

Primary Battery File

National Archives, Washington D.C.

Record Group 77

Correspondence of the Chief of Engineers

Entry 96

File, Fort, Battery:

1891: 2123

1890: 4880

Ft. Warren

Btty Jack Adams

Subject: Modifications of Fort Warren.
J. W. H.

August 12 90.

Lieut. Col. S. M. Mansfield,
Corps of Engineers,
Boston, Mass.

Colonel:

There is sent to you by today's mail a tracing of a plan and sections showing modifications at Fort Warren, proposed by The Board of Engineers August 4, 1889, to adapt the site to a modern armament.

This tracing shows proposed emplacements for five guns, to be mounted on disappearing carriages.

You are requested:

1. To report as to what portion of the proposed modifications should be built first, having in view to furnish an emplacement for one 8-inch rifle on a disappearing carriage. This emplacement might

eventually be used for a 10-inch rifle.

2. To submit detailed working drawings of the portion of the proposed modifications - adapted to the site as recommended for construction, with detailed estimates of the cost of its construction.

By direction of the Chief of Engineers,
and in his absence:

Very respectfully,

Your obedient servant,

J. M. Allen

Major, Corps of Engineers,

In charge.

LT. COL. S. M. MANSFIELD,
Corps of Engineers, U. S. A.

UNITED STATES ENGINEER OFFICE,

P. O. BOX 5346, ROOM 124 P. O. BUILDING,

BOSTON, MASS.

August 28, 1890.

The Chief of Engineers,

United States Army,

Washington, D. C.

General:

Referring to letter from your office dated August 12, 1890, transmitting a tracing of a plan and sections showing modifications at Fort Warren, proposed by The Board of Engineers, August 1, 1889, to adapt the site to a modern armament and showing proposed emplacements for five guns, to be mounted on disappearing carriages, I have the honor to submit the following reply to the first of the two requirements contained in said letter, viz.: To report as to what portion of the proposed modifications should be built first, having in view to furnish an emplacement for one 8-inch rifle on a disappearing carriage.

Of the proposed emplacements one is to occupy a position in the body of the work, the remaining four are together in the Ravelin. An inspection of a chart of the harbor shows at once the relative efficiency of these five guns. The one in the Bastion of the Fort by its sector of fire, covers the Main Ship,

the Black Rock, and the Hypocrite Channels, while the four guns provided for the Ravelin, merely look down the single Main Ship Channel; in this respect the Bastion gun is so far superior to the others as to warrant its selection. In providing its emplacement we will have a work which will be complete in itself to add largely to the strength of the Enceinte, and afford a complete traverse against an enfilading fire along Front II.

It must be observed however, that until the works planned exterior to the Scarp are constructed, the gun will be inadequately protected, and herein lies the only serious objection I can find to the selection of this emplacement as the first to be built. But this objection is overcome by considering that we may readily fill with sand the casemates in the shoulder and flank should an emergency arise, and thus sufficiently protect the gun.

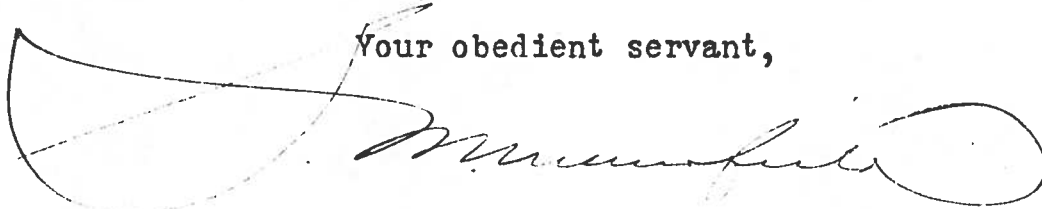
For a further consideration of the matter, I have had prepared a preliminary estimate of the cost of this work complete, excepting the gun platform for which I have no data. There is involved the removal of a partially constructed magazine in the parade of the Bastion, and a liberal percentage is added for plant which will be available for future work. The estimate amounts to \$78,391.02. A like estimate for the southernmost

emplacement in the Ravelin amounts to \$38,960.40. This difference in cost is, in my opinion, more than balanced by the advantage the gun in the Bastion would possess over one in the Ravelin in commanding the approaches, and the strength that will be added to the body of the work by placing it there.

