplets		4 - 24 M1870-87	
Bat. d'Equeurdeville		4 - 27 M1870-87	
Batteries on the ramparts of the Naval Arsenal			
Front Nord			
Bastion I		3 - 27 M1870-87	
Courtine I - II			4 - 100 M1897TR
Bastion II		5 - 27 M1870-87	
Front Est			
Cavalier XIII- XIV		6 - 47 M1885TR	
Bastion X			6 - 100 M1897TR

Battery	First-Period The 1870s	Second-Period The 1880s	Third-Period 1890 to /1914
Fort Chavagnac			
32 cm Barbette Bat. (L)		2 - 32 M1870-84	
32 cm Barbette Bat. (R)		2 - 32 M1870-84	
32 cm Casemate Bat.		2 - 32 M1870-81	
100 mm Bat. (L)		2 - 100 M1881TR	
100 mm Bat. (R)		2 - 100 M1881TR	
47 mm Bat.		4 - 47 M1885TR	
Forts and Batteries on the Central Breakwater, West to East			
Fort du Musoir Ouest			
32 cm Barbette Bat (L).		2 - 32 M1870-84	
32 cm Barbette Bat. (R)		2 - 32 M1870-84	
32 cm Casemate Bat.		2 - 32 M1870-84	
100 mm Bat. (L)		2 - 100 M1881TR	
100 mm Bat. (R)		2 - 100 M1881TR	
47 mm Bat		4 - 47 M1885TR	
Digue Branch Ouest (Breakwater, West Branch)			
19 cm Bat. No. 3			5 - 19 M1870-93
19 cm Bat. No. 4			5 - 19 M1870-93
Bat. Intermediaire			6 - 30 M1883-T-93 Mortars
Fort Central			
32 cm Barbette Bat.(L)		3 - 32 M1870-84	
32 cm Barbette Bat.(R)		3 - 32 M1870-84	
100 mm Bat. (L)			4 - 100 M1897TR
100 mm Bat.(R)			4 - 100 M1897TR
47 mm Bat.		4 - 47 M1885TR	
Digue Branch Est (Breakwater, East Branch)			
19 cm Bat. No. 1			5 - 19 M1870-93
19 cm Bat. No. 2			5 - 19 M1870-93
Fort du Musoir Est			
32 cm Barbette Bat.(L)		2 - 32 M1870-84	
32 cm Barbette Bat.(R)		2 - 32 M1870-84	
32 cm Casemate Bat.		2 - 32 M1870-84	
100 mm Bat.(L)		2 - 100 M1881TR	
100 mm Bat.(R)		2 - 100 M1881TR	
47 mm Bat		4 - 47 M1885TR	

Battery	First-Period The 1870s	Second-Period The 1880s	Third-Period 1890 to /1914
Fort de l'Ile Pelee, and the East Breakwater			
Fort de l'Ile Pelee			
32 cm Barbette Bat.(L)			3 - 32 M1870-93
32 cm Barbette Bat.(R)			2 - 32 M1870-93
		1 - 32 M1870-84	
32 cm Casemate Bat.			3 - 32 M1870-93
274.4 mm Bat.		4 - 274.4 M1881	
100 mm Bat.		4 - 100 M1881TR	
47 mm Bat		6 - 47 M1885TR	
Digue Est (E. Breakwater Battery)			4 - 100 M1897TR
Fort Flamands, and Batteries on the mainland, on the right (East) flank			
Fort des Flamands			4 - 100 M1897TR
Bat. Greves		2 - 47 M1885TR	
Tourlaville Bats.			
West Bat			5 - 30 mortars
Center Bat.			6 - 30 mortars
East Bat.			6 - 30 mortars
Capelain Bats.			
240 mm Bat.		6 - 240 M1884	
95 mm Bat. E		4 - 95 M1888	
95 mm Bat. W		6 - 95 M1888	
Bretteville Bats.			
Bats. Haute			
240 mm Bat.			4 - 240 mm M 1901TR
Bat. Annexe		4 - 95 M1888	
Bats. Basse			
27 cm Bat.	3 - 27 M1870M		
Bat. Annexe		4 - 95 M1888	

Armament Details

The following section provides information on the individual batteries. Batteries recently dismounted or scheduled for dismounting are indicated by (D).

Battery	Gun Numbers & Models	Carriage Models	Height of Site	Notes
Batteries on the Left (West) Flank				
Batteries de Nacqueville				
Bat. Haute 240	4 - 240 M1903TR	M1903TR	T 95.5	1
Bat. Haute Annexe	4 - 95 M1888	M1888	-	
Bat. Haute 24 (D)	4 - 24	Traversing	-	
Bat.Haute 19 (D)	4 - 19	Traversing	-	
Bat. Basse 27 (D)	4 - 27	Traversing	T 14.40	2
Bat. Basse 95	4 - 95 M1888	M1888	T 9.22	
Bat. de la Seroterie	4 - 270 Mor. M1889	M1890 *Ameliore*	T 74.67	3
Bats. d' Amfreville				
West Bat.	4 - 24 M1870	Traversing	T 80.03	
East Bat.	4 - 24 M1870	Traversing	T 72.43	
Batteries on the Mainland near the West Breakwater, and on the West Breakwater				
Bats. de Querqueville				
32 cm Bat.	4 - 32 M870-81	M1882PA	T 13.32	
TR Bat.	4 - 100 M1897TR	M1897PC	T 12.70	
27 cm Bat.	3 - M1870-93	-	P 13.1	
100 mm Bat.	3 - 100 M1897TR	M1897	7.0±	
27 cm Bat. (D)	4 - M1870-81	M1886PA	P 13.1	
27 cm Bat. (D)	4 – M1870	-	-	
. 19 cm Bat.(D)	8 - 19	-	-	
Polygone	5 - 30 Mor M83-T-93	M1893PA	T 5.54	4
Ouest Digue (West Breakwater)				5
4 - 47 mm Bat. (D)	4 - 47 M1885	M1885	9.0±	
100 mm Bat.	3 - 100 M1897	M1897	7.0±	
Batteries on the Mainland, to the West of the Arsenal				
Bat. Hameau de la Mer (D)	5 - 30 Mor. M83-T-93	M1893PA	-	6
Bat. St. Anne (D)	4 - 24 M1870	-	P 11.6	7
	8 - 19 M64-66	-	P 11.6	
Bat. des Couplets	4 - 24 M1870-87	M1888PC	T 46.32	8
Bat. d'Equeurdreville	4 - 27 M1870-87	M1888PA	T 20.61	9
Bat. d'Equeurdreville	4 - 27 M1870 (D)	-	T 20	

Battery	Gun Numbers & Models	Carriage Models	Height of Site	Notes
Batteries on the Ramparts of the Arsenal				
Front Nord				10
Bastion I	5 - 27 M1870-87	M1888PA	P15.30 – 16.40	
Courtine I - II	4 - 100 M1897TR	M1897PC	P 15.40	
Bastion II	5 - 27 M1870-87	M1888	T 15.64 – 15.72	
Bastion III (D)	4 - 47 M1888TR	M1888	P 18.6	
Front Est				
Cavalier XIII- XIV				
North 47	4 - 47 M1888TR	M1888	-	
South 47	2 - 47 M1888TR	M1888	-	
27 cm Bat. (D)	4 - 27 M70-87	Barbette	-	11
Bastion X	6 - 100 M1897TR	M1897TR	P 12.00	12
Fort Chavagnac				
32 cm Barbette Bat.(L)	2 - 32 M1870-84	M1888PA	T 12.79	
32 cm Barbette Bat.(R)	2 - 32 M1870-84	M1888PA	P 12.66	
32 cm Casemate Bat.	2 - 32 M1870-81	Casmt. M1888PA	T 7.98	
100 mm Bat. (L)	2 - 100 M1881TR	Vavasseur	P. 13.1	
100 mm Bat. (R)	2 - 100 M1881TR	Vavasseur	P. 12.6	
47 mm Bat	4 - 47 M1885TR	M1885	P. 13.6	
Forts and Batteries on the Central Breakwater, West to East				
Fort du Musoir Ouest				
32 cm Barbette Bat.(L)	2 - 32 M1870-84	M1888PA	T. 17.12	
32 cm Barbette Bat.(R)	2 - 32 M1870-84	M1888PA	T. 17.12	
32 cm Casemate Bat.	2 - 32 M1870-84	Casmt. M1888PA	8	
100 mm Bat.(W)	2 - 100 M1881TR	M1881	T. 17.19	
100 mm Bat.(E)	2 - 100 M1881TR	M1881	T. 17.24	
47 mm Bat	4 - 47 M1885 TR	M1885	T. 13.22	
Digue Branch Ouest (Main Breakwater, West Branch)				13
19 cm Bat. No. 3	5 - 19 M1870-93	M1886PC	T 7.62	
19 cm Bat. No. 4	5 - 19 M1870-93	M1886PC	T 7.65	
Battery Intermediaire	6 - 30 M83-T-93Mort.	M1889PC modified	T 8.51	14
Fort Central				
32 cm Barbette Bat.(L)	3 - 32 M1870-84	M1888PA	T 17.36	
32 cm Barbette Bat.(R)	3 - 32 M1870-84	M1888PA	T 17.36	
100 mm Bat. (L)	4 - 100 M1897TR	M1897PC	T 17.35	
100 mm Bat. (R)	4 - 100 M1897TR	M1897PC	T 17.36	
47 mm Bat.	4 - 47 M1885TR	M1885	P 17.11	15

Battery	Gun Numbers & Models	Carriage Models	Height of Site	Notes
Digue Branch Est (Main Breakwater, East Branch)				
19 cm Bat. No. 1	5 - 19 M1870-93	M1886PC	T 7.61	16
19 cm Bat. No. 2	5 - 19 M1870-93	M1886PC	T 7.511	
Fort du Musoir Est				
32 cm Barbette Bat.(L)	2 - 32 M1870-84	M1888PA	P 16.30	
32 cm Barbette Bat.(R)	2 - 32 M1870-84	M1888PA	P 16.30	
32 cm Casemate Bat.	2 - 32 M1870-84	Casmt. M1888PA	8	
100 mm Bat. (L)	2 - 100 M1881TR	M1881	P 16.17	
100 mm Bat. (R)	2 - 100 M1881TR	M1881	P 16.14	
47 mm Bat.	4 - 47 M1885TR	M1885	D 13.93	
Fort de l'Ile Pelee and the East Breakwater.				
Fort de l'Ile Pelee				
32 cm Barbette Bat.(L)	3 - 32 M1870-93	M1888PC	T 17.67	
32 cm Barbette Bat.(R)	2 - 32 M1870-93	M1888PC	T 17.67	
	1 - 32 M1870-84	M1888PC	T 17.67	
32 cm Casemate Bat.	3 - 32 M1870-93	Casmt. M1888PA	8	17
274 mm Bat.	4 - 274.4 M1881	M1888PC	T 10.15	18
100 mm Bat.	4 - 100 M1897TR	M1897	P 16.83	
47 mm Bats.	6 - 47 M1885TR	M1885	P 9.2	
Seaward 24 Bat. (D)	5 - 24 M1870	-	19	19
Seaward 27 Bat. (D)	3 - 27 M64-66	-	19	19
Inward left rear (D)	4 - 19 M64-66	-	10	19
Inward center rear (D)	2 - 24 M64-66	-	8	19
Inward right rear (D)	2 - 24 M64-66	-	8	19
Right flank (D)	3 - 47 M885TR	-	10	
Digue Est (East Breakwater Bat.)	4 - 100 M1897TR	M1897PC	T 8.4	
Fort Flamands, and Batteries on the Mainland, on the Right (East) Flank				
Fort des Flamands				20
100 mm Bat.	4 - 100 M1897TR	M1897PC	P 15.18	
19 cm Bat. (D)	6 - 19 M1870	-		
19 cm Bat. (D)	2 - 19 M1864-66	-		
47 mm Bat. (D)	2 - 47 M1885TR	-		
Bat. Greves	2 - 47 M1885TR	M1885	-	
Tourlaville Bats.				21
West Bat.	5 - 30 Mor. M83-T-93	M1883PA	T 14.15	
Center Bat.(D)	6 - 30 Mor. M83-T-93	M1883PA	T 14.15	
East Bat.	6 - 30 Mor. M83-T-93	M1883PA	T 14.15	

Battery	Gun Numbers & Models	Carriage Models	Height of Site	Notes
Capelain Bats.				22
240 mm Bat.	6 - 240 M1884	M1890 *Ameliore*	T 97.35-94.35	
95 mm Bat. East	4 - 95 de cote	M1888	T 97.95	
95 mm Bat. West	6 - 95 de cote	M1888	T 94.35	
Bretteville Bats.				
Bats. Haute				
240 mm Bat.	4 - 240 M1901TR	M1901TR	T 77.63	23
Bat. Annexe	4 - 95 de cote	M1888	T 80.01	24
19 cm Bat.(D)	2 - 19	-	-	25
24 cm Bat.(D)	8 - 24	-	77	
Bats. Basse				
27 cm Bat.	4 - 27 M1870M	M1883PA	P 13.95	26
Bat. Annexe	4 - 95 de cote	M1888	P 16.9	

Notes

1. Nacqueville Haute 240 mm battery was of up-to-the-minute design when it was built, probably around 1905. Like other M1903TR batteries, it was equipped with *magazines de combat* M1901. The new 240 mm battery replaced batteries of four 19s and four 24s which were dismounted after 1904. The four 19s in Nacqueville Haute were installed in 1881. The new battery had six emplacements, but only four guns. The battery position was surrounded by a ditched perimeter.

