

LETTER
FROM
THE SECRETARY OF WAR,

TRANSMITTING,

In response to the resolution of the 5th instant, a report on the improvements of the entrance to Yaquina Bay, Oregon.

FEBRUARY 10, 1890.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
Washington City, February 7, 1890.

The Secretary of War has the honor to transmit to the Senate a letter from the Chief of Engineers, dated the 6th instant, with a report from Capt. Thomas W. Symons, Corps of Engineers, on the subject of the improvement of the entrance to Yaquina Bay, Oregon, in response to resolution of the 5th instant, as follows:

Resolved, That the Secretary of War be directed to furnish to the Senate any additional information he may have received on the subject of the improvement of the entrance to Yaquina Bay, Oregon, since the date of his last annual report.

REDFIELD PROCTOR,
Secretary of War.

THE PRESIDENT OF THE UNITED STATES SENATE.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, D. C., February 6, 1890.

SIR: I have the honor to acknowledge reference to this office of resolution dated February 5, 1890, of the United States Senate, directing the Secretary of War "to furnish to the Senate any additional information he may have received on the subject of the improvement of the entrance to Yaquina Bay, Oregon, since the date of his last annual report," and beg leave to return the same with accompanying copy of report of the 13th ultimo from Capt. Thomas W. Symons, Corps of Engineers, the officer in charge of the work, submitting estimate amounting to \$370,560.30 to complete and give the requisite strength and stability to the works at Yaquina according to the present project with such modifications as seem justified by experience.

Very respectfully, your obedient servant,

THOS. LINCOLN CASEY,
Brig. Gen., Chief of Engineers.

Hon. REDFIELD PROCTOR,
Secretary of War.

IMPROVEMENT OF ENTRANCE TO YAQUINA BAY, OREGON.

U. S. ENGINEER OFFICE,
Portland, Oregon, January 13, 1890.

GENERAL: In answer to the communication of Senators Dolph and Mitchell in regard to Yaquina Bay, referred to me by indorsement for report December 26, 1889, I have the honor to submit the following report:

The Government work at Yaquina Bay, for the benefit of the harbor entrance, consists of a south jetty completed as to length in accordance with the approved project of the Board of Engineers of November 13, 1888, and of a north jetty which has been built for a little more than one-third of its projected length from the shore.

I estimate that to "surely complete and give the requisite strength and stability to the work according to the present project" with such modifications as seem justified by experience will cost fully \$370,560.30.

THE SOUTH JETTY.

I send herewith tracings showing longitudinal section of the south jetty as it exists, with reference to high and low water lines and lines of sand along foot of north (channel) side of jetty, and along foot of south side of jetty. The tracing also shows twenty cross-sections of the jetty tramway as built, and the jetty enrockment as actually existing in the latter part of December, 1889.

The jetty was considered as completed about November 1, 1889. Since then the jetty has settled into the sandy foundation and a quantity of stone has been washed down to either side. The stone (which is the best available) is rather soft and a portion has been lost by the constant abrasion to which it is subjected. The deepening of the channel by scour has also dropped in much stone.

It is evident to me that if this jetty is to be maintained as a high-tide jetty, it must be very materially strengthened by making it wider, and, when first built, considerably higher than ordinary high tide, to allow for settlement, displacement, and abrasion. Although the jetty crest is now approximately up to ordinary high-tide level, the waves and big seas pass entirely over it.

Upon the tracing sent herewith, I have indicated what I think should be the approximate cross-sections of the jetty to give the requisite strength and stability to the work, to enable it to withstand the violence of the sea in its exposed condition, and to control in proper manner the tidal flows, and to prevent sand being carried over the jetty into the channel.

The outer 750 feet of the jetty is far more exposed than the remainder to the action of the breakers, and it is, in consequence, proposed to give it as stronger cross-section.