In view of the above considerations I recommend the construction of the 8-inch gun emplacement in Bastion B as the portion of the proposed modifications which should be built first; and while awaiting the decision of the Department, I shall proceed with the preparation of the working drawings and detailed estimates.

Very respectfully,

Your obedient servant,

A large, stylized handwritten signature in dark ink, featuring a prominent loop at the end and a long horizontal stroke across the middle.

Lt. Col. of Engineers.

4880 1 1890
ENGINEER DEPARTMENT

Boston, Mass.,
August 28, 1890.

Forw.
519 1 10

Maneufield,
Lt. Col. S. M.

Referring to Dep.
letter of Aug. 12, 1890, rel. to
modifications at Fort
Warren as proposed by
Bd. of Engrs. submit re-
port & recomds. construc-
tion of the 8-inch gun em-
placement in Bastian B.
as a portion of the proposed
modifications which
should be built first. Will
proceed with working
drawings and detailed
estimates.
Acsnt. Sept. 1, 1890.

RECD. ENGR. DEPT. 29 SEP 29 1890.
RECD. ENGR. DEPT. 29 SEP 29 1890.

LT. COL. S. M. MANSFIELD,
Corps of Engineers, U. S. A.

UNITED STATES ENGINEER OFFICE,

P. O. BOX 5346, ROOM 124 P. O. BUILDING,

BOSTON, MASS.

September 23, 1890.

The Chief of Engineers,

United States Army,

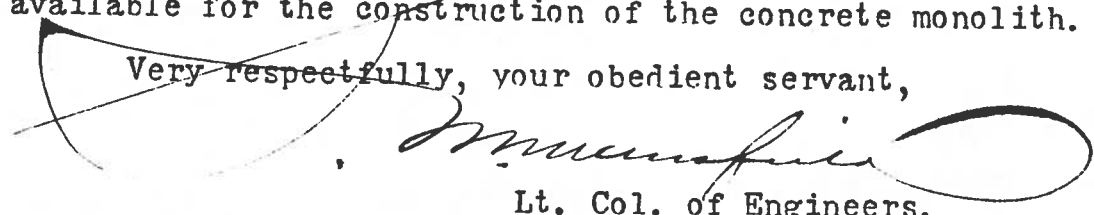
Washington, D. C.

General:

I have the honor to state that considerable work could be done at Fort Warren during the remainder of the working season in removing old magazine and masonry, in collecting material, and in making necessary excavations for the 8-inch gun emplacement which do not depend on the completion of the working drawings ordered to be prepared, and which could be undertaken so soon as the selection of the emplacement has been approved by the Department.

The detailed drawings cannot be submitted before the middle of October, 1890, so late that the working season will be lost before operations are commenced. If these preliminary operations are effected this fall, the whole of the next working season would be available for the construction of the concrete monolith.

Very respectfully, your obedient servant,


Lt. Col. of Engineers.

ENGINEER
14880 2 1890
DEPARTMENT

Boston, Mass.,

Sept. 23, 1890.

Forw.
519
RECEIVED SEP 27 1890
Boston, Mass.

Maryfield.
Lt. Col. S. M.

States that
considerable prelimi-
nary work as within
mentioned could be done
at Ft. Warren during re-
mainder of working season
which does not depend on
completion of the working
drawings, & if effected the
whole of next working
season would be available
for the construction of
the concrete monoliths.

RECD. ENGR. DEPT. 27 SEP 29 1890.
mdo. 1 accompanying.
RECD. ENGR. DEPT. SEP 24 1890.

1st Inclosurement.

Chief, Chief of Engineers
U. S. Army
Washington 25/1890.

Collectively returned to next
Council Mandated.

Your section of Section B,
Fort Warren, for the enclosurement
of the 8" gun, for which you were
requested by letter of March 12 to
submit working drawings, is ap-
proved. No work, however, will
be undertaken until the drawings
and estimates are completed and
have received approval of the
proper authorities.