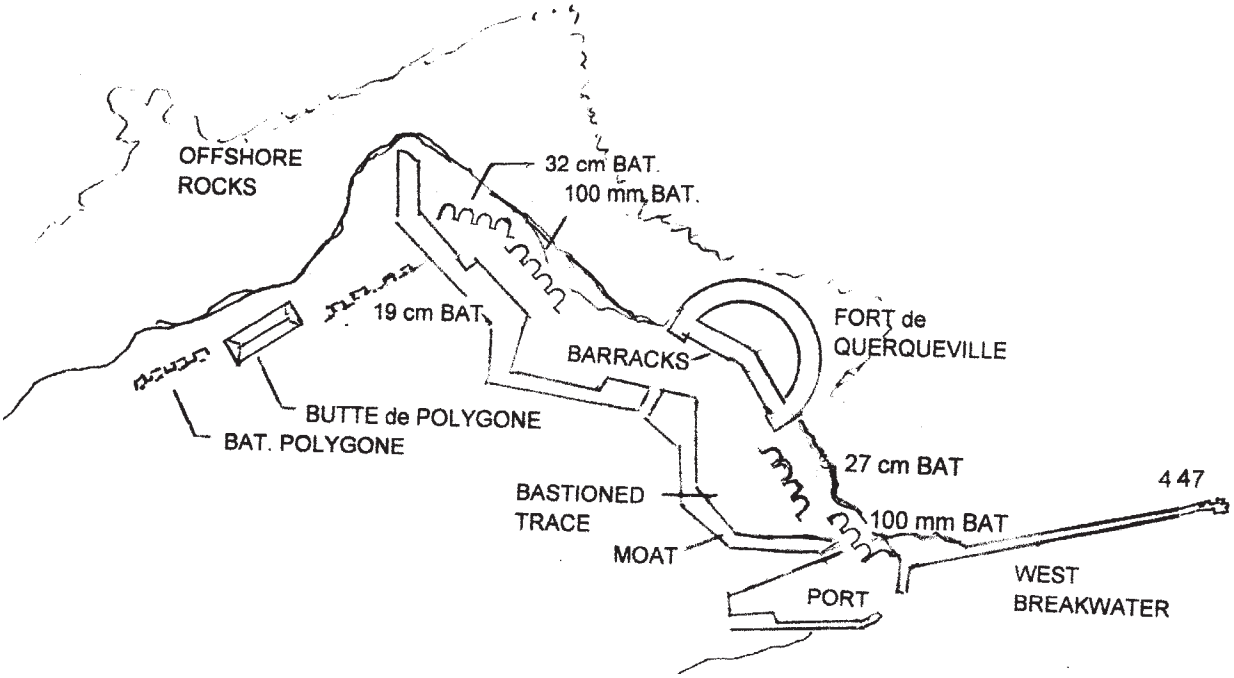
2. Nacqueville Basse 27 cm battery was armed with four 27 cm M1870M guns on traversing carriages. The capitals of the two pairs of guns were about 40 degrees apart. The carriages are assumed to have been M1883PA, the model of Nacqueville's counterpart 27 cm battery, on the right flank, at Bretteville Basse. The Nacqueville Basse Battery was protected by a strong walled perimeter with three small bastionettes. Located on the seashore, the seaward portion of the perimeter has been partly destroyed by the sea. It might be noted that Battery Bretteville Basse, on the east flank of the port, also was beside the sea and also within a walled perimeter with bastionettes. It survives essentially intact. Nacqueville *Batterie Annexe* was outside the perimeter, and the Bretteville 95s were inside the perimeter. The Nacqueville 27s were installed in 1881 and dismounted at some point after 1904 and before 1912.

3. Seroterie was equipped with a modified *magazine de combat* M1901. The mortars were positioned in pairs, with the magazine between the pairs. Presumably the magazine was a 20th century replacement for the original magazine. The magazine had only two compartments, one for projectiles and one for charges, instead of the three compartments that were normal for *magazines de combat* M1901.

4. The Querqueville Complex formed a powerful element of the Cherbourg defenses. It is shown in Map C10.

   Querqueville Fort is a vast, curved, casemated work, with 53 casemates in a row, forming an arc of about 220 degrees. Its foundations rest in the water. It is not evident from photographs or other available information that the fort mounted guns in barbette. The fort was Ouvrage 1 of the complex.

   Ouvrage 2 was a battery of four 27 cm guns M70-81 on M1886PA carriages. The battery was positioned close against the right side of the old fort. It had limited leftward traverse because its field of fire was blocked by the fort, giving this formidable battery a field of fire of only about 60 degrees, focused, at a range of about 1500 yards, on the close approaches to the western entrance of the harbor. Hidden by the old fort, this powerful battery was not visible to an approaching ship until the ship was within its field of fire, near the harbor entrance.



Map C10 – The Querqueville Complex

It appears that this battery had three sets of armament. Initially, in the 1870s, it was armed with four First-Period M1870 27s. Subsequently, presumably in the mid-to-late 1880s, the M70s were replaced by four 27 cm M70-81s. The M70-81s were mounted on barbette carriages M1886PA. That is, they were somewhat older guns on newer carriages.

Then, in or shortly after 1901, the battery was re-built, and the four M70-81s were replaced by three M70-93s. The M70-93s were very powerful, modern guns. Only three were built. The reconstruction gave the battery new *magazines de combat* M1901.

In 1899, a battery of three 100 mm M1897 guns was installed adjacent to the 27 cm battery and within a few yards of the base of the western breakwater. This battery was sometimes referred to as the "Racine" (Root) Battery. The positioning of this battery was analogous to the positioning of the battery of four 100s to the right of the 32 cm battery of *Ouvrage 4.* Racine Battery was not in service for long. By 1912, it had been dismounted. While it was in service, a total of seven high-velocity 100 mm guns bore at short range, from the Querqueville batteries, on the approaches to the western harbor entrance. These were backed up by four ageing M1881 100s at Fort Chavagnac, as well as two on Musoir Ouest. At one point, there was a plan to install four 100 mm M1897s about mid-way along the length of the western breakwater. It is thought that this project was not carried out.

Ouvrage 3 was to the left of the old fort. Its armament is not known. Apparently it pre-dated 1870. It was not armed during the period of interest here.

Ouvrage 4 was to the left of *Ouvrage* 3. By 1881, *Ouvrage* 4 was armed with, left to right: three 24s, one 27, two 24s, one 27, two 24s. These are assumed to have been First-Period weapons, that is, the 27s would have been M1870s, and the 24s either M1870s or M1876s. Five of these guns were in individual emplacements. The two pairs of 24s to the right were positioned two to each emplacement. These seven pieces were replaced, around 1888, by four 32 cm M70-81s, which were still in place in 1912. This battery provided the main heavy-weight firepower of the armament on the left flank of the defenses. The 100s were installed around the turn of the century.

The old fort, and *Ouvrages* 2, 3, and 4, were all protected to the rear by earthen mounds behind a spacious ditch.

A battery of eight First-Period 19s was positioned behind and to the left of the 32 cm battery. The two capitals were oriented at practically right angles to each other. The 19 cm battery was denominated a *batterie annexe*. It was installed 1877–79.

The *butte de polygone* was an embankment about 200 yards long built to receive test projectiles fired into it. The 19 cm battery was to its right and the *butte de polygone* mortar battery was to its left. The mortar battery was installed in 1881. Presumably it was deactivated shortly thereafter, following the withdrawal from service of the muzzleloading 30 cm M1883 mortars, and activated again with 30 cm M1883-T-93 mortars, that is, M1883 mortars that had been transformed into breechloaders as the model of 1893.

The 19 cm battery and the *butte de polygone* battery covered the left flank of the Querqueville complex. Their capitals were toward the northwest. Both were deactivated between 1904 and 1912.

From WWI until after WWII, the wide flat area behind the Querqueville batteries was a naval air station, with a period as a Luftwaffe fighter base. What was the airfield is now occupied by numerous modern buildings of a military school.

Much of the above information regarding the Querqueville Complex is from a document of the Bernard Cros collection, presented in Malchair, *Les Defenses de Cherbourg, 1874 – 1914*, 2006, privately printed, pp. 34 and 35. *Les Defenses de Cherbourg* is the most definitive description of the pre-WWI defenses of Cherbourg in the literature. Malchair provided the author one of the few copies. It was greatly appreciated and is available for reference by any CDSG member.

5. The 1050 m west breakwater was completed in 1897. Its seaward parapet was 6.97 m above mean low water and the deck behind the parapet was at the 5.31 m level, sloping to 5.26 m. The 47 mm battery was installed in 1898. Its designation was Batterie du Musoir de la Digue. Two of the 47s were directly on the end of the breakwater, in a battery elevated a few feet above the general level of the parapet. Those guns bore directly on the channel. The other two 47s, behind the breakwater parapet, were oriented parallel to the channel. The emplacements for this battery are still intact.

6. Battery Hameau de la Mer was built in 1881 and deactivated shortly thereafter, when it was determined that the method of projectile rotation was unsatisfactory. It was modernized in the 1890s or early 20th century when the T-93s were installed. In this analysis of armament along the coast from Dunkerque southward, the presence of several 270 mm mortar batteries has been noted. Cherbourg was the only channel port to receive 30 cm mortars. This battery was active in 1904 but dismounted by 1912.

7. Battery St. Anne was deactivated some time before 1912, perhaps around 1905.

8. Battery Couplets was one of four batteries mounting 24 cm M70-87 guns; the other three were at Brest. Mounted on its M1888PC barbette carriage, the M70-87 was only slightly less powerful than the all-steel 240 mm M1884, which was coming into service at the time the 70-87s were being built. Couplets Battery (as well as nearby Equeurdreville 27 cm battery) was of straightforward, simple design, without surrounding walls and moats, underground magazines, or the like. The service magazines were in the traverses between the guns. By 1912, this valuable battery was scheduled for removal, together with large numbers of other, mainly older, guns and mortars.

9. Battery d'Equeurdreville was armed by 1881 with four 27 cm M1870s, and subsequently with four 27 cm M1870-87s.

10. In 1904, the 100s of Courtine I – II were on hand but not mounted. They were installed later. The original armament of Bastion II had been five 27s, as shown in Map C5, in two or three separate batteries. At one point, four 47s were mounted in Bastion III. Their mounting and dismounting dates are not known.

11. The cavalier formed the principal wall protecting the arsenal from the east. It was armed initially with two First-Period 27 cm M1870 guns, then with two Second-Period 27 cm guns on barbette mounts. Later, two more Second-Period 27s were added. To the right of the 27s, stretching along most of the length of the cavalier, was a line of 25 - 16 cm converted smoothbores, employed as saluting guns. These sometimes show up in turn-of-the-century photographs of the naval arsenal. Eventually, after 1904, the 27s (and 16s) were removed, the 27s being replaced by four 47s. Two other 47s were at the right end of the cavalier, bearing directly on the arsenal entry channel. They were installed around 1890. Fort Homet, built at the northeastern corner of the naval arsenal and rebuilt 1779 – 1785, was not armed during the period of interest here.

12. One source cites these 100s as "M1895". Undoubtedly "M1897" is intended.

13. Around 1895, 20 Third-Period (M70-93) 19s replaced the 60 First-Period 19 cm guns on the breakwater. The 20 guns were organized into two 5-gun batteries on the breakwater to the east and west of Fort Central, and one each beside Forts du Musoir Ouest and Est. These batteries were provided with ammunition and other support by the adjacent forts, which also provided accommodations for the gun crews.

14. The deck of the breakwater had to be widened for a short distance to accommodate Batterie Intermediaire.

15. This 47 mm battery was added some time after Fort Central was completed. It fired into the harbor.

16. To illustrate the contour of the breakwater near 19 cm Batteries 1 and 2, breakwater heights are as shown, in meters:

	Battery No 1	Battery No. 2
Crest, seaward parapet	7.03	6.97
Deck, behind parapet	5.36	5.31
Rear of deck	5.33	5.26

17. These casemate guns were formerly understood to have been 32 cm M1870-84s. It is now understood that they were M1870-93s. If so, eight of the ten M1870-93s were installed in Fort de l'Ile Pelee. The other two were in Battery Capucins Haute at Brest.

18. These were former shipboard guns, allocated to the seacoast defenses. This was the only battery of 274.4 mm M1881s in the French defenses.

Around 1895, six new 274.4 mm M1893 naval guns were allocated to the coast defenses. It is thought that they were intended at the time as replacements for the M1881s at Pelee. Instead, they went into storage until 1915, when they were installed on railway mounts.

