

Primary Battery File

National Archives, Washington D.C.

Record Group 77

Correspondence of the Chief of Engineers

Entry 103

File, Fort, Battery:

35391

Ft. Wool

Project for 12inch Battery

U. S. ENGINEER OFFICE,
166 GRANBY STREET,

Norfolk, Va., August 6, 1900.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. Army,
Washington, D. C.

General:-

In accordance with the instructions contained in Department letter of May 29, 1900, 35391, I have the honor to submit plans and a detailed estimate of the cost of ~~the~~ the emplacements for two 12-inch disappearing guns at Fort Wool, Va.

I have carefully revised ^{all} estimates and believe that the quantities and prices are as near correct as ^{it} is possible to estimate them.

Nearly all the appliances for conducting the work have to be supplied and since this is the beginning the cost is considerable for a single week but will be found to be very reasonable for the completed batteries which it is proposed to erect on the Rip Raps.

The preparation of the site is also a matter of considerable expense, although the design of the battery is made to conform to existing conditions as far as possible without extensive demolitions.

Particular attention has been paid to dispositions of magazines and waterproofing to insure their dryness, and the drainage of ^{all} gun pits and interiors is intended to be capable of being cleaned

out if necessary and kept in an efficient condition at all times.

It is proposed to transfer some of the appliances from Fort Monroe - such as steam dummy engines and concrete mixers. In fact to take advantage of such interchanges as may be possible.

A small steamer is necessary to transport the workmen to and fro, as it will hardly be possible to board and house the workmen in so limited a space.

Fresh water for the engines and for drinking will have to be transported and lots of small stores and materials for the work delivered by the government at the fort.

The old wharf was completely destroyed and the stone piers damaged to such an extent as to require an entirely new wharf. Upon examination it was found that the accumulation of rock and sand about the site of the old wharf made an entirely new construction necessary and most economical.

I do not believe that the proposed work could be safely undertaken for a less sum than the \$181,044.⁷¹ shown in the itemized estimate herewith.

No estimate has been made for mounting the guns and carriages as it is believed this work will be done by the garrison or details from the force at Fort Monroe.

E S T I M A T E.

2 Hoisting engines,-----	\$ 1,880.00
2 Derricks,-----	250.00
6 Cars,-----	510.00
4 Split switches,-----	50.00
47 tons of R. R. iron with connecting plates and bolts, @ \$35 per ton, -----	1,645.00
4 Railroad frogs,-----	65.00
Carried forward,-----	4,370.00

Brought forward,-----\$153,020.30

WHARF.	
115 pine bearing piles, creosoted, 40 feet long,	\$1,840.00
@ 460 per linear foot,	345.00
Driving piles above each @ \$3,	145.00
Sawing piles and fitting tenons,	400.00
40 fender piles (oak), 45 feet long, @ \$10 in place,	90.00
Dressing tops, bolting & wiring piles, each, @ \$2,-	60.00
6 cypress mooring piles, 45 feet long, in place,-	1,799.80
89,990 feet B.M. yellow pine lumber, @ \$20,-	15.00
500 pounds 1-inch bolts and nuts,	11.25
500 pounds 7/8-inch drift bolts,	54.00
450 feet 3/4-inch wire rope, @ 12¢,	12.50
6 doz. 1/2-inch staples, 4 inches long,	37.50
15 kegs 6-inch spikes,	12.50
5 kegs 12d nails,	5.00
2 kegs 10d nails,	
Labor fitting and putting timber in position, @	
\$7.50 per 1,000 feet B. M.,	6,749.25
	11,565.80
	164,586.10
	16,458.61
Contingencies, 10 per centum,	
Total for battery & wharf,	\$181,044.71

Respectfully submitted,

James D. Quinn

Major, Corps of Engineers,

U. S. Army.

1364 F. W.

2 inclosures, in separate roll.

Through:-

Colonel Pater C. Hains,
Corps of Engineers, U. S. Army,
Division Engineer, Southeast Division.

WAR DEPARTMENT
AUG 11 1900

Norfolk, Va.
Aug. 6, 1900.

Quinn,
Maj. James B.

As directed by E.D. 35391, May 29, 1900, submits detailed estimates for 2 empls. for 12" disab. guns at Fort Wool, Va. Total for battery and wharf (including boat \$5000) \$181,044.71

Specd by "Specd" Aug 3, 1900, 3,476 in May 1900, 2d 59, 84, 70.

RECD. BACK. OFFICE CHIEF OF ENGRS. OCT 20 1900

Recd Engr Office, Balto, Aug. 7, 1900.

1st. Indorsement.
U. S. Engineer Office,
Baltimore, Md.,
August 10, 1900.