For this portion of the jetty the cross-section proposed for the enrockment is 30 feet in width at 5.4 feet above ordinary high water; or 12.5 feet above mean low water, with a slope on the channel side of 1 vertical to 3 horizontal to 2 feet below low water, and 1 vertical to 1 horizontal from 2 feet below low water to the bottom; and a slope on the shore or south side of 1 vertical to $1\frac{1}{2}$ horizontal to the low-water line, and a slope of 1 on 1 thence to the bottom.

This cross-section is believed to be about that which can be secured by dumping stone from the existing tramway and permitting it to settle into place under the influence of the waves. The remainder of the

jetty will be more protected by sand which will pile up in rear of it, and not being so exposed the cross-section, it is believed, can be diminished to that shown on the remaining cross-section of the tracing herewith. This differs from that before described only in having a top width of 20 feet instead of 30 feet.

To hold and protect the shore end of the jetty with certainty, it is estimated that 12,000 tons of rock will be required.

In explanation of the estimate for the cost of the south jetty, it may be stated that the sandy shoals of the bay have completely encircled the wharf where the stone for the existing jetty has previously been received, and before work can be commenced it will be necessary to extend the tramway and build a new wharf at the bay channel. This extension should be made across the mud flat to a point well up the bay, where the bottom is soft and the channel deep and permanent, and the water comparatively smooth.

The derrick and engine are good, and would only have to be moved to the new site.

A good portion of the old jetty tramway was built in 1882, seven years ago, and has been subjected to much wet from the spray of the breakers. The life of the yellow fir in bridge structures and trestles is about nine years, and in this case is naturally shorter. Most of the tramway needs extensive repairs to make it safe for the locomotive. I think the piles, although somewhat decayed and eaten by the "teredo," could be made to last for two or three years more.

The haul being so much longer it would be advisable to purchase a new locomotive, and at least ten new dump cars, larger, stronger, and more conveniently arranged than those at present at Yaquina. Three additional stone scows should be built.

If the wharf approach is constructed by hired labor, one or two pile-driver scows should be built, and pile-driver derricks, etc., provided. We have engines which could be used for a time for this work.

A fresh water supply for the new wharf would be required, including a new windmill. It will be necessary to build a new ways and repair the old scows.

With the plant on hand, and recommended in this report, it would require about a year to do this work.

THE NORTH JETTY.

In constructing the north jetty so far it has been found necessary to use more rock than just sufficient to bring it up to the level of half-tide as projected by the Board of Engineers. This was necessary in order to protect the jetty tramway, many of the piles of which have very little holding in the sand and rock composing the bed.

For this reason and in order that the jetty may remain permanently at the elevation of half-tide, allowing for settlement, displacement, and abrasion, it will be advisable to build it in the first place to the level of high tide.

I submit herewith a tracing showing the cross-section which, in my opinion, the jetty should have "to give the requisite strength and stability to the work according to the present project."

For the outer 750 feet of the north jetty it is proposed that the cross-section shall be similar to that for the outer 750 feet of the south jetty, having a width on top at high-water line when completed of 30 feet.

The other 930 feet yet untouched to have a similar cross-section, but diminishing in width so that at the present end of the jetty the width shall be 20 feet, which 20-foot width shall continue to the shore end.

The further extension of the north jetty tramway will be attended with great difficulties and many uncertainties, and these will increase as the jetty progresses, owing to the deeper and rougher water and the rocky bed which is of varying hardness. Many delays and contingencies are liable to occur to a work in such an exposed situation, and much will depend upon the character of the bed-rock met with.

In order to provide for reasonable contingencies the estimate for the construction of this tramway is made liberal and is, for the first 500 feet \$6 per foot, for the next 500 feet \$7.20 per foot, and for the remaining 680 feet \$9.60 per foot.

In further explanation of the estimate of the cost of completing the north jetty submitted herewith it may be mentioned that it will be necessary to overhaul the pile-driver and provide a heavier hammer and stronger hoisting engine, and construct a new and stronger pile-driver derrick.

Three new stone scows should be built a little larger than those now on hand, some of which are old and are becoming unfit for service. Twenty new stone boxes to be loaded on the scows with the largest pieces of stone should be constructed.