19. These guns armed Fort de l'Ile Pelee before its reconstruction, and were dismounted around 1890. It is thought that the breakwater forts had no positions suitable for guns of this size, and could not mount First-Period 19 cm or larger guns. Their armament, therefore, in effect became progressively weaker as time passed, and by around 1885 or 1890 was hopelessly obsolete. Chavagnac may have mounted large (19 or 24 cm) First-Period pieces, *en barbette,* as did Fort Flamands.

20. When built, 1844-56, Fort Flamands was an island. As late as 1890, Fort Flamands mounted six 19 cm M1870s (old guns) and two 19 cm M1864-66 (very old guns) on its parapet. It is likely that these were dismounted in the 1890s. The 100 mm battery was installed some time after 1900. In 1904 Ft. Flamands mounted two 47 mm guns, which were later removed, perhaps in connection with the installation of the 100 mm battery.

In 1904 there was a project to arm Fort Flamands with six new 305 mm 40-caliber guns, of which 12 then were being produced. Four of the guns may have arrived at Cherbourg. None was installed. All 12 of the new 305s remained in storage until eight were mounted as railway artillery, beginning in 1914.

21. The Tourlaville Batteries were built in 1888. Their original muzzleloading 30 cm M1883 mortars were soon dismounted and replaced a few years later by T-93s installed on the original carriages. The batteries were positioned in a curved line, with about 20 meters between batteries. They were of a standard design (which also was shared by Polygone and Intermediaire, as well as Toulbroc'h, at Brest.) The magazine for each battery was a long corridor, inside the parapet that formed the front of the battery. Traverses were between Mortars 1 and 2, 3 and 4, and 5 and 6. This created two firing pits each with two mortars, plus one pit and one mortar on each flank. A passageway penetrated each traverse, from the rear of the traverse into the magazine. Ammunition was moved by rail hand carts from inside the magazines to the mortars. How storage of charges was differentiated from projectiles in the magazines is not clear. For West Battery, Mortar No. 6 and the left flank firing pit was deleted from the design. For Polygone Battery the right flank pit and mortar were omitted.

22. The Capelain 240 mm M1884 guns were positioned in a battery structure apparently built for the late-model 240TRs, suggesting that when the battery was built, the intent was to arm it with TRs, rather than M1884 guns. The battery was armed with six 240 mm M1884s, on M1890 carriages *ameliore* (improved). Nothing is known of the carriage "M1890 *ameliore.*" Whatever the carriage design implied, the battery was of the latest design, featuring *magazines de combat* M1901.

The batteries with *magazines de combat* were designed to blend inconspicuously into the terrain. In this battery, the crest was contoured to fit a gentle slope, as shown by the following trunnion heights.

Gun Number	Trunnion Height
1	97.35
2	96.85
3	96.35
4	95.85
5	95.35
6	94.85

The batteries with *magazines de combat* M1901 were not ordinarily provided with defended perimeters, and that is the case here. There were no ditches, walls, caponiers, or bastionettes. Close-in defense was to be left to the infantry. The *batteries annexe* were very close to the 240 battery, within about 10 yards to the left and right.

23. The new Bretteville 240TR battery was installed in 1910 within an older, extensive, irregular, perimeter, replacing a battery of eight 24s. The battery was of normal design for the 240TR batteries, that is, it incorporated *magazines de combat* M1901. Very likely Bretteville Haute was the last battery installed at Cherbourg before the war began in 1914. It was the only 240 mm M1901TR battery in France. Twenty-one of these guns were built. The other 17 were at Bizerte. The M1901TR was a concentric-recoil weapon. Mounting the M1884 gun with its trunnions removed, it could fire much more rapidly than its M1884 predecessor. The *batterie annexe* was outside the perimeter.

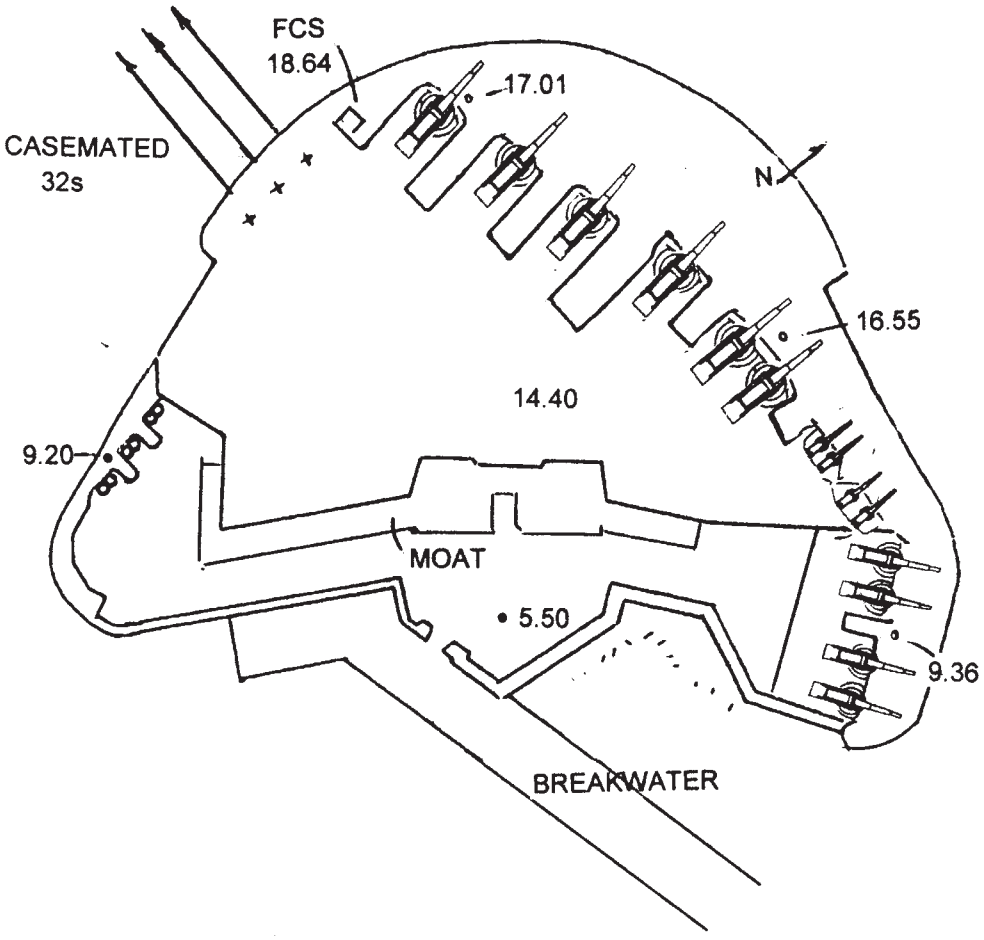
24. At Cherbourg the 95s were concentrated on the flanks. Three of the four batteries on the right flank, and one of the two batteries on the left flank, were associated with nearby 240 mm batteries. By the time those 95 mm batteries were installed, the guns were close to 20 years old, and had been supplanted in the ATB role by much more powerful 100s. Therefore, it seems likely that the 95s at Cherbourg were installed as substitutes for unaffordable 100s.

25. The 19 cm battery was installed 1878-80.

26. The 27 cm battery was within a perimeter with two bastionettes, and the *batterie annexe* was within the same perimeter. In 1904, the No. 4 gun was not mounted.

The Principal Forts

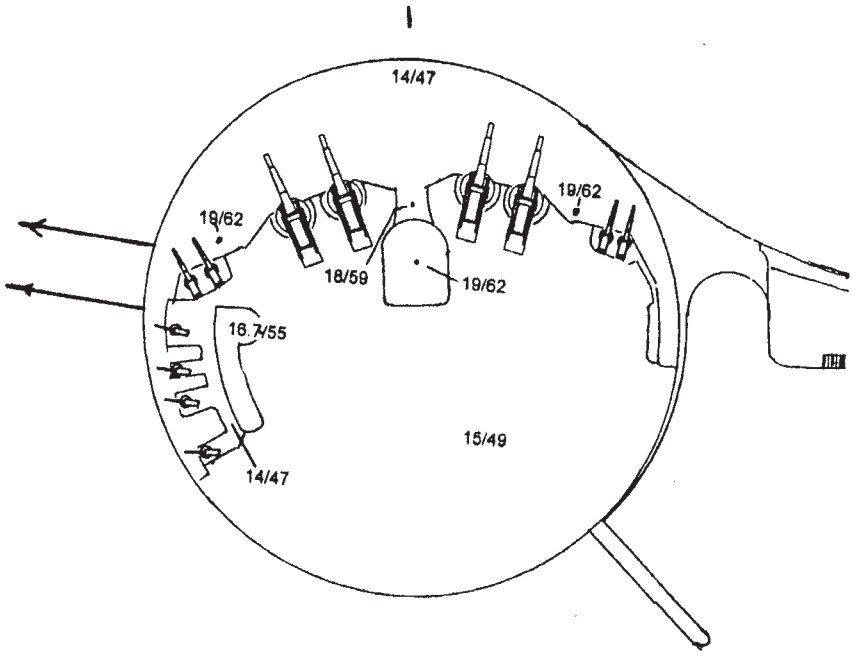
The following drawings show the armament of the principal forts, as of 1912. Arrows indicate the casemate guns.



Drawing C2- Fort de l'Ile Pelee

Fort de l'Ile Pelee

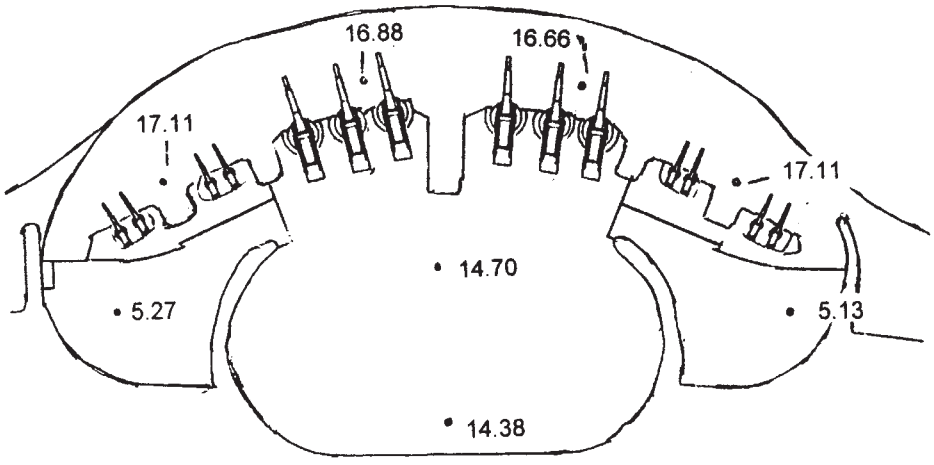
Fort de l'Ile Pelee mounted nine 32s, one of which, on the barbette tier, was an M1870-84. It is thought to have been the right-hand gun, in the line of six 32s. The eight other 32s were M1870-93s. In Drawing C2, the arrows indicate casemated, non-traversing, 32 cm guns. The 274.4 mm battery is on the right. Note the moat, inside the bastioned gorge. Heights are in meters. The longest axis of the fort is about 165 meters.



Drawing C3 – Fort Musoir Ouest

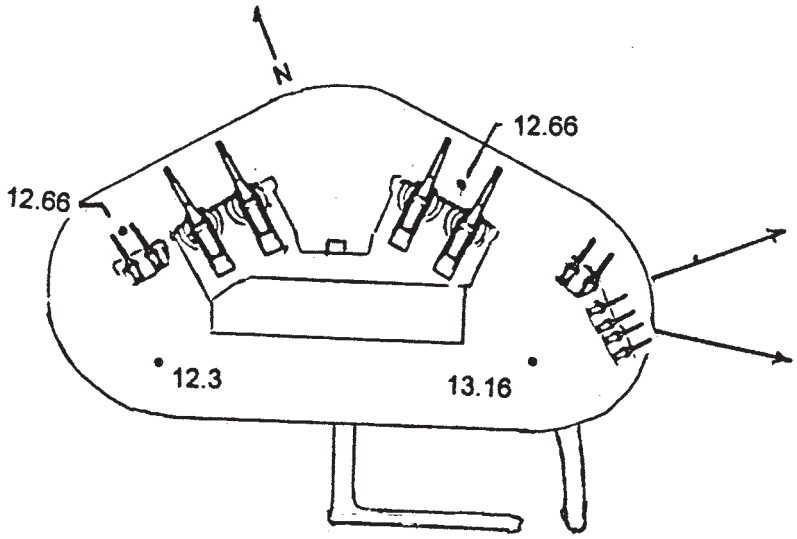
Musoir Forts

The heights shown are in meters/feet. The two Musoir forts were mirror images of each other. All their 32s were M1870-84s. The longest axis of the fort is about 100 meters.



Drawing C4 - Fort Central

Fort Central's 32s were all M1870-84s. Heights are in meters. The longest axis of the fort is about 125 meters.



Drawing C5 - Fort Chavagnac

Fort Chavagnac's barbette 32s were M1870-84s. The casemated 32s were M1870-81s. Heights are in meters. The longest axis of the fort is about 110 meters.