They are to be returned
by command of
Brig. Gen. Bailey:

John S. D. Knight
Captain Corps of Engineers.
(Incls. 2 of 4850-1890.)
(Incls. 1 of 2850-1890 herewith.)

2nd Inclosurement.

U. S. Engineer Office,
Boston, Mass. Sept 27/1890.

Copies of fully re-
turned to the Chief
of Engineers, U. S. A.,
in compliance with
preceding endorse-
ment.

Maryfield
Lt. Col. of Engineers.
(1 inclosure.)

Forw.
519

RECD. ENGR. DEPT. SEP 29 1890.



MEMOIR.

The following is intended to supplement and explain the two sheets of drawings forwarded under this date and relating to the proposed emplacement for an 8 or 10-inch high power rifle in Bastion B, Fort Warren, Mass.

These drawings have been prepared in accordance with instructions from the Engineer Department of Aug. 12, 1890, transmitting a project of the Board of Engineers for "Modifications of Fort Warren--to adapt it to receive a modern armament," and directing that one of the five barbette positions thereon shown be selected for immediate construction, and that detailed drawings and estimates be made of the one so selected. The barbette emplacement in Bastion B was selected for reasons already given, and the preparation of the detailed drawings for the same was approved in Department letter of Sept. 1, 1890.

With perhaps a single exception, no deviation from the determinate proportions and dimensions of the Board's plan has been made except when imperatively demanded by the omission of the **water** battery, or the adaptation of necessary details. In one or two cases of discrepancy in the drawing, the construction which seemed most consonant with the general principles and policy of

the plan has been adopted.

It being important in approaching the question of actual construction, to know exactly the present condition of the work to be modified, and as that condition is not completely shown in any of the drawings of the work which have heretofore been made, some pains have been taken to ascertain the actual state of affairs, and indicate it on the same plan with the proposed work, so that the necessary operations, both of demolition and construction may readily appear. To do this without confusion has been a difficult undertaking, and has necessitated the adoption of a notation more complex than is desirable.

By reference to the barbette plan on sheet 1, it will be seen that the site to be occupied by the new emplacement now presents an earthen parapet, with a masonry revetment, behind which are eight 10-inch platforms. On the same terreplein are two 15-inch platforms, one center and one front pintle, but the trace of the breast-height has not been correspondingly modified, the project under which these platforms were built not having been completed. On four of these platforms guns are now mounted, a 15-inch smooth bore in the salient, a 10-inch smooth bore in the right shoulder angle, and two 8-inch converted on the right flank.

On the same terreplein also, but beyond the limits of the new work are a front pintle 15-inch and two 10-inch platforms, the latter having guns mounted and the former not. The parapet here is in the same condition as before described with respect to the 15-inch platform.

The new superior slope has been developed on the guiding lines laid down by the Board, with the additional assumption that within the sector of fire, all lines of this slope passing through the pintle shall be straight. Contours at a distance of 5-10 feet show the resulting surfaces, mostly planes, which constitute the superior slope. They also show the form adopted for the exterior slopes along that part of the scarp which is to be covered by the water battery. Simple surfaces, lending themselves readily to developement into the forms required when the water battery is built, have been aimed at. It is thought best to remove the present scarp coping, as a measure of economy, since it is worth much more than the material which replaces it, and also because in part of the parapet, its upper outer edge is a line of the earth slope and if left in position, it will cut the slope in two, and increase the difficulty of its maintenance.

The junction of the new rampart with the earthen parapet on its left has been worked out with a view to preserving some cover for

the 15-inch gun, giving at the same time a simple and agreeable resolution of one set of surfaces into the other.

The stairs at the right of the banquettes are shown on the Board plan as old work but not in their present position. The part to be used has been left as now and the banquettes slope modified accordingly. That the ascent is broken into two flights, and that additional banquettes room at a slightly lower elevation results, is believed to be advantageous rather than the reverse.