Respectfully submitted to the

Chief of Engineers, U.S.A.

These two emplacements will undoubtedly cost considerably more than two similar ones on a new and more economically reached site. The drawings herewith are not in sufficient detail to enable me to act intelligently on the most important question in connection with the construction, viz. the foundations.

It will be remembered that Fort Wool is built on a foundation of riprap stone thrown on the shoal that formerly existed there. There is nothing in the letter of the district engineer, or in the drawings that show that any investigation has been made relative to this important matter. These 12-inch guns on disappearing carriages will be effective only in case they retain their levels, and the question of stability in the foundations is of supreme importance. I do not understand that any borings have been made to determine the character of the shoal itself, whether of sand or mud. It is of importance after knowing this to know also about how many pounds to the square foot pressure will be exerted under the gun platforms.

If the magazines are retained in their present positions with reference to the guns, some provision should be made to protect them from a reverse fire from small boats, that might come up

between Fort Wool and Willoughby Spit. I suggest that the drawings be returned for further study on the lines suggested above.

Col., Corps of Engineers, U.S.A.
Div. Eng. S.E. Div.

2d indorsement.
Office Chief of Engineers,
U. S. ARMY.
August 15, 1900.

Respectfully returned to Major Quinn.

It is noticed that the old type of shot lift has been adopted in the drawings. The chain hoist is a much more efficient device. Its use necessitates, at the lower end, the reception of all ammunition on the ascending side of the endless chain, and at the top the ammunition is all delivered on the descending side of the chain. The arrangement of magazines and passages given in the drawing will perhaps require slight modification on this account.

No immediate steps are desirable in connection with the electric light plant. Standard specifications are in preparation, and all new installations must conform thereto. The space provided for the plant is deemed sufficient. It is suggested that the cost of "mixing, placing and ramming about 1,500 cubic yards of Portland concrete on rubble stone

for foundation @ \$7.50", could well be reduced by adopting a concrete of weaker proportions, say 1-4-10, as only compressive strains are involved. An error of about \$6,000 seems to exist in the last item of cost of the wharf. In this location the question of foundations is serious, and more information as to its character should be embodied in the project of the local officer. Much of this information is believed to be on the files of his office. Protection against fire from small boats entering between Willoughby Spit and the Rip Raps appears to be sufficiently provided by the four 15-pounder rapid-fire guns called for by the approved project. A passive defense against reverse fire, by parados or otherwise, would be expensive and is not believed to be required.

By command of Brig. Gen. Wilson:

Alamin V. Clark
Major, Corps of Engineers

35391
2
Incls. 3 & 4 in sep. Roll.

Through Col. PETER C. HAINES,
Corps of Engineers,
Division Engineer, Southhead Division.

3rd. Indorsement,
U.S. Engineer Office,
Baltimore, Md.,
August 16, 1900.

Respectfully transmitted to
Maj. James B. Quinn, Corps of En-
gineers, U.S.A., inviting at-
tention to the preceding in-
dorsements.

Peter C. Hains

Col., Corps of Engrs., U.S.A.,
Div. Eng. S.E. Div.

Rec'd E. O. Morris, Va., Aug. 17, 1900.

4th indorsement.
U. S. Engineer Office,
Norfolk, Va., Sept. 3, 1900.

Respectfully returned to the
Chief of Engineers, U.S. Army,
with report as to subsidence
at Fort Wool, Va., and plans
and detailed estimate for the
battery referred to within, re-
vised as directed in the 2nd
indorsement hereon.

James B. Quinn

Major, Corps of Engineers,
U.S. Army.

1364-4 F.W.
2 inclos. sep. roll.
1 add'l inclo. 4th ind. accomp.
& 1 in sep. roll.
Through:-

Colonel Peter C. Hains,
Corps of Engineers, U.S. Army,
Div. Eng., S.E. Div.

5th. Indorsement.
U. S. Engineer Office,
Baltimore, Md.,
Sept. 13, 1900.

Respectfully submitted to
the Chief of Engineers, U.S.A.
It is well understood that
an exceedingly small amount
of unequal settlement in plat-
forms of the 12-inch disap-
pearing type, will render the
mechanism ineffective. The
letter of Major Quinn, giving
an account of the settlement
that has taken place since
Fort Wool was first begun,
shows that the maximum settle-
ment has been no less than
5 1/4 feet, and the mean set-
tlement is given as 4 42/100
feet. In the old works
erected for coast defense
purposes it was a matter of
little consequence whether
there was some settlement or
not. Slight settlement fre-
quently took place in the
works established along the
coast, but the guns at that
time were small, and no dif-
ficulty was experienced in
leveling up the platforms;
indeed it was not necessary
as it did not seriously af-
fect the accuracy of fire.