General Notes

Few First-Period Guns

Compared to other French defenses, not a great deal of First-Period armament, which by that time was obsolete, remained in service at Cherbourg as WWI approached. Of the First-Period weapons, only the two Amfreville 24 cm batteries and the Breteville Basse 27 cm battery were still in service. Nacqueville Basse 27 cm battery and Battery St. Anne had recently been dismounted.

The First-Period Armament

No authoritative summary or analysis of the First-Period armament of the French coastal defenses has been found. It appears possible nevertheless to assemble from the fragments of information accumulated for this study a tabulation of the First-Period armament *on the mainland* at Cherbourg that is probably reasonably accurate, as follows:

Battery	First-Period Armament	Comment
Nacqueville Basse	4 - 27 M870M	Installed 1881. Dismounted after 1904.
Nacqueville Haute	4 - 24, 4 - 19	Dismounted after 1904. Replaced by four M1903TRs (in six emplacements.)
Amfreville, East	4 - 24	Still in place, 1912.
Amfreville, West	4 - 24	Still in place, 1912.

Battery	First-Period Armament	Comment
Querqueville		
Ouvrage 2	4 - 27	Installation date not certain. Replaced ca. 1890 by 27 cm M70-81.
Querqueville		
Ouvage 4	7 - 24, 2 - 27	Installation date not certain. Replaced ca. 1888 by 32 cm M70-81.
Querqueville		
Annexe	8 - 19	Dismounted after 1904.
St. Anne	4 - 24, 8 - 19	Dismounted after 1904
Fort Chavagnac	Not known	
Fort Flamands	6 - 19 M1870	Dismounted after 1904.
	2 - 19 M64-66 (pre-First-Period.)	Replaced by four 100s M1897.
Capelain	Not known	The battery layout indicates that there was a battery at this position before the six-gun M1884 battery, with *magazines de combat* M1901, was constructed. We have no information on its armament.
Bretteville Basse	4 - 27 M1870M	Three still in place, 1912.
Bretteville Haute	8 - 24, 2 - 19	Dismounted after 1904. Replaced by four 240 mm M1901TRs.

We have only limited information about First-Period armament in the pre-reconstructed breakwater forts. We do know that 12 batteries, each of five First-Period 19s, lined the main breakwater until replaced, after about 1904, by 20 - 19s M70-93.

Analysis of the above armament indicates that the defenses of Cherbourg, between about 1870 and 1885 or 1890, were not especially formidable. It is particularly notable that there were no First-Period 32s at Cherbourg.

The Strong Flanks

After around 1903, the ten 240 mm guns (six M1884s and four M1901s) on the right flank of the Cherbourg defenses provided strong protection against fast enemy ships suddenly striking from the east. These were reinforced by 14 - 95s and 17 - 30 cm mortars.

The west flank was guarded by even more powerful armament:

- The Querqueville Complex, with four 32s, five 30 cm mortars, four 100s, and four 27s.
- Nacqueville Haute Battery with four 240 mm M1903TRs.
- Nacqueville Basse Battery, with four M1870M 27s.
- The Amfreville Group, with eight 24s.

Each of the two Nacqueville batteries was supported by a *batterie annexe* of four 95s, and the entire complex was backed by the four 270 mortars of la Seroterie.

The Cancelled M1902s

About 1902 there was a plan to replace the two Amfreville 24 cm batteries with a single battery of four 240 mm GP M1902TR guns, and similarly to replace the six 240 mm M1884 guns of Battery Capelain with four 240 mm GP M1902TRs. Although the M1902TR 240 mm GP project was halted after two guns had been built, for several years thereafter the Cherbourg armament plan continued to call for installation of these weapons. Presumably the reference, in the plans, to 240GPs really meant: "240 mm guns, with characteristics similar to those of the cancelled GPs, are to be installed in the future."

The 100 mm ATB Weapons

The great difference in firepower between the models of 100 mm guns mounted at Cherbourg should be kept in mind. When installed in the mid-1880s, the 100 mm M1881TR was a high-velocity, rapid-fire piece, much more useful against torpedo boats than the 47s and probably about as effective as the later 95s. But 15 years after they had been installed, the M1881s had become, comparatively, medium-velocity, relatively slow-firing pieces.

The 100 mm M1897TR and its brother, the M1889-T-97TR, were much more formidable than the M1881s.

Data for the 100 mm guns were as follows:

	M1881	M1889-T-97 and M1897
Tube length (m.)	2.6	5
Tube length (Cal.)	26	50
IV (m/s)	560	760
IV (ft/sec.)	1837	2493
Range (m.)	11,300	14,500
Weight (piece)(kg.)	1190	1830
Weight (carriage)(kg.)	1940	3500
Weight (total)(kg.)	3130	5330
Rate of fire (shots/min.)	3	5
Projectile weight (kg/lbs.)	16.2/35.7	16.2/35.7

For comparison, data for the 47s and 95s were:

	47 mm M1885	95 mm M1888 (de cote)
Tube length (Cal.)	40	23.8
IV (m/s)	610	422
IV (ft/sec.)	2001	1384
Range (m.)	4000+	9000
Projectile Weight (kg/lbs.)	1.3/2.8	12/26.4

As is seen, the M1897 100s were far more effective ATB weapons than the other rapid-fire pieces of the defenses. Some M1897s were mounted in the forts when the forts were modernized around 1900, and others were installed later, but by 1912, a few of the obsolescent M1881s were still part of the armament in Forts Chavagnac, and the Musoirs, where they covered narrow channels at point-blank range. As seen under "Plans," below, it was planned that all ATB armament eventually would consist of 100 mm M1897s (and perhaps T-97s.) The following table shows the 100 mm armament in 1912. The conclusion to be reached is that before 1900, Cherbourg was not a healthy place for enemy torpedo boats, and the 1912 Plan made it even less so.

Table I 100 mm Armament, as of 1912

	M1881s	M1897s
Battery		
Courtine I – II		4
Bastion X		6
Querqueville		
Racine Battery		3
Ouvrage No. 4		4
Chavagnac	4	
Musoir Ouest	4	
Central		8
Musoir Est	4	
Flamands	4	
Pelee		4
Jetee Est		4

The Second-Period 27 cm Guns

Available information indicates that the total inventory of Second and Third-Period 27s was installed at Cherbourg. Of these, the chief concentration was arrayed along the arsenal ramparts.

Concerning the arsenal guns, as well as the two other batteries of Second-Period 27 cm guns in the Cherbourg defenses – Batteries Equeurdreville and Querqueville Ouvrage No. 2 - there are discrepancies in the available records. The discrepancies are that the numbers installed and the numbers built do not add up.

The following data apply:

Second-Period 27 cm Guns

Gun Models	M1870-81	M1870-87	Unknown
Numbers built:	8	7	
Guns Installed:			
Querqueville, Ouvrage No. 2	4		
Bat. Equeurdreville		4	
Bastion I		3	
Bastion II		5	
Cavalier XIII-XIV			4*

*Battery diagrams show four 27s in this battery. The models are not given. A photograph of one of the guns is labeled "Short 32 cm gun," which is almost certainly incorrect. Careful study of the photograph leads to the conclusion that the "short 32" probably was a 27 cm M70-81. If that is correct, it accounts for all the M1870-81s. However, the number of M1870-87 guns installed (12) appears to exceed the number reported built (7). The 27 cm guns of Cavalier Battery were dismounted before 1912.

Of the eight 27 cm M70-81s built, four were in Ouvrage No. 2. It seems likely that the other four were in Cavalier Battery. It is noteworthy that there was a time lag of some years between the installations of the two pairs of guns in Cavalier Battery.

This leaves seven M70-87s, which filled 12 emplacements.

Three M1870-93s (Third-Period) guns were built. They are accounted for as having probably replaced the four M70-81s of Ouvrage No. 2, about 1901. Whether or not this happened, enough information is available to negate any assumption that the M70-93s were installed in the arsenal batteries or in Equeurdreville.

The conclusion is that available information is inadequate at this time to establish with certainty the armament of each 27 cm battery at Cherbourg.

The Walled Batteries

It is significant that four batteries were protected by walled perimeters, featuring bastionettes and in some cases ditches. All four were at isolated sites, on the flanks. Presumably the concept was to protect the outlying batteries against raiders arriving from the sea. The following comments apply:

Bretteville Basse, four M1870M 27 cm. *Batterie annexe*, four 95s.

This battery was close to the shore. It had two bastionettes. The *batterie annexe* was in within the perimeter, to the right of the main battery.

Nacqueville Basse, four M1870M 27 cm. *Batterie annexe*, **four 95s.**

This battery was positioned within a few feet of the shore, and a portion of its walls beside the sea has been washed away. It had three bastionettes and an irregular outline. The *batterie annexe* was outside the perimeter, to the right.

Nacqueville Haute, four M1903TR 240. *Batterie annexe*, **four 95s.**

The 240 mm battery was at the 95-meter (311-foot) level, atop a ridge several hundred yards from the sea, and therefore not overly exposed to amphibious raids, but nevertheless was provided with a sturdy perimeter, featuring two bastionettes. This battery, incorporating M1901 magazines, replaced an older 27 cm battery. The new battery had six emplacements, but only four guns. The *batterie annexe* was outside the perimeter, to the right.

Bretteville Haute, four M1901 240 mm. *Batterie annexe*, **four 95s.**

Like Nacqueville Haute Battery, this 240 mm battery was set back from the shore about 500 meters and crowned a 77-meter (253-foot) ridge, and therefore was not particularly exposed to commando attacks from the sea. The perimeter was extensive, with four bastionettes. The 240 battery replaced a battery of eight 24s. The eight 24s of that battery were the east-flank counterparts of the eight 24s that armed the Amfreville Group on the west flank. The M1901 battery incorporated *magazines de combat* M1901. The *batterie annexe* was outside the perimeter, to the right.

Also of note, concerning battery close-in protection:

Battery Capelain, six 240 M1884, with two *batteries annexe*.

Although this battery was armed with M1884 guns, it was built for fast-firing guns of the M1901, 1902, or 1903 models. It was outfitted with *magazines de combat* M1901. One *batterie annexe* had six 95s and one had four. The complex was not protected by a defended perimeter. It is notable that the (unusual) six-emplacement structure was matched, on the left flank of the defenses, by another six-emplacement battery, Battery Nacqueville Haute. Capelain Battery was armed with older guns that benefitted little from the rapid ammunition delivery capabilities of the *magazines de combat* M1901, and in the Nacqueville Haute Battery only four of the six positions were armed. All this hints at budget-induced constrictions in the coast defense program.

Querqueville Complex

The 32 cm, 27 cm, and 100 mm batteries at Fort Querqueville were protected from the rear by the moated, bastioned earthwork that protected the fort.

Battery Seroterie, four 270 mm mortars.

Battery Seroterie sat well back from the sea at the 75-meter (246-foot) level. Except for a heavy fence guarding its left and rear, it was not protected.

Plans

The 1912 plan for the development of the defenses called for the following:

Position/Battery	Existing Armament	Intended Armament
Batteries on the left (West) flank		
Batteries de Nacqueville		
Bat. Haute	4 - 240 M1903TR	No change
Bat. Haute Annexe	4 - 95	Removed
Bat. Basse	4 - 95	Removed
New 100 Bat.		4 - 100
Bat. de la Seroterie	4 - 270 Mortars	Removed

Position/Battery	Existing Armament	Intended Armament
Bats. d' Amfreville		
West Bat.	4 - 24	4 - 240GP
East Bat.	4 - 24	Removed
Batteries on the mainland near the West Breakwater, and on the West Breakwater		
Bats. de Querqueville		
32 cm Bat.	4 - 32 M70-81	No change
TR Bat.	4 - 100 M1897	No change
27 cm Bat.	3 - 27 M70-93	No change
Butte de Polygone	5 - 30 Mortars	Removed
Ouest Digue (West Breakwater Battery)		
47 mm Bat.	4 – 47 M1885TR	Removed
Batteries on the mainland, to the West of the arsenal maritime		
Bat. des Couplets	4 - 24 M70-87	Replaced
Bat. des Couplets	4 - 240 M1902GP	To be installed
Bat. d'Equeurdreville	4 - 27 (Second-Period)	Removed
Batteries on the ramparts of the Arsenal Maritime		
Front Nord		
Bastion III	4 - 47 M1885TR	Removed
Bastion II	5 - 27	Removed
Courtine I - II	4 - 100 M1897	6 - 100 (two bats.)
Bastion I	3 - 27	Removed