The details of lighting and ventilation have seemed to require three small openings in the upper part of the concrete mass. They have been carefully worked out so as to avoid any element of danger or weakness.

fig 1
The lighting of the magazine chambers and passages is accomplished by five lamps, as shown in the drawings. Two of them are approached by a passage debouching from the main entrance gallery in the direction of its axis and a third by a short separate passage, leading from the inner door recess, both outside the inner door of the gallery. Each of these lamp passages communicates with the space to be lighted by a lamp recess, the details of which are shown. The form of the recess is such as to weaken the wall as little as possible; to make the lamp easy of access for lighting and inspection, and to cause it to take air from the bottom

of the passage and deliver the heated gases at the crown of the arch. In the short passage it is thought this provision will be sufficient to supply the lamp with air pure enough for combustion. In the long gallery special provision has been made, as shown, for carrying off the products of combustion.

fig 8
The construction of the lens and its insertion in the wall are not more elaborate than the conditions demand. As the concrete worked in the forms required would be deficient in strength, the opening to the interior is made in a block of granite, securely embedded in the wall. On its rear or outer face is a circular grove adapted to receive a bronze ring embedded in rubber or asbestos cement. The ring inserted, a slab of slate is placed against it, the slate ~~ring~~ being held in place by bringing up over its edges the cement used in finishing the interior of the recess. In laying the concrete mass, the recess will be left large enough to admit the slate slab before finishing, so that the metal work can be deferred until after the completion of the masonry, if thought desirable. The inside of the bronze ring described is threaded to receive the ring of the lens. The latter is arranged to receive two plates of glass 3-8 inches thick separated by an equal space. Each plate is set against a thread of asbestos packing, and held in place by a threaded ring, as shown. In setting

the plates, it is proposed to put a few grains of some deliquescent salt in the space between them so that no free moisture can accumulate on their inner surfaces. All the metal work of this design as well as all metal work described in this memoir is to be of the bronze adopted by the Board of Engineers, except when otherwise stated. The other two of the five lamps proposed will be simple battery lanterns, placed in niches prepared for them, one in the retaining wall opposite the entrance from the parade, and the other in the upper ammunition passage opposite the lift.

The ventilation of the magazine and shell room is provided for in connection with that of their lamp passage by means of air shafts leading from the crowns of the arches near the rear end to a junction with the shaft from the lamp gallery at a point beyond the shell room recess. The vertical pipes are of such length that the lateral may fall slightly from the magazine to the junction with the lamp ventilator, so that no condensation can flow toward the magazine. The verticals and the lateral branch from the magazine to the shell room will be of unglazed pipe, and the rest of vitrified pipe, embedded in the concrete. An adjustable damper will be placed in each vertical, near the roof of the chamber and controllable from the inside.

The air shaft beyond the junction of the lamp and magazine

branches is carried to the outside air through a shaft formed in the concrete with vertical and horizontal sections as shown. The lower opening will be below the level of the adjacent terreplein. Whenever the lamps are burning, they will provide a forced ventilation of moderate power for the magazine and shell room.

The ventilation of the ammunition passages is provided for by an opening through the rear wall at the top of the lift shaft. It has been so designed as to be impenetrable by a chance missile, to drain outwardly and to facilitate an outward current for ventilation. No provision is made for closing this opening, as it is apprehended that its most important function will be to carry off smoke during action.

The drainage of the magazine system is accomplished by 4, 6, and 8-inch vitrified pipe drains, leading as shown on the horizontal section. The outer ends of the drains leading from the magazine and shell room will be provided with flap valves or equivalent devices, to permit the outflow of water while preventing the ingress of air. These valves will be removable and the inlet wells being of ample size, the drains can be examined when desired, or cleaned out if they should become obstructed. The well in the outer passage will be connected with the nearest inlet of the present system through a running trap.

For the drainage of the exterior surfaces of the monolith it is proposed to interpose a vertical stratum of broken stone between the concrete and the earth filling, and to run blind drains of stone as indicated on the horizontal section from the base of the concrete mass to the adjacent counterforts of the present scarp wall, which is known to be thoroughly drained.