With the 12-inch gun on
the disappearing carriage the
case is different; even
though the gun platform space
should receive special treat-
ment, as suggested by Major
Quinn, I think it doubtful
whether the foundations can
be depended on to give the
stability necessary for the

large guns that are proposed to be mounted there. I have always understood that settlement had taken place in that work, but I never before knew that the amount had been so great.

The site selected for these two guns is one that specially calls for the disappearing type of carriage if it can be worked efficiently, but this should not be left in doubt. Rather than have any uncertainty in regard to the stability of the platform I would prefer to use the barbette style of carriage, though it is not so well suited to this site. The platform of the barbette carriage, however, is much less liable to settle unequally, and in case it does, it can be leveled up much more easily than the disappearing one.

I presume the stone, of which this artificial island has been formed, is of irregular shape, and much of the interior of large size. If this be so, piling the foundation would be out of question. If, however, the material was made up largely of small stone, it is probable that piles could be driven through it. There is no information in Major Quinn's letter on this subject.

I would suggest that Major Quinn be directed to excavate at the site of the platform as deep as practicable without great cost, to determine whether the stone in the

interior of the work is large or small. If piling cannot be adopted to give stability to the platform, and no other expedient is found practicable at reasonable cost, I would prefer to use a barbette carriage and even to reduce, if necessary, the caliber of the guns.

Peterson

Col., Corps of Engrs., U.S.A.,
Div. Eng. S.E. Div.

RECEIVED OFFICE CHIEF OF ENGRS. SEP 15 1900

6th Indorsement.

Office Chief of Engineers,

U. S. ARMY.

September 26, 1900.

Respectfully returned to
Major Quinn.

In view of the importance of these guns, the Chief of Engineers is very desirous of locating them at Fort Wool, but with the information before him it appears unwise to authorize the work until more reliable information is had as to the material immediately underlying the proposed concrete foundations of the guns and magazines. The suggestion of the Division Engineer, that a series of excavations be made to determine the nature of the filling in rear of the present stone battery (Fort Wool), is approved. If Major Quinn needs funds for the purpose, a sum not

to exceed \$500 will be allotted for such excavations, on his request.

He is also requested to make some borings at the site near Fort Monroe, for two 12-inch rifles, to be sure as to whether a suitable foundation can be had at that point, if none can be found at Fort Wool.

Major Quinn has adopted the distance between guns shown in the Board's report, but in the exposed site of Fort Wool, it is thought that the full thickness of traverse between guns should be retained. This could be done by moving back the battery somewhat. This would give safe cover to magazines, which is not the case in the battery as shown within.

A careful and accurate record should be kept as the excavations are carried on, so as to show what thickness of sand or other reliable material overlies the mud layer. When the water level is reached, recourse should be had to the ordinary methods of boring, till the mud layer is reached. One boring at least 100 feet deep should be attempted, unless hard bottom below the mud is found at less depth.

While these borings and excavations are in progress, Major Quinn is requested to communicate with the Division Engineer, so that he can personally in-

vestigate the character of material.

By command of Brig. Gen. Wilson:

Thomas V. Abikh

Major, Corps of Engineers.

35391

2

Inclo. 5 accomp.

Inclos. 3, 4 & 6 in sep. roll.

Through Col. PETER C. HAINS,

Corps of Engineers,

Division Engineer, Southeast Division.

7th. Indorsement.

U.S. Engineer Office,
Baltimore, Md.,

Sept. 27, 1900.

Respectfully transmitted to Maj. James B. Quinn, Corps of Engineers, U.S.A., who will please inform the Division Engineer some days in advance of the time of making the borings.

Peter C. Hains

Col., Corps of Engrs., U.S.A.,
Div. Eng. S.E. Div.

Rec'd E.O. Hays, Sept. 28/00

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8th indorsement.
U. S. Engineer Office,
Norfolk, Va., Oct. 26, 1900.

Respectfully returned to
the Chief of Engineers, U. S.
Army, instructions having been
received to submit plans and
estimate for the proposed 12-
inch battery near the light-
house, Fort Monroe, Va., in lieu
of the projected battery, of
the same caliber, for Fort
Wool, Va. (See 2nd indorsement,
O. C. of E., Oct. 23, 1900, on
35391.)

James H. Rogers
Major, Corps of Engineers,
1364 F. W. U. S. Army.

1 inclo., accomp., &
3 in sep. roll.