Front Est		
Cavalier XIII – XIV	6 - 47 M1885TR	Removed
Bastion X	6 - 100 M1897	Removed
Fort Chavagnac		
32 cm Barbette Bat (L)	2 - 32 M1870-84	No change
32 cm Barbette Bat(R)	2 - 32 M1870-84	No change
32 cm Casemate Bat.	2 - 32 M1870-81	Removed
100 mm Bat. East	2 - 100 M1881TR	2 – 100 mm M1897TR
100 mm Bat. West	2 - 100 M1881TR	2 – 100 mm M1897TR
47 mm Bat	4 – 47 M1885TR	Removed
Position/Battery	Existing Armament	Intended Armament
Forts and Batteries on the Central Breakwater, West to East		
Fort du Musoir Ouest		
32 cm Barb. Bat.(L)	2 - 32 M1870-84	No change
32 cm Barb. Bat.(R)	2 - 32 M1870-84	No change
32 cm Casemate Bat.	2 - 32 M1870-84	Removed
100 mm Bats.	4 - 100 M1881TR	4 - 100 mm M1897
47 mm Bat	4 - 47 M1885TR	Removed
Digue Branch Ouest (Main Breakwater, West Branch)		
19 cm Bat. No. 3	5 - 19 M1870-93	Removed
19 cm Bat. No. 4	5 - 19 M1870-93	Removed
Battery Intermediaire	6 - 30 M-T-93Mortars	Removed
Fort Central		
32 cm Barbette Bats.	6 - 32 M1870-84	One gun each bat. removed
100 mm Bat. (L)	4 - 100 M1897TR	No change
100 mm Bat. (R)	4 - 100 M1897TR	No change
47 mm Bat. East	2 - 47 M1885TR	Removed
47 mm Bat. West	2 - 47 M1885TR	Removed
Digue Branch Est (Main Breakwater, East Branch)		
19 cm Bat. No. 1	5 - 19 M1870-93	Removed
19 cm Bat. No. 2	5 - 19 M1870-93	Removed
Fort du Musoir Est		
32 cm Barb. Bat.(L)	2 - 32 M1870-84	No change
32 cm Barb. Bat.(R)	2 - 32 M1870-84	No change
32 cm Casemate Bat.	2 - 32 M1870-84	Removed
100 mm Bats.	4 - 100 M1881TR	4 - 100 mm M1897TR
47 mm Bat.	4 - 47 M1885TR	Removed

Fort de l'Ile Pelee, and the East Breakwater

Fort de l'Ile Pelee		
32 cm Barbette Bat.	5 - 32 M70-93	Two guns removed.
	1 - 32 M70-84	Presumably one was to be the M70-84.
32 cm Casemate Bat.	3 - 32 M70-93	Removed
274 mm Bat.	4 - 274.4 M1881	No change
100 mm Bat.	4 - 100 M1881TR	4 - 100 mm M1897TR
47 mm Bats.	6 - 47 M1885TR	Removed
Digue Est (East Breakwater Bat.)	4 - 100 M1897TR	No change

Position/Battery	Existing Armament	Intended Armament

Fort Flamands, and Batteries on the mainland, on the right (East) flank

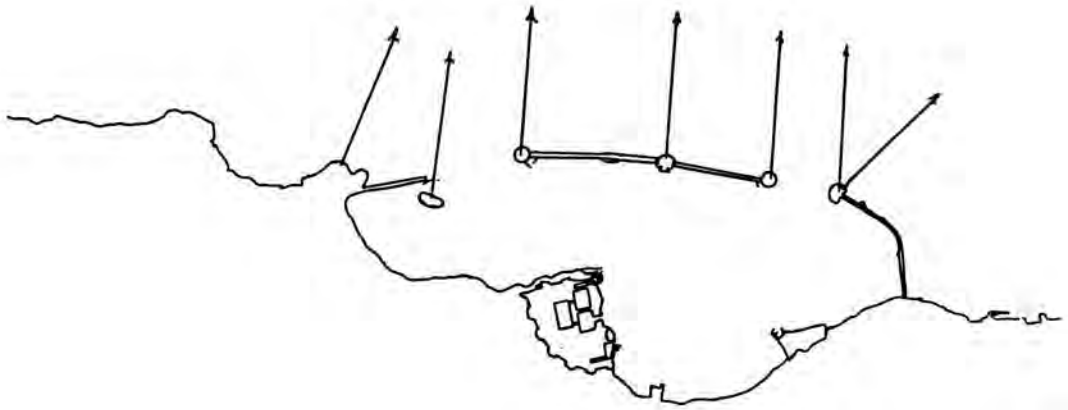
Fort des Flamands	4 - 100 M1897	No change
Bat. Greves	2 - 47 M1885TR	Removed
Tourlaville Batteries		
West Bat	5 - 30 mortars	Removed
East Bat.	6 - 30 mortars	Removed
Capelain Batteries		
240 mm Bat.	6 - 240 M1884	4 - 240 M1884
95 mm Bat. East	4 - 95 M1888	Removed
95mm Bat. West	6 - 95 M1888	Removed
New 240 Bat.	-	4 - 240GP
Bretteville Bats.		
Bats. Haute		
240 mm Bat.	4 - 240 M1901TR	No change
Bat. Annexe	4 - 95 de cote	Removed
Bats. Basse		
27 cm Bat.	4 - 27 M1870	Removed
Bat. Annexe	4 - 95 de cote	Removed
New 100 Bat.	-	4 - 100

In summary, the following were to be removed:
All the casemated 32s
Two 32s from the barbette tier at Ft. de l'Ile Pelee
Two 32s from the barbette tier at Ft. Central
All mortars

All 47s
All 95s
All 100 mm M1881s
All 19s (the breakwater batteries)
All armament of the bastioned naval arsenal, except six 100s
All other First-Period armament (two Amfreville 24 cm batteries & Bretteville Basse 27s.)
Battery Equeurdeville (four Second-Period 27s)

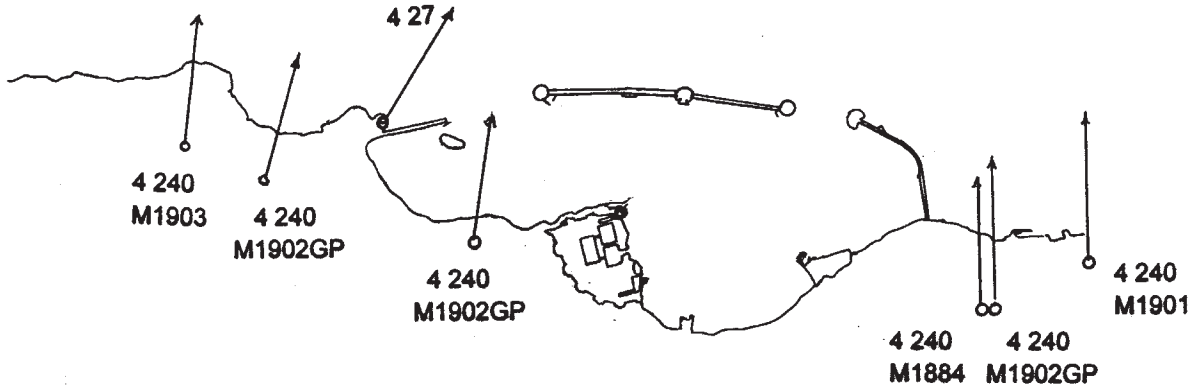
The following were to be installed:
Four 100s each, at Nacqueville Basse and at Bretteville Basse.
Four 240GPs each, at Amfreville and Capelain.
Two additional 100s for Batteries Courtine I and II.
Four 240GPs replacing four 24s M70-87 in Battery Couplets.
Four 100s in each of the Musoirs and at Chavagnac, replacing the M1881s.

The armament after these changes had been incorporated is shown in Maps C10, C11, and C12.



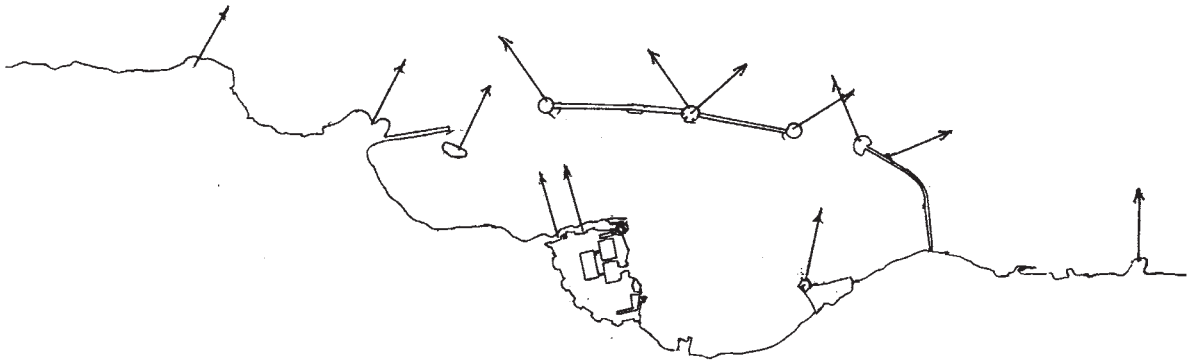
Map C11 - The planned defenses of Cherbourg, 1912: The heavyweights, six 32 cm batteries and one 274.4 mm battery.

Each battery had four guns. The 274.4 mm battery is on the right, in Fort de l'Ile Pelee. The other Ile Pelee battery mounted four M70-93s, and the left flank battery, at Fort Querqueville, mounted M70-81s. All others were 32 cm M70-84s.



Map C12 - The planned defenses of Cherbourg, 1912 - Heavy reinforcing and flank batteries.

The 240 mm M1902 GPs were to be added. The other batteries existed, but the 27 cm battery had only three rather than four 27 cm M1870-93s, and the 240 mm M1884 battery had six guns rather than four.



Map C13 - The planned defenses of Cherbourg, 1912: The ATB batteries.

Fifty-three high-velocity, fast-firing, 100 mm M1897 guns were to form the ATB armament. All batteries were to have four guns except the two at the naval arsenal, each of which was to receive three.

Survey Distances to the Following Positions, in Meters

From Battery Saint-Anne to Fort Chavagnac, 1400; to Fort Querqueville, 2850; to Battery Hameau de la Mer, 1520.

From the center of Fort de l'Ile Pelee to Fort Musoir Est, 900; to Fort des Flamands, 2200; to Greves, 1900; to Capelains, 3900; to Bretteville Basse, 4200.

From Equeurdeville to Bastion III, 900; to Bastion II, 1250.

From Fort Homet to Fort Flamands, 2650.

From Fort Querqueville (entryway) to Amfrevlle Est, 1800; to Amfreville Ouest, 2200; to Nacqueville Haut, 2950; to Seroterie, 2560; to Nacqueville Basse, 2800.

Acknowledgement

Thorough analysis and thoughtful comments by CDSG member Dag Schmidtke led to reconstruction of certain portions of this paper. His contribution is greatly appreciated.

ATTACHMENT 1

The Three Periods of French Seacoast Ordnance Development, 1870-1914

The characteristics of seacoast armament (and other elements of military and civilian technology) progressed enormously during the era of interest here, 1870 to 1914. The characteristics of the weaponry can be thought of as falling into three chronological periods, the 1870s, 1880s, and 1890-1914, referred to herein as the First, Second, and Third Periods.

The First Period - The 1870s

The guns of the 1870s had all the basic characteristics of modern artillery: They were rifled breech loaders with recoil systems. The major difference between these guns and their predecessors of the 1860s was that the older guns employed few (three or five) deep rifling grooves, whereas the models of 1870, and all others thereafter, incorporated multiple, relatively shallow, grooves.

All First-Period guns were iron, with steel chambers and rifled-steel inserts that extended a few calibers up the bore. First-Period guns were banded in steel from the breech to just forward of the trunnions, and all were on traversing carriages with recoil systems. Compared to guns of the Second and Third Periods, the First-Period guns were short and not very powerful. Only two were longer than 20 calibers, the last two of the period – 32s M70-79, of 24 calibers. First-Period seacoast guns were numerous, more than 700, in calibers of 19, 24, 27, and 32 cm. These four calibers remained standard throughout the period of interest.

The Second Period – The 1880s

The Second Period was one of transition. The first heavy model built in quantity was the 25-caliber 32 cm M70-81, which was followed shortly by the 30-caliber 32 cm M70-84. The M70-84 retained the iron body of its predecessors, but was fitted with a full-length steel liner. The middle of this period saw the introduction of the first French all-steel heavy seacoast gun, the 240 mm M1884. This piece was on a barbette carriage, and thereafter the barbette carriage became standard, giving heavy guns easier traverse and faster loading.

Except for the 240 mm M1884s, all heavy guns of the period, like those of the First Period, were of iron, banded in steel, and with chambers of steel. They also were longer than their First-Period predecessors, 28 calibers being about average.

Second-Period guns were only half as numerous as First-Period pieces, about 350 being built. Of those, 49 were 32 cm M1881, 51 were 32 cm M1884, and almost 200 were 240 mm M1884. During this period, rapid-fire anti-torpedo boat (ATB) guns were introduced in large numbers, as were rifled mortars.

The Third Period - 1890 to 1914

The Third Period saw the last of the composite guns. All heavy guns built after the Model 1870-93 were all-steel. They were, however, not numerous. Their numbers did not permit them to form the main strength of the defenses; through WWI the primary power of most French defenses was provided by guns of the 1880s - the Second Period.

A review of the production of Third-Period heavy guns follows.

Model 1870-93, the last of the iron-body pieces. The model was built in the usual four calibers: 19, 24, 27, and 32 cm.

Ten 32s were built. Eight armed Fort de l'Ile Pelee at Cherbourg, and two were installed (on old-style traversing carriages) covering the approaches to Brest.