The only voluntary variation from the dimensions of the Board drawing has been made in the width of the passage leading to the foot of the lift shaft. This was shown as 4 feet, but as it is the objective point of all the traffic in the system, it is thought it should be at least as wide as the passage out of which it leads, and it has been so drawn.

Doors so designed as to be tight or ventilating as desired, are provided for the magazine and both the shell room entrances. For the latter a special form of recess is required and is shown in the drawings. The double doors and transom as shown will be used at the shell room entrances. For the magazine, a single door of similar construction but with circular top will be mounted to swing into the dead end of the gallery, as indicated. A removable barricade is provided to close the upper passage, and a stout door of three thicknesses of plank rivetted together diagonally will be hung at the entrance from the parade.

Ring bolts of mild steel will be placed in granite blocks in the breast-height face of the rampart, one in front of the pintle, of extra size for the main haul in mounting the gun, and others at convenient places for guys and tackle.

As the weight of the ammunition to be handled and the methods to be adopted for transporting it to and from the lift are not known, the details of that appliance cannot be definitely determined. For the sake of completeness, however, and to exemplify the conditions which the lift must meet, a design is presented. The use of metal is minimized, rigidity sufficient for certain and smooth working and elasticity enough to take up the concussion of firing are combined, while facility of erection has been carefully considered. The head containing all the gear goes together in the shop. It can readily^{be} skidded to place from the upper gallery, when the supports slip up into their places and are wedged up from below under the sills, pressing the curve of the head firmly against the arch. There is no attachment of the lift to the masonry, except by this pressure. The operation of setting up has been so simplified that the lift can be kept stored in a secure place and set up when occasion for its use is foreseen. Any power desired can be given by varying the sizes of two cog wheels.

Those shown in the drawing are of such size that reversing their positions changes the power in the ratio of the weights of 8-inch and 10-inch ammunition. A pawland ratchet are provided to hold the loaded cage at any point, and a hand line raises the pawl to permit the cage to descend. The teeth of the ratchet should be so undercut that the pawl cannot be raised while holding a load. The hoisting rope should be of extra flexible steel or phosphor bronze cable.

The following is a detailed estimate of the cost of this em-
placement:

a. Work of first importance, being all north of parade and case-
mate walls--

7134 cubic yards of earth excavation, incl.

spoiling in ditch, at 65 cents per c.y. · \$4637.10

248 cubic yards demolition of masonry--

55 c.y. at \$10, - - \$550.00

104 c.y. at \$4, - - 416.00

41 c.y. at \$8, - - 328.00

79 c.y. at \$1, - - 79.00 1373.00

5757 cubic yards of concrete, at \$6.50 per

cubic yard - - - - - 37,420.50

150 lin. feet of drain in place - - 150.00

6829 cubic yards embankment, cost included

in excavation - - - - -

Total for 1st stage - - \$43,580.60

Add for Engineering and contingencies 20% 8,716.12

Probable cost of 1st stage - - - \$52,296.72

b. Work of second importance, being between

old parade wall and new interior crest--

366 cubic yards of excavation, at 65 cents

per cubic yard - - - - - \$237.90

48 cubic yards of demolition of masonry,

at \$1 per cubic yard - - - - - 48.00

422 cubic yards of demolition of masonry--

22 c.y. at \$8, - - \$176.00

400 c.y. at \$2, - - -800.00 976.00

1251 cubic yards of concrete, at \$6.50 per

cubic yard - - - - - 8131.50

Total - - - - - 9393.40

Add for Engineering and contingencies 15% 1409.01

Probable cost of 2nd stage - - - \$10,802.41

c. Third and final stage--

1282 cubic yards of excavation, at 65 cents

per cubic yard - - - - - \$833.30

318 cubic yards concrete (filling casemate)		
at \$8 per cubic yard	- - - -	\$2,544.00
1680 cubic yards concrete (covering case-		
mates), at \$6.50 per cubic yard	- -	10,920.00
Three pairs of inside doors, at \$75 per pair		225.00
One pair of outside doors, at \$100 per pair		100.00
Barricade in upper gallery	- - -	25.00
Three sets of lamp recess fittings, at \$40		
per set	- - - - -	120.00
Tile for ventilating shafts	- - -	50.00
Construction of lift	- - - -	400.00
Total	- - - -	<u>15,217.30</u>
Add for Engineering and contingencies 10%		<u>1,521.73</u>
Total for third and final stage		\$16,739.03
Cost of emplacement complete	- - -	<u><u>\$79,838.16</u></u>