RECD, OFFICE CHIEF OF ENGRS. OCT 29 1900

U. S. ENGINEER OFFICE,
166 GRANBY STREET,

Norfolk, Va., September 6, 1900.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. Army,
Washington, D. C.

General:-

Referring to the 2nd indorsement, Office of the Chief of Engineers, U. S. Army, August 15, 1900, on E. D. 35391-2, I have the honor to submit the following, relative to the plans for two 12-inch emplacements at Fort Wool, Va.-

The records of this office show that when the project for building up an artificial island on Willoughby Shoals was adopted there was from 12 to 15 feet of water over the shoal and the bottom consisted of a layer of sand and mud for a depth of about 17 feet and after that the usual stratum of soft mud - usual throughout this neighborhood - the thickness of which I do not exactly know, but which is over 25 feet, the borings not having been carried beyond that depth.

During the process of construction the riprap must have settled some no doubt, but no record of settlement was kept until the commencement of the fort, and in the extracts from the records a table will be found giving the settlement of certain portions of the work between 1830 and 1856, and it will be observed that in the extract from Major Jno. L. Smith's report of March 17, 1857, the mean sub-

sidence is given as 4-42/100 feet.

It will be observed that, as is usual in such cases, when time permits, the foundation had been loaded and at the date mentioned the subsidence had practically ceased and no further settlement had been observed up to 1865.

The settlement, it will be observed, was not uniform and some of it was undoubtedly due to the compacting of the riprap before the voids had become completely filled with sand. I do not think that it would be safe to say that further subsidence might not occur, but I do not believe that with the weights so equally distributed the results would be important in the case of the parapets, etc., but with the gun platforms it would be different, and while no plan was presented, it was the intention to have the gun platforms undertaken after the behavior of the rest of the work had been ascertained.

After further consideration I am of the opinion that the gun-platform space will require special treatment, and that in addition to its being ^{kept} separate from the rest of the work, the riprap foundation should have sand washed into the interstices, then have a bed of concrete laid upon it and when the concrete has thoroughly hardened to pile upon it granite blocks to a height of about 20 feet. It is possible with this ^{load the} foundation would soon assume a stable condition and the completion of the gun platforms thereafter might be preceeded with safely.

The riprap outside the walls of the old fort is full of cavities in which the tide rises and falls, and during storms this water is

forced up by wave action with sufficient strength to possibly prevent the binding of a meager concrete, or to form cracks through which the sand filling would escape eventually. It was deemed a measure of prudence to have this layer of concrete rather rich in cement than otherwise. In placing the concrete it must be understood that considerable leveling up of the riprap is necessary, which adds considerably to the expense.

New drawings have been prepared providing for the chain lifts.

In connection with the subject of subsidence of Fort Wool, Va., the following extracts and information from the records of this office are given:-

A drawing dated in 1818 gives fifteen feet of water on shoal at low tide. Another dated 1833 gives the strata of the bottom as follows,-

6 feet	Hard sand,
1 foot	Hard sand and mud,
3 feet	Soft sand and mud,
4 ft.6 in.	Coarse black sand,
2 ft.6 in.	Hard clay and sand,
<u>25 ft.6 in.</u>	Soft mud.

42 ft.6 in.

A drawing dated 1857 gives the subsidence from 1830 to 1856, at embrasures 40, 45, 50 and 54, which are on the east end of the work and near the location of the proposed platforms for 12-inch guns, as follows,-

No. of embra- sure.	Subsidence											
	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842
40	.89	.43	.47	.60	.67	.39	.19	.13	-	.24	-	.09
45	1.02	.44	.45	.64	.67	.38	.24	.13	-	.23	-	.09
50	.99	.42	.46	.70	.94	.09	.40	.13	-	.18	-	.09
54	.93	.41	.56	.67	.92	.33	.28	.16	-	.20	-	.09

No. of embra- sure.	Subsidence, cont'd.									
	1843	1844	1845	1846	1847	1848	1849	1850	1851	1856
40	.09	.11	.07	.06	.00	-	.05	.03	.03	.00
45	.14	.12	.08	.06	.02	-	.04	.02	.03	.00
50	.08	.10	.07	.06	.02	-	.04	.02	.04	.00
54	.07	.10	.07	.06	.03	-	.02	.00	.03	.00

Extract from letter of Major Jno. L. Smith, Corps of Engineers,
dated March 17, 1857, reporting on the project of Fort Calhoun.