Two 24s and three 27s were built. The disposition of the 24s is not known. The 27s are believed to have replaced the four M1870-81s at Fort Querqueville around 1901.

Of the 48 - 19s, 20 replaced 60 older 19s on the Cherbourg breakwater. Four-gun batteries were emplaced at Dunkerque, Noumea, and Fort de France. Presumably the remaining dozen went directly into storage. Guns of this type served in the field during both World Wars, mainly as railway pieces.

Model 1893-96. Twenty-two 240 mm and twelve 305 mm pieces were built. The 240s were funded through appropriations for the colonies, and were commonly referred to as "the colonies guns." All were installed, either in turrets or on barbette mounts, at Dakar or Saigon.

The twelve 305s were the most powerful seacoast guns built by France. (The 340s installed at Toulon and Bizerte, though more powerful, were shipboard guns, employed ashore.)

As nearly as can be determined, the new 305s went directly into storage rather than into the defenses. Funding for new batteries was not available.

Beginning in 1914, eight 305s were installed on railway carriages. They were intended to have high-angle, all-round fire, but were too powerful for their mountings, and could fire only with restrictions on their traverse and elevation. As the war progressed, the 305s were given new mounts permitting their full use, and 240 mm colonies guns were installed on the old mounts, which were modified to permit full employment of the 240s. They served through WWII.

Models 1901, 1902, and 1903 were all 240 mm pieces.

The M1901 was the M1884 tube, with trunnions removed, mounted on a new high-angle carriage. The new piece fired at least twice as fast as its M1884 predecessor. The M1901 was an effort to improve firepower at minimal cost by using older tubes. Twenty-one M1901s were built. Seventeen were installed at Bizerte and four at Cherbourg.

It was initially intended that 16 M1902s would be built, but the program was halted after two were manufactured. They were 31.4 calibers in length, versus 26 calibers for the M1884. They were referred to as 240 mm GP, for "grande puissance," that is, "great power." Presumably the 240 GP project was halted due to lack of funding.

Thirty-one M1903s - fast-firing, powerful weapons - were built. They were installed as listed below:

Defense	Batteries	Guns
Le Havre	1	4
Cherbourg	1	4
Brest	3	11
Marseilles	1	4
Toulon	1	4
Oran	1	4

The M1901, M1902, and M1903 guns were the only 20th century heavy guns installed in French defenses before WWI.

Further indicators of efforts to improve the effectiveness of pre-WWI harbor defenses, on a thin budget, were the M1911 carriages. These were new barbette carriages, mounting old, First-Period 24 cm guns. The new carriages gave the guns, which formerly had been mounted on traversing carriages, easier tracking and faster loading capabilities. They were mounted as follows:

Defense	Batteries	Guns
Dunkerque	1	4
Boulogne	2	8
Le Havre	1	4
Toulon	1	4
Marseille	1	3

It should be noted that the years around the beginning of the Third Period saw an ambitious program for the installation of mortars. They were emplaced in the following quantities:

Type	Number	Comment
270 mm M1889	77	
30 cm M1883-T-93	75	M1883 muzzleloaders rebuilt as breechloaders
30 cm M1893	30	Steel copy of T-93.

It seems evident that the mortar program was a disappointment, in that the batteries being installed in quantity in the early 1890s were being dismounted by around 1910.

Around the turn of the century the ATB armament was considerably strengthened, with the installation of 77 new 100 mm M1897 guns, and 20 M1881 100s that had been modified by the installation of new breechblocks to become equivalent to the M1897s. These were designated as M1881-T-97s.

Nevertheless, as the 1912 plan for Cherbourg emphasizes, there remained a serious need for even more ATB guns to replace the 47s and the old 100s, as well as 95s.

The main pattern to be observed throughout the Third Period, as WWI approached, was that, year by year, the gun-power of French defenses declined.

Dad's Service in the Coast Artillery

Jim Rhett

263rd Coast Artillery Regiment distinctive unit insignia (DUI).
Bolling Smith Collection

My father, James M. (Jim) Rhett, was born in Beaufort, SC, May 1, 1917. He joined the South Carolina National Guard September 18, 1939, enlisting in Headquarters Battery, 263rd Coast Artillery Regiment (Harbor Defense), at Ft. Moultrie, in the defenses of Charleston, SC. The unit was mobilized January 13, 1941, and Jim was quickly promoted to corporal and then to sergeant.

As a boy, my father told me tales of his military experiences, which I have recorded as I recall them. The text in quotation marks is taken from notes he left in a scrap book.

One sunny Sunday morning, before the war, as he strode along the company street at Ft. Moultrie, Jim spotted the two most slovenly soldiers he had ever seen, sitting in very un-soldierly fashion on the curb. As he approached the two to give them a thorough upbraiding, he saw that they were his two younger brothers, Billy and Alfred. Knowing my father, the dressing-down that followed was all the more severe.

Uncle Billy worked in the fort machine shop. The colonel in command came down to inspect the facility wearing the usual army pith helmet with the large brass eagle on the front. When he entered the concrete doorway to the shop he ducked, as the door was low and he was quite tall. As he did so he removed his helmet and my observant uncle noticed that the long screw that held the eagle on the helmet still protruded its full length inside the helmet. Billy offered to clip the screw off so it would not reach so far into the helmet. This was what everyone else did as soon as they got a new helmet so it would not rub the forehead, but the colonel would have none of it. That was how it was issued, that was how it was to be worn. Inspection completed, the colonel replaced his head gear and headed for the door, but this time forgot to duck, driving the long hat pin into his forehead. With blood streaming down his face he snatched off the helmet and swung around to my uncle, still holding the side cutters, and calmly commanded "cut the son of a b---- off." Replacing the helmet, and this time ducking, he left the shop, blood now spotting his blouse, while the shop crew, at attention, struggled to hold back the laughter.

Col. Claud C. Smith, commander, 263rd Coast Artillery, October 22, 1941. *NARA Still Pictures, 111-SC-WW2 126033.*

263rd Coast Artillery firing 3-inch gun, October 22, 1941. *NARA Still Pictures, 111-SC-WW2 126036.*

The big guns at Fort Moultrie at this time were 10-inch disappearing rifles and 12-inch mortars. They had not been fired since WWI. The concussion from the 12-inch mortars was so severe that when they were finally let loose in 1940, they shattered glass in post-WWI homes.

Jim left the 263rd Coast Artillery in October of 1941 for the Coast Artillery School at Ft. Monroe, VA, where he studied fire control electricity. Upon completion of the fire control course, the War Department sent him to the Submarine Mine School, adding much to his electrical knowledge, as the army's submarine mines were electrically controlled from shore.

Coast Artillery School DUI. *Bolling Smith Collection*

The attack on Pearl Harbor, December 7, 1941, occurred while Jim was still in fire control school. When he finished the submarine mine course he was reassigned to 2nd Coast Artillery Regiment at Ft. Story, VA. His application for officer candidate school (OCS), submitted right after entering the Submarine Mine School, was accepted and he was transferred to Camp Davis, NC. After completing OCS he was commissioned a 2nd lieutenant, July 10, 1942, and assigned to the 69th Coast Artillery Regiment (Antiaircraft) at San Diego, CA.

69th Coast Artillery Regiment DUI. *Bolling Smith Collection*

Jim was promoted to 1st lieutenant, October 22, 1942, and commanded a searchlight battery for a few months before being moved to command a 90 mm gun battery, March 15, 1943. The battery was primarily deployed to defend the aircraft industry in the San Diego area. The battery moved often, supposedly for security but really as part of its training mission. They did their practice shooting in the Imperial Valley at USMC Camp Dunlap, on the banks of the All-American Canal.

AA searchlight and sound locator, which was used in conjunction with searchlights until replaced by radar. *Bolling Smith Collection.*

At this time, the army was not issuing side arms to stateside junior officers without special needs, such as MPs, so Jim searched local gun shops to acquire a pistol. Civilian pistols were in short supply, but he finally found a used civilian 9 mm Lugar, which he purchased and carried for some time. He never felt comfortable with the German gun in an American uniform, however, and 9 mm ammunition was not readily available from the U.S. Army. Not long before he was transferred overseas, he bought a .45 Colt Automatic Pistol, model 1911, also a used civilian model, and mailed the Lugar home.

One of Jim's favorite stories of this period was of the much revered regimental chaplain who, being Catholic, had several Napa Valley grape growers come to him for help. In the summer of 1943 there was a bad infestation of grasshoppers. Being modern Americans these Italian-American farmers were embarrassed to go to their local priest and ask him to lay a curse on the pests, but they felt certain it was needed. Since the good army father was well known in the community from organizing various exchanges between the army and community, the farmers asked him to perform the exorcism. It was necessary for him to do it at night, lest their less pious neighbors find out. The chaplain duly performed the ceremony, the first and probably last of his career, at the edge of one of the vineyards after dark. Next morning it was learned that a freak freeze hit the valley in the early morning hours and killed everything; locusts, crops, and all. The chaplain was held in much awe in the valley thereafter.

Captain James Rhett's battery of the 69th Coast Artillery, firing at Camp Dunlap, CA. *Author's collection*

One of the things Jim was most proud of was the efficiency with which his battery moved from one location to another. He attributed this in part to several Oklahoma Native Americans in the outfit. On one occasion the battery was set up in a residential neighborhood above an aircraft plant. In the late afternoon they received orders to move the battery to a different location. They packed up and were gone by dawn. Sometime later Jim ran into one of the neighbors nearest to the former location who remarked that he was astonished at how quietly and quickly the unit had evacuated the site. Apparently the location had played host to several other batteries who were not nearly so quiet. The neighbor had slept through the whole thing.

The 69th and other stateside units were employed largely as part of the army's cadre training system. In Jim's words, the "better" soldiers were pulled out of these units to form the commissioned and non-commissioned nuclei of new units created to expand the army. The 69th was withdrawn from the field in March 1944 for "re-training" at Camp Haan, CA. In my father's judgment, "Since there was virtually nothing left in the ranks of the 69th that was trainable, the regiment was deactivated and the officers and men transferred to other units."(1) Judging from the guidon he was given, it appears that Captain Rhett was assigned to Battery A, 69th C.A. Bn.

Dad spent a couple of months on temporary duty in a quartermaster truck company before transferring to one of the army's first two 4.7-inch (120 mm) gun batteries. He remained there until December 23, 1944, when he was transferred to Ft. Ord, CA, and from there overseas by way of Camp Stoneman, near Pittsburg, CA. He went on a winding trip across the Pacific by way of Hilo, HI, through the islands to the Solomon Islands, to Finschaven, New Guinea, and from there to Hollandia, and finally north to the Philippines. "I stayed on the island of Luzon for a while at a place called Alabang, which is about 10 miles south of Manila. While stationed there for two months at a replacement depot, I had considerable time to roam about like a tourist. The fighting was within earshot, though, and due to the rather fluid fight situation, there were more tourists being shot with guns than cameras."

For a few weeks Jim was commander of the only prisoner-of-war camp on Luzon. Only about 200 Japanese soldiers remained of the nearly 200,000 who had been there when the Americans returned to the Philippines.

69th Coast Artillery company guidon presented to Captain Rhett when he left the unit. *Author*

When he left the replacement depot he went to Leyte, assigned to the 237th AA Searchlight Bn, scattered from Leyte to Mindoro to Zamboanga. "By November the island was secured in practically all of its scattered pockets and the necessity of going to Japan (which would have been the next target when we moved next) had been removed by the use of the atomic bombs at Nagasaki and Hiroshima and the subsequent surrender of the Japanese nation, so we turned in all our gear and left for the States."

Jim landed in Los Angeles and went to Camp Anza, Riverside, CA, where the 237th Bn was inactivated December 29, 1945. From there he was sent to Ft. Gordon, Augusta, GA, and home on leave to Beaufort.

"I signed an agreement to stay another year, so after my leave was up, I reported to Ft. Bliss, TX, which had become Antiaircraft Replacement Training Center Headquarters, and which was at that time the scene of the organizing of the first guided missile battalion – the beginning of the *Space Age*."

At Ft. Bliss he was assigned to command a 90 mm training battery until he left the service on December 20, 1946. "When I left the service, I rejected promotion to the rank of Major. Later when I accepted a commission in the Reserves, I received the promotion, and for five years held that rank." Jim was honorably discharged November 15, 1953. He died July 4, 1977.

I once asked my father, who grew up on the water and around boats on the coast of the Beaufort area, why he went into the army and not the navy. His explanation was that at the time the army had almost as much tonnage afloat as the navy, and coastal craft were more to his liking.

Capt. James Rhett at Fort Bliss, TX, 1946. *Author's collection*

My father was quite proud of his service in the Coast Artillery Corps. I never fully understood the significance of that until I began reading CDSG references online. I should not have, but I missed the significance of some of the things my dad would tell me when I was a child. Such as the history and family ties to the old armory, now a museum, in Beaufort, SC, and the Civil War-era relative, Col. Alfred Rhett, who served at, and later commanded, the battery at Ft. Moultrie during that conflict.