4880
ENGINEER
4
DEPARTMENT
1890

Memor

explanatory of the
drawing and con-
taining a detailed
estimate of cost of
proposed modifica-
tions of Station B,
Port Warren, Mass.

THE BOARD OF ENGINEERS.
42^a
ENCLOSURE
NO. 1
1891

42^a
595
1
91

UNITED STATES ENGINEER OFFICE.

P. O. BOX 5346, ROOM 124, P. O. BUILDING,

BOSTON, MASS.

November 12, 1890.

The Chief of Engineers,
U. S. Army,
Washington, D. C.,

General:

In accordance with Department letter of Aug. 12, 1890, I have the honor to forward in a separate roll two tracings, "detailed working drawings", of the proposed modifications of Bastion B, Fort Warren, Mass.,

A memoir explanatory of the drawings and containing a detailed estimate of the cost of the proposed modifications is enclosed herewith.

Very respectfully,
your obedt. servt.,

Munroe
Lieut. Col. of Engineers

3 Incl

2 Tracings in separate roll.

this Office.
By command of
Brig. Gen. Casey:
John S. K. Knight
Captain, Corps of Engineers.
(Incls. 3 of 4880-1890.)
(Incls. 4, 5, 6 herewith.)
(5 & 6 in separate roll.)

4th indorsement.
U. S. Engineer Office,
Boston, Mass., June 12, 1891.
Respectfully returned
to the Chief of Engineers,
U. S. Army, in accordance
with third indorsement.
The modifications re-
lating to interior crest
and communication between
two divisions of guns have
been adopted at the accom-
panying drawings in red.
Munroe
Lt. Col., Corps of Engineers
FOR RECD. ENGR. DEPT. JUN 18 1891.

4880

3

1890

The Board of Engineers.

4880 RECEIVED

1891

Jan. 12, 1890

Dated.

595

20 91

Mansfield

Lieut. Col. J. M.

In accordance with Dept. letter Aug. 12/90 forwarded in separate not detailed working drawings of proposed modification of Bastion B. Sent Nathan Place, with numerous explanatory of the drawings & detailed set of cost.

Cost complete \$79838.16

Enclos. 5 6 in Map files, Bn. 22.

Sheet 47.

513-11

RECD. ENGR. DEPT. JUN 13 1891.

Enclos. 4, 5, 6 accompany.

RECD. ENGR. DEPT. BACKMAN 13 1891.

Z

RECD. ENGR. DEPT. NOV 13 1890.

1st Indorsement.

Office, Chief of Engineers,
Wash. D.C. Army,

February 26, 1891,

Respectfully referred to the Board of Engineers for consideration and report at as early a day as practicable. In the performance of this duty, Lieut. Colonel Mansfield will be associated with the Board as a member thereof.

Wm. Mansfield, Chief of Engineers,
Brig. Gen., Chief of Engineers,
Enclos. 3 of 4880-1890.
Enclos. 4, 5, 6 herewith.
(576 in separate not.)

2nd Indorsement.

The Board of Engineers,
Army Building,
New York City, March 17, 1891.

Respectfully returned to the Chief of Engineers.
At a meeting held yesterday, at which Col. Mansfield was present,

the subject of the modification of Bastion B, Fort Warren, Mass. herein proposed, was carefully considered. It was agreed that the project be recommended for approval and that Col. Mansfield be authorized to begin operations at once looking to the completion of the first stage of the project, which provides for the construction of the magazines and the covering mass designated in his report "North of parade and casemate walls" for which the estimated cost is \$52,296.72.