"The subsidence has been 5-27/100 feet at the greatest and 3-89/100 at least. The mean of the subsidence at 16 points of observation was 4-42/100 feet. It continued after the foundations were loaded, at a decreasing rate and in 1851, slight traces of it only could be perceived at 6 of the 16 places observed 2/100 of a foot in one of them 4/100 in another and 3/100 in the remaining four. There has been no subsidence since 1851 although the removal of the loading of the foundations was not commenced until about 18 months ago and is not yet completed. It is possible therefore that the foundations are now safe against risk of further subsidence. It may be possible also

that injuries caused by subsidence to the masonry which had been laid before it was perceived, and which are apparent in many parts of the scarp, though not in the piers, may not have been of such extent, in portions thereof, and especially the piers, as to require their re-jection and removal. But it is not probable, and if such portions of the old masonry as may appear to be uninjured should be retained as parts of the new work, on the ground of economy, and should afterwards show defects, not now apparent, there could be no justification that would explain away the fact now known that they had undergone a subsidence of over four feet and, by fair presumption, were rendered thereby unfit to be relied on."

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Extract from letter of John Bogart, Civil Engineer, Ass't., dated August 24, 1864, reporting on the condition of arches at Fort Wool, Va.

"Some time since, in September last, small openings or cracks were observed in the joints of several of the small or communication arches of the Left Straight Branch. Some of the openings were re-pointed in order to ascertain whether the arches were really opening or whether the cracks were due to shrinkage of mortar. There is now however no room for doubt that the arches are certainly opening. A large number of the communication arches, both on the East and West Branches of the work, show it more or less. Most of the openings are at joints near to the keys of the arches and they vary in width from the slightest crack to about $1/16$ or $3/32$ of an inch."

X X X X X X

"All these breaks in communication and casemate arches follow the same general line running near the center of the small arches. Careful levels have been taken but fail to show any differences of elevation in the work either on the scarp or along the Parade and it would seem that if any settlement has occurred it has been quite uniform and so small as to have as yet escaped instrumental detection.

It has been noted that none of the breaks or openings in the arches have appeared until after the flagging of the floor of the second tier had been laid immediately over the arch."

X X X X X X

Extract from letter of Colonel Henry Brewerton, Corps of Engineers, U. S. Army, dated March 17th, 1865, forwarding tabular statement* of levels taken at Fort Wool, Va.

"These levels clearly indicate that no subsidence of any consequence is taking place in the foundation of the work; and that the cracks in the arches must be due to other causes, than the settlement of the foundation. I see no reason why the work should not be resumed."

X X X X X X

Extract from the annual report for fiscal year ending June 30, 1865, dated August 28, 1865, signed by Colonel Henry Brewerton, Corps of Engineers.

*Could not be found among the records of this office.

"In consequence of the appearance of cracks in some of the casemate arches, and arches of communication, it was considered prudent to contract operations on the work, under the impression that the foundations were still settling; but after careful levelling and observation, it cannot be perceived that any subsidence has taken place since the date of the last annual report; and it is now proposed to continue operations, as far as can be done without interfering with any modification of the plan and general profile of the work, which may be adopted to conform to the views of the Board of Engineers of January 1864."

X X X X X X

Extract from the annual report for fiscal year ending June 30, 1866, dated September 14, 1866, signed by Colonel Henry Brewerton, Corps of Engineers.

"In several places considerable openings were discovered in the foundation, which has been the cause of some settlement of the superstructure. These openings were carefully filled with rich grout mortar of cement and sand, as much as the openings would take. After which the space next the scarp, from which the enrockment was removed, was filled, repeatedly with sand and gravel. This material has found its way into the voids of the enrockment, thus adding to its stability."

X X X X X X

From the date of Colonel Brewerton's annual report for fiscal year ending June 30, 1866, up to the time of suspension of the work, which was in August 1870, no record of the subsidence of Fort Wool, Va., can be found on the files of this office.

The detailed estimate has been revised, and, as amended, is as follows:-

E S T I M A T E.

2 Hoisting engines,-----	\$ 1,850.00
2 Derricks,-----	250.00
6 Cars,-----	510.00
4 Split switches,-----	50.00
47 Tons of R. R. iron with connection plates and bolts,-----	1,645.00
@ \$35 per ton,-----	
Carried forward,-----	\$ 4,305.00

#36476-721

OFFICE OF CHIEF OF ENGINEERS

SEP 15 1900
WAR DEPARTMENT

Sept 6, 1900.

Mr. James B.

Submits report upon
subject of subsidence at
Fort Mott, Va., with various
plans & estimates for
repairs & estimates for two
12-inch displacement guns
at that place in accord-
ance with Act of Aug.
15, 1900, on E.D. 35391.

RECEIVED BACK OFFICE CHIEF ENGINEER, 00 29, 1900
with m.e. 2

Submitted to Mr. Sept 29, 1900