Like so many other WWII veterans' records, my father's records were reported destroyed in the St. Louis National Personnel Records Center fire of 1973. I would be extremely grateful for any information anyone may be able to share about the units mentioned above for the periods noted. Thank you.

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Editorial Note

1. The army decided that coast artillery regiments were unwieldy and split the regiments into separate battalions. The 69th C.A. regiment was inactivated September 10, 1943, and its three battalions became the 69th AAA (Gun) Bn, inactivated 11-9-44; the 529th AAA (Automatic Weapons) Bn, inactivated 9-5-45; and the 249th AAA (SL) Bn, inactivated 7-14-44.

The Destruction of USS Dai Ching, January 27, 1865

Bolling W. Smith

On December 21, 1864, Lt. Gen. William T. Sherman successfully concluded his march through Georgia with the capture of the coastal city of Savannah. After a month of resting and refitting, he started his armies north toward Columbia, SC. While Sherman vastly outnumbered the few Confederates left to oppose him, he asked the Union navy to help cover his right flank, the South Carolina low country bordering the Atlantic Ocean, as he drew Confederate forces inland by marching on Columbia, SC. He therefore asked Rear Adm. John A. Dahlgren to send warships up rivers north of the big Union naval base at Port Royal Sound, in support of Maj. Gen. John. G. Foster, commander of the Union Department of the South, at Hilton Head, SC.(1)

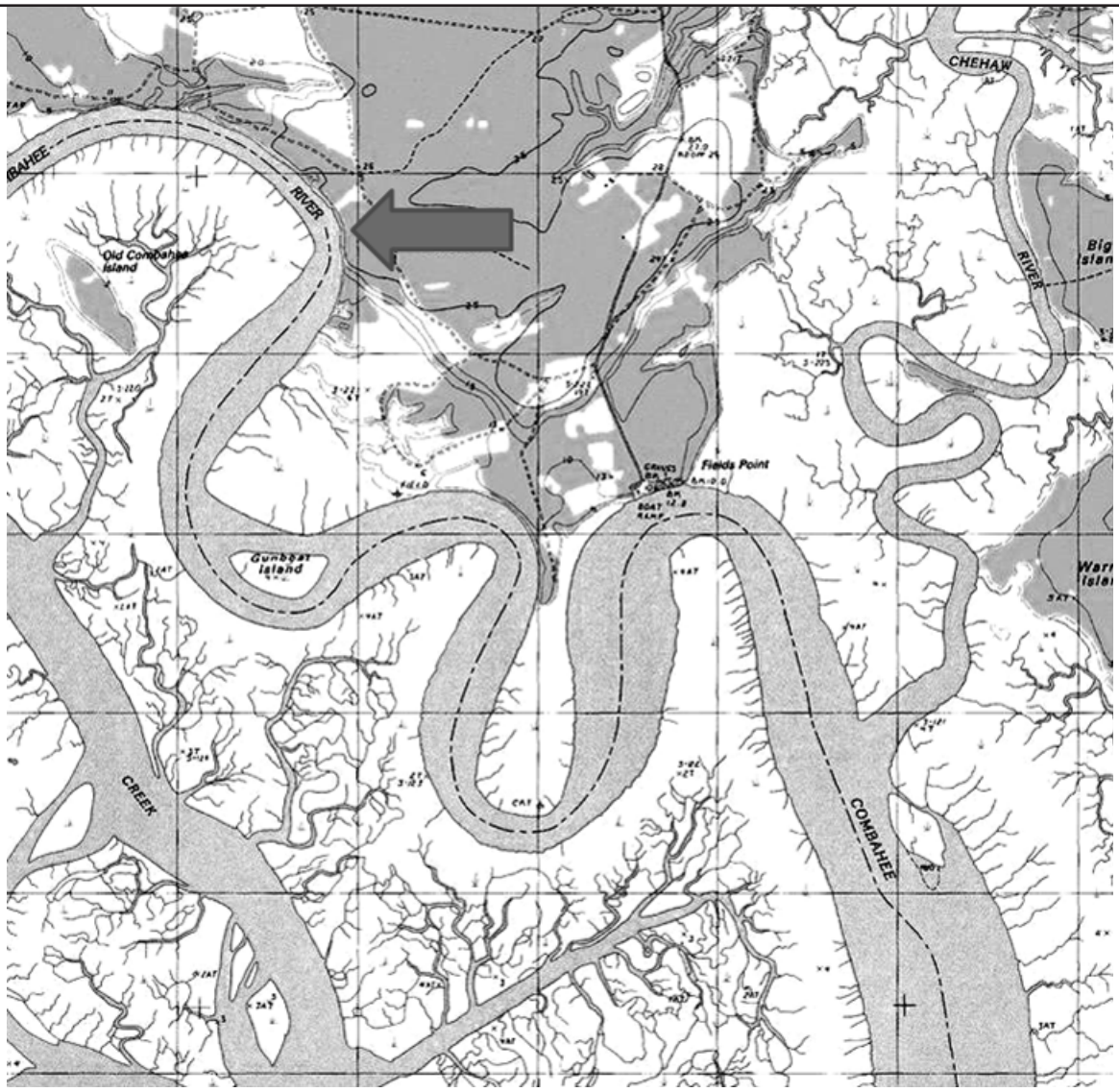
Admiral Dahlgren readily agreed and ordered warships up a number of the rivers between Port Royal and Charleston. This coastal area is a maze of waterways, marshes, mudbanks, and islands, with serpentine channels. One of the warships sent was the USS *Dai Ching*, whose strange-sounding name was due to her being constructed in 1862 for Frederick T. Ward's mercenary force in China. Acquired by the US Navy on April 21, 1863, the unarmored wooden screw steamer was some 175 feet long, with a displacement of 520 tons and a draft of 9 feet 6 inches. She had a normal complement of 83 officers and men, and was armed with one 100-pounder and two 20-pounder Parrott rifled guns, in addition to four 24-pounder SB howitzers. She was hardly an exemplary warship; Admiral Dahlgren described her as "the least valuable in many respects of the light-draft gunboats, her speed under steam being less than 5 knots."(2)

Dai Ching was commanded by Lt. Cmdr. James C. Chaplin, USN. Born May 14, 1836, Chaplin was appointed midshipman in 1850 and passed midshipman in 1856. He was promoted to master in 1858, and lieutenant that same year. On April 18, 1863, he was promoted to lieutenant commander. (3)

While Sherman's plans were necessarily fluid, several Union gunboats were instructed to ascend the coastal rivers to "menace the flank of the rebel position." Sherman hoped "just to make the enemy uneasy on their flank," and Dahlgren instructed Chaplin to provide the army all possible assistance. *Dai Ching* with the armed tug USS *Clover* was to make a demonstration on the Combahee River, to "annoy the rebels as much as possible."(4)

The Combahee River flows into St. Helena Sound, north of the Union stronghold of Port Royal Sound. The river's only previous brush with history came when a Union force, under virulent abolitionist Col. James Montgomery, assisted by Harriet Tubman, raided up the river and freed some 700 slaves. Just up the Combahee from its mouth was Tar Bluff, an unusually high cliff some 26 feet above the river. Here, the river swerved from the northeast to the south, and ships approaching from downriver would face the bluffs head on for a distance of 2,100 yards.

At Tar Bluff, the Confederates had erected a small battery. It was apparently armed with only three guns, but two of them were reported to be 7-inch Brooke rifles, not only larger than *Dai Ching's* single 100-pounder Parrott (6.4 inches), but less prone to the disastrous explosions that plagued the larger Parrott guns. No Confederate reports of the action have been found; the only account is Lieutenant Commander Chaplin's official report.



Low-lying areas such as the South Carolina low country are subject to frequent changes. The arrow in this modern topographic map shows the general location of Tar Bluff and the Confederate battery. Gunboat Island in the river is near the final location of the USS *Dai Ching*. *www.topoquest.com*.

On January 25, 1865, *Dai Ching* sailed to St. Helena, where Chaplin picked up a pilot, a "colored" man by the name of Samuel Small, from the US Steamer *Settin*. As the pilot was afraid to go farther after dark, *Dai Ching* anchored for the night.

After starting upriver just after 6:00 AM on the morning of January 26, the gunboat met a small boat manned by white men. Acting Ensign F.S. Leach, from the tug USS *Clover* (5) spoke to them and reported that they were from the Confederate schooner *Coquette*, a blockade runner loaded with 74 bales of cotton. *Coquette* was presently about five miles upriver, two miles below the Confederate battery at Tar Bluff.

At 7:30, *Dai Ching* went to general quarters. The Confederate works could be seen about two miles away, but no men or guns were visible. When the *Coquette* was reached, Acting Master George Howorth was sent in a cutter with an armed crew to take possession, and *Clover* was ordered to take her in tow and follow *Dai Ching*.

Dai Ching had approached within a mile of the battery when the Confederates opened fire. The engines were immediately reversed, and the gunboat turned and headed downriver. Lt. Cmdr. Chaplin's intent was to engage the battery from the reach below, where they would be less exposed to the fire of the battery. While turning a very sharp bend in the river, with a strong ebb tide, Chaplin realized his ship had run into the bank on the starboard. He then discovered that the pilot had abandoned his post as the first Confederate shells flew overhead and had hidden in the ship's hold. His immediate attempts to back her off were unsuccessful, and his 100-pounder Parrott would not bear on the battery. His remaining guns, however, were actively firing at the battery.

Chaplin signaled *Clover* to come to his assistance. Meanwhile, he cut way his main-rail to allow the 100-pounder to be pointed at the battery, and it was soon "doing good execution." Clover came up and took *Dai Ching's* line, but that parted. Then, instead of coming back and taking the hawser which had been prepared, the tug stood on downriver, despite signals recalling her from a distance of only half mile. Acting Master Howorth was told to proceed downriver and communicate with the steamers *Pawnee* and *Stettin*. Acting Ensign Duncan was sent in a cutter with four men to bring *Clover* back, but just before they reached the tug, she started downriver.

The tide had now fallen considerably and *Dai Ching* settled by the stern, which was in 36 feet of water. Meanwhile, the Confederate battery had not been idle, and *Dai Ching* had been struck more than 30 times, mostly shell believed to be from the Brooke rifles. Her decks had been holed in six or seven places, and one shot penetrated the hull below the waterline. The ammunition for the 20-pounders had been exhausted, leaving the 100-pounder Chaplin's only means of replying to the Confederate fire.

Retaining only enough men to work the 100-pounder and to pass ammunition to it, Chaplin ordered the rest of his crew into the marsh, cautioning them to keep under the bow, sheltered from the enemy fire. At 2:30 PM, the 100-pounder was struck by a solid shot, carrying away the forward hurter on the carriage and smashing the eccentric, disabling Chaplin's last gun.

Chaplin described the boat now as "a perfect wreck," under accurate heavy artillery fire they could neither escape nor reply to. All concerned agreed that there was no hope of saving *Dai Ching* and the only thing left to do was to fire the boat and abandon her. The small arms were passed to the men in the marsh. The paymaster's books and chronometer were placed in the boat's gig, the only remaining small boat, with Acting Ensign Walter Walton and two of the wounded who were unable to walk.

At 3:00 PM, the *Dai Ching* was fired aft, and by 3:30 she was in flames, as the crew worked their way downriver. After walking four miles and wading several creeks, they saw *Clover.* When signaled, the tug came to their aid and took them off. On *Clover,* Chaplin was reunited with Acting Ensign Walton, who reported being fired at by a 12-man enemy picket. He also reported seeing the second cutter ashore with several bullet holes in her; Acting Ensign Duncan and his crew were presumed captured. The crew of *Dai Ching* was taken downriver to USS *Pawnee*, where they were kindly cared for.

Lieutenant Commander Chaplin expressed his opinion that had *Clover* come to his aid as ordered and taken the hawser, it would have been possible to save the ship. In addition, Walton had arrived on *Clover* after Leach had given orders to proceed downriver, disregarding Howorth's orders to return to *Dai Ching,* and only by positive command was Walton able to induce Leach to proceed upriver a short distance to search for the officers and men in the marsh, who otherwise would have been compelled to spend the night in the marsh.

In contrast, however, Chaplin commended Acting Master William McKendry and Acting Ensign Walton - McKendry for serving the 100-pounder for seven hours and Walton for firing the 20-pounder until the ammunition was expended, after which he went below and filled shells for the 100-pounder

before taking the wounded to safety in the gig. Chaplin closed with the request that the loss of USS *Dai Ching* be examined by a court of inquiry.(6)

Enclosed with Chaplin's report was the report of Acting Assistant Surgeon John R. Richardson, listing the wounded from *Dai Ching*. In addition to three men "slightly wounded," five were described as "wounded" and one as "severely wounded." One item of interest - the slightly wounded "cabin boy" named W.C. Chaplin, may have been a relative of the captain.