It was also agreed to recommend that the interior crest of the proposed emplacement for the high power gun be continued Northward from a point designated on the crest line in the drawing by reference (70) to that marked reference (69) at the intersection with the old interior crest of the North face of Bastion B so as to provide cover for rapid fire guns in the bastion North of the modified emplacement; also that connection by ramp or stairs be made between the terreplein of the high power and rapid fire guns; also that until the type of the modern disappearing carriage is definitely adopted, the work described in the project

as the second stage and lying between "the old parade wall and the new interior crest" be not carried nearer to the proposed interior crest than from 20 to 25 feet.

For the Board:

Henry C. Coffey
Colonel of Engineers,
Bvt. Brig. Gen., U.S.A.,
President of the Board.

3d Indorsement.
Office, Chief of Engineers,
W. D. Army

March 18, 1891.

Respectfully returned to Lieut. Colonel Mansfield, whose attention is invited to the recommendations of the Board of Engineers contained in the 2d indorsement which are approved. Lieut. Colonel Mansfield will note on the drawing herewith the modifications relating to interior crest and connection between terreplein of gun and parapet made such record as he may deem necessary, will return these papers to

Subject: Project for expenditure of funds. Fort Warren, Mass.

LT. COL. S. M. MANSFIELD,
Corps of Engineers, U. S. A.

UNITED STATES ENGINEER OFFICE,

P. O. BOX 5346, ROOM 124 P. O. BUILDING,

BOSTON, MASS.

March 24, 1891.

The Chief of Engineers,
U. S. Army,
Washington, D. C.,

General:

I have the honor to submit the following project for the expenditure of the sum of \$50,000⁰⁰, allotted by the Secretary of War, Sept. 8, 1890, for one 8-inch gun emplacement at Fort Warren, Mass., from the appropriation approved Aug. 18, 1890, for "Gun and Mortar Batteries".

The project approved Mich. 18, 1891 is to complete the first stage of the project submitted Nov. 12, 1890, for the modification of Bastion B, Fort Warren, Mass., viz: To construct the magazines and the covering mass, north of the parade and casemate wall...

I respectfully recommend that all materials be purchased, so far as is possible, by contract after inviting proposals in the usual manner, and that the work be done by hired labor; as

this method is most advantageous and economical for the Government.

The balance available for this work is \$11,980.53.

The following are the probable monthly expenditures:

April, 1891	\$808.53	Jan ^y 1892	\$150.00
May "	5000.00	Feb. "	150.00
June "	5000.00	Mar. "	700.00
July "	5000.00	April "	4000.00
Aug. "	5000.00	May "	5000.00
Sept. "	5000.00	June "	5000.00
Oct. "	5000.00		
Nov. "	3000.00		
Dec. "	1000.00		

very respectfully,

~~your obedt. servt.,~~

M. M. M.

Lieut. Col. of Engineers

2123	ENGR. DEPT.	1891
601	RECEIVED MAR 30 1891	
U. S. ENGINEER OFFICE BOSTON, MASS.		

Wm. H. Wood,

March 24, 91.

*Manufactured
Lieut. Col. Q. M.*

Submit project for the expenditure of the \$50,000. allotted from appropriation of Aug. 18, 90, for "Gunnery and Mortar Batteries" for one 8 inch gun emplacement at Fort Warren (Mass.), the material to be purchased by contract after provision, and work to be done by hired labor.

5131-1890 1 mch. 31, 91.
4880-1890.

See No. 1 to Col. Mansfield, by inst. No. 31, 1891.

REC'D ENGR. DEPT. MAR 31 1891

Indorsement

Office Chief of Engineers,

U. S. ARMY,

March 27, 1891.

Respectfully returned approved.

When such record as may be necessary has been made, this paper will be returned to this Office.

By command of Brig. Gen. Casey:

John E. D. Thwait

Captain, Corps of Engineers

2123-1891

2nd Subaltern

U. S. Engineer Office
Boston, Mass. March 30, 1891

Respectfully returned to the Chief of Engineers, U. S. Army, in accordance with 1st Subaltern's inst.

Manufactured
Lieut. Col. of Engineers

To 601-91

REC'D ENGR. DEPT. MAR 31 1891