Admiral Dahlgren reported Acting Ensign Charles Duncan, three landsmen, and one male nurse captured "while conveying orders to the U.S.S. *Clover* on the 26th January, in the Combahee River."(7)

Admiral Dahlgren sent *Ottawa* and *Winona* into the Combahee River to observe the Confederates, and to prevent their making any use of the wreck of *Dai Ching*. Captain Stillwell, in *Ottawa*, reported that he anchored within 200 yards of *Dai Ching*, and found her burnt to the waterline. Captain Stillwell could see troops in the battery, but was unable to do anything more, since taking the battery would require a combined attack.(8)

In a January 29 letter to General Sherman, Admiral Dahlgren expressed his disappointment at the loss of *Dai Ching,* and regretted that he had no gunboat to replace it. In his diary entry for January 27, Dahlgren faulted Chaplin on two accounts: He did not drive in the pickets, and he grounded at high water. Later, on January 29, Dahlgren commented that "All agree that the tug deserted the *Dai Ching* and the captain behaved cowardly."(9)

On January 30, 1865, Admiral Dahlgren wasted no time appointing a court of inquiry, chaired by Cmdr. John A. Almy. The court was directed to pay particular attention to "the conduct of the commanding officer of the U.S. Tug *Clover*, and how far that influenced the final loss of the *Dai Ching*." The court met promptly. Although its findings are undated, Admiral Dahlgren forwarded them to Secretary of War Gideon Welles on February 10, 1865.

The board appears to have based its findings on Lieutenant Commander Chaplin's report, with a few minor differences that may have been based on oral testimony. The court concluded *Dai Ching* was grounded at 8:00 AM, with 7 fathoms (42 feet) of water under her stern, with no boat large enough to carry out an anchor to help get her off. The court concluded that the fault for *Dai Ching's* grounding lay with "the cowardice of Stephen Small (colored), the pilot, who fled below at the first fire of the enemy's battery." On the other hand, the court found that Chaplin "used every exertion, as far as lay in his power, to get the *Dai Ching* afloat, and he fought her with spirit and bravery as long as it was possible to do so."

In addition, as directed, the court looked closely at the actions of *Clover*. Acting Ensign Leach maintained that he could not come to the aid of *Dai Ching* because there was insufficient water, but his pilot said that the water was deep enough if *Clover* kept in the channel, and the court concluded that there was sufficient water. Further, when *Dai Ching* was observed to be on fire, and the crew could be assumed to have abandoned her, Leach turned his back on them and started downriver. The court concluded that Leach "neglected his duty in the highest degree, disobeying orders by not complying with the signal to come to the assistance of the *Dai Ching*," and that he "displayed great negligence and withdrew and kept out of danger to which he should have exposed himself, and did not afford the practicable relief and assistance to a vessel of the United States when she was ashore and attacked by an enemy's battery." The court recommended that Leach face a court martial.

Lastly, the court concluded that although Chaplin ordered Acting Master Howorth to go to *Pawnee* and *Stettin* for aid, Howorth went aboard *Clover*, told her commander to take him downriver past the sharpshooters to the prize schooner *Coquette*, without the authority of Lieutenant Commander Chaplin, and while *Dai Ching* was flying a signal for *Clover* to come to her. This, the court believed, was "highly reprehensible."(10)

The whole regrettable affair was not without its repercussions. Samuel Small, the pilot of *Dai Ching*, was punished by the navy for his failures, and Acting Ensign Leach was tried by court martial and convicted of disobeying orders and deserting his post. He was dismissed from the service on April 14, 1865.(11) Acting Master George Howorth's career was more puzzling. He resigned from the service on May 30, 1865, but his resignation was revoked on July 13 and he was granted leave.(12) He was subsequently honorably discharged on September 30, 1865. On August 22, 1867, he was appointed acting master, but died at the New York Naval Hospital less than a year later, on March 29, 1868.

Similarly, Lt. Cmdr. James C. Chaplin died September 23, 1866, while serving as executive officer on USS *Monocacy*, in the Asiatic Squadron.(13)

One factor not discussed in the investigation is the role of prize money. The U.S. Navy continued to pay prize money to naval officers and crewman until World War I, and the lure of prizes had traditionally been a motivating factor in the sea service. Whether this was a factor in Chaplin's decision to ascend the Combahee within dangerous range of a known Confederate battery is a question that no one in the navy asked, much less answered.

Perhaps the final comment should be that of General Sherman, who wrote General Foster on January 29, "Tell Admiral Dahlgren I regret the loss of the *Dai Ching*, but can quote Admiral Porter, who told me once that 'ships were made to be lost.'"(14)

Sources

1. General Foster was an engineer officer, and Fort Foster, ME, was named for him. U.S. Navy Department, *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series I, Vol. 16 (GPO, 1903), hereafter ORN, pp. 169, 171-72, 185, 187.
2. Paul H. Silverstone, *Warships of the Civil War Navies* (Annapolis: USNIP, 1989), p. 88. ORN, p. 191.
3. The rank of passed midshipman became ensign in 1862. The rank of master was between passed midshipman or ensign and lieutenant. In 1883, this rank was renamed lieutenant junior grade (JG). Edward W. Callahan, ed., *List of Officers of the Navy of the United States and of the Marine Corps from 1775 to 1900* (NY: L.R. Hammersly & Co., 1901), p. 109.
4. ORN, 190-91, 202. War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies,* Series I, Vol. 47, Pt. 2 (GPO, 1895), hereafter *OR*, p. 122.
5. U.S. Navy, *Dictionary of American Naval Fighting Ships*, http://www.history.navy.mil/danfs/d1/dai_ching.htm
6. ORN, pp. 192-94. OR, pp. 327-29.
7. ORN, p. 194.
8. ORN, p. 196-98.
9. ORN, pp. 205, 365-66.
10. ORN, pp. 197-200.
11. Barbara Brooks Tomlin, *Bluejackets & Contrabands: African Americans and the Union Navy* (Lexington, KY: University of Kentucky Press, 2009), p. 186.
12. *United States Service Magazine*, Official Intelligence, December 1865, p. 380.
13. Callahan, pp. 109, 279, 326.
14. OR, p. 162.

The Red-Leg Infantry of the 45th Coast Artillery Brigade in Italy

Charles H. Bogart

Throughout the history of the United States Army, artillerymen have trained as infantrymen and have served in that capacity, acquiring at one time the name "red-leg infantry," for the red stripe on their artillery uniform pants.

During World War II, the United States Army recognized that men serving in the infantry were more likely to be killed or wounded then members serving in other branches, so on October 27, 1943, the War Department established the Combat Infantry Badge (CIB). To further increase the prestige of the award, on June 10, 1944, Congress approved an extra $10 a month for every enlisted infantryman awarded the CIB. To be eligible to receive the CIB, a soldier had to meet three requirements:

1. Be a member of the infantry branch and satisfactorily perform the duties of an infantryman.
2. Be assigned to an infantry unit during such time as the unit was engaged in active ground combat.
3. Actively engage the enemy in ground combat.

Following the December 7, 1941, Japanese attack on Pearl Harbor, the U.S. Army expanded rapidly. The Coast Artillery Corps activated almost 100 new units during 1942, most of which were antiaircraft. Among the new units activated was the 45th Coast Artillery (AA) Brigade, which unfurled its flag on June 1, 1942, at Camp Stewart, GA. On April 22, 1943, the brigade departed the New York Port of Embarkation for North Africa, coming ashore at Casablanca in early May. Once ashore, the 45th CA (AA) Brigade moved to Oran, where it assumed responsibility for the antiaircraft defense of Fifth Army's headquarters, ports, and bases. The brigade's secondary responsibility was to provide ground security at the places its guns protected.

Soldiers of the 45th AAA Bde move up a ridge, into line against the Germans, who were forced off Mt. Belvedere. *Coast Artillery Journal.*

On September 22, 1943, the 45th CA (AA) Brigade landed in Italy and assumed the antiaircraft defense of the Port of Naples. The Luftwaffe still had fight left in it and during the fall and winter of 1943, Naples and its port facilities were subjected to almost nightly air attacks. Not until Fifth Army broke through the German Gustav Line and advanced north to the Gothic Line in May 1944 did the threat of Luftwaffe attacks against Fifth Army's logistical centers and supply lines cease to be a major concern.

Members of the 45th AAA Bde man a German AA railroad car originally presented to Mussolini by Hitler. *Coast Artillery Journal.*

On April 8, 1944, the 45th CA (AA) Brigade was redesignated the 45th Antiaircraft Artillery Brigade, but its mission remained unchanged.

In August 1944, a number of infantry divisions were transferred from Fifth to Seventh Army for Operation Dragoon, the August 1944 invasion of Southern France. Meanwhile, the width of Fifth Army's front lines expanded as it advanced up Italy's boot, and it found itself with less infantry to man a longer front line. With the Luftwaffe now but an occasional intruder over Italy, one solution was to use the men of the 45th AAA Brigade to help man the front lines.

On November 5, 1944, the 45th AAA Brigade was relived of its antiaircraft role. Headquarters, 45th AAA Brigade, now became Headquarters, Task Force 45. Task Force 45 was to help man Fifth Army, taking over a portion of the front line held by the 34th and 91st Infantry Divisions. The task force was an ad hoc unit, with infantry, field artillery, tank, and tank destroyer units, as well as American and British antiaircraft units, in addition to miscellaneous units and even Brazilian and Italian units. From the CAC, the task force used the 91st AAA Group - 435th AAA AW Bn. and 439th AAA AW Bn., and the 107th AAA Group - 536th AAA AW Bn. and 898th AAA AW Bn. Later men from the 403rd AAA Gun Bn., 351st AAA Searchlight Bn., 434th AAA AW Bn., and 900th AAA AW Bn. were incorporated into Task 45. With a total strength varying from 3,000 to 8,000 men, the task force covered a front of 12 to 25 miles.

On February 10, 1945, Maj. Gen. Willis D. Crittenberger, commanding general of IV Corps, commended the 45th AAA Brigade. He particularly cited:

> The conversion of American and British antiaircraft units to the role of infantry and artillery in support of ground troops, which conversion was accomplished while in contact with the enemy along the front lines and without any preliminary preparations, can be recorded as a noteworthy example of American ingenuity and improvisation.

The 45th AAA Brigade was inactivated on February 13, 1945, when the U.S. 10th Mountain Division took over the sector. The task force reported casualties of 87 killed, 342 wounded, and 111 missing between July 1944 and January 1945. On February 14, 1945, the officers and men of HQ, 45th AAA Brigade, became the staff of HQ, 473rd Infantry Regiment, and the former coast artillery members of Task Force 45 became members of the 473rd Infantry Regiment. The CAC men took the CAC branch insignia off their uniforms and put on infantry branch insignia. They were now officially infantrymen, only now eligible to receive the CIB, despite serving four months in the front line. The 473rd Infantry was assigned to the 93rd Infantry Division and fought with that division to the end of the war. On September 14, 1945, after seven months of service, the 473rd Infantry stood down, ending the saga of the CAC men who traded their crossed cannon for crossed rifles.

Source

Col. Gerald G. Gibbs, "Activities of the 45th AAA Brigade," *Coast Artillery Journal*, Vol. 90, No. 6 (November-December 1947), pp. 2-10.

Book Review

Railway Guns of World War II
New Vanguard 231
By Steven J. Zaloga

PB, 48 pp., B&W and color photographs, color artwork. Osprey Publishing, www.ospreypublishing.com, 2016. ISBN 9781472810687, $18.00.

This is a relatively short overview of railway guns in WW2 by one of Osprey's most respected and prolific authors, with extensive illustrations. The book does not cover antiaircraft railway guns, or "small caliber railway guns used in the direct-fire role," which were covered in Osprey's *Armored Trains*, by the same author, in 2008.

With limited space and many excellent illustrations, Zaloga endeavors to cover the major combatants in the war. The basic point of railway guns was to make large-caliber artillery mobile enough for field use, and most countries, the U.S. excepted, primarily envisioned using them against fortifications, such as those the largely surrounded Germany. Nineteen pages are devoted to German railway gun development, with 10 pages on the Soviet Union, and four pages each on Italy and France. Less space is devoted to Finland, Japan, and Britain, and the final two pages are on American railway seacoast artillery.

By far, Germany put the most effort, and expenditure, into the development and use of railway artillery, although it is doubtful that they ever got their money's worth. However, Germany's largest railway guns, reflecting Hitler's megalomania, have long captured the imagination of the world. Russia also developed railway guns between the wars, in addition to improvising a number of railway weapons from idled naval guns.

Most nations that had railway guns ended up using them, at least in part, for coast defense, although none appear to have been particularly effective. The vulnerability of railway guns and their tracks to aerial attack seriously limited their usefulness, unless their owners had air superiority, and air superiority allowed other means of attack. In addition, the comparatively fluid conditions of World War II made large railway guns less advantageous.

This is an extremely interesting book, by an excellent author, with very good illustrations. Anyone interested in coast defense or artillery should find it enjoyable and informative.

Bolling Smith

M1900 6-inch gun on M1900 barbette carriage, c. 1930, at Battery West (later Battery Kessler), Fort Tilden, NY. *Bolling Smith Collection, from William Gaines.*

M1903 6-inch gun on M1903 disappearing carriage, Emplacement No. 1, Battery Amos Stoddard, Fort Worden, WA, pre-WWI.
Bolling Smith Collection courtesy of David Kirchner.