Water should be brought from the Government tank to the wharf in an inch-and-a-half galvanized pipe. At present the water for boilers, boats, etc., is supplied by the water company of the city of Newport, and this supply is limited and uncertain.

It will require about 10,000 tons of stone to complete the existing portion of the jetty in accordance with the cross-section submitted herewith. In making the estimate for the stone required for the balance of the jetty, the average depth of the bed rock below the plane of M. L. L. water is assumed at 10 feet. Where the jetty now ends this depth is 6 feet; at the outer end of the projected jetty it is over 12 feet. As the jetty advances all the sand from in front of it is scoured away, making it necessary to drive the piles in all cases into the bed-rock.

Estimated cost to complete the work at Yaquina Bay according to present project.

SOUTH JETTY.

Building three new stone scows, at \$2,500.....	\$7,500.00
One pile-driver, scow derrick, etc.....	1,200.00
One hoisting engine.....	1,325.00
One derrick at quarry.....	700.00
Ten new dump-cars, at \$500.....	5,000.00
Water supply for new wharf.....	1,500.00
Shifting derrick and engine to new wharf.....	150.00
Building new wharf, 40 feet by 120 feet.....	2,000.00
Building 4,400 feet of track trestle to new wharf, complete, with track, at \$4.50.....	19,800.00
Repairing 3,000 feet of old tramway, at \$2.....	6,000.00
Rails and fittings for double tracking south jetty tramway, 5,000 feet of track, at 60 cents.....	3,000.00
Placing on spur and shore extension of jetty 12,000 tons of stone, at \$1.50.....	18,000.00
Placing on 3,000 feet of main jetty 60,000 tons of stone in pieces from 100 pounds to 6 tons (averaging 2 tons), at \$1.50.....	90,000.00
Contingencies, engineering, superintendence, rents, etc., 10 per cent....	15,617.50
Total.....	171,792.50

NORTH JETTY.

Building three new stone scows, at \$2,500.....	7,500.00
Two hoisting engines, at \$1,325.....	2,650.00
One 10-ton locomotive.....	4,000.00
Two derricks, at \$700.....	1,400.00

Ten new dump-cars, at \$500.....	\$5,000.00
One 3,000-pound pile-driver hammer, at 4 cents.....	120.00
Repairing jetty pile-driver	600.00
Perfecting water supply at Newport, 2,000 feet of pipe and laying same, at 30 cents.....	600.00
Twenty new stone boxes, at \$25	500.00
Building quarters at Cannon quarry	1,200.00
Purchase of new tools and supplies.....	3,000.00
Constructing jetty tramway 1,680 feet long—first 500 feet at \$6, second 500 feet at \$7.20, and the remaining 680 feet at \$9.80.....	13,128.00
Placing on existing 1,050 feet of jetty and shore trestles 10,000 tons of stone, at \$1.50	15,000.00
Extending jetty enrockment, 84,000 tons of stone, at \$1.50.....	126,000.00
Contingencies, engineering, etc., 10 per cent.....	18,069.80
Total.....	198,767.80
Total estimated cost of both jetties.....	370,560.30

Of this amount there can be profitably expended during the next fiscal year \$250,000.

This would enable all auxiliary operations incident to the vigorous prosecution of the work to be done, and about two-thirds of the rock to be put into position.

It is possible that as the work advances it will be found practicable to reduce the cross-section of the enrockment proposed, and yet retain sufficient strength to resist the action of the sea, thereby reducing the ultimate cost.

With this in view it will be well to carry on the work as much as possible along the entire length of the jetties, and to stop it when more mature judgment, born of further experience, indicates that they "surely have the requisite strength and stability."

In regard to the latter part of this letter of Senators Dolph and Mitchell which states "we should be gratified if the officer in charge be requested to submit to your judgment his views upon the feasibility of making such a channel as will allow the exit of vessels drawing 25 feet of water and what additional appropriation would be sufficient to attain this result," I have the honor to report as follows:

I do not think that sufficient experience has been had with this harbor or with harbors of this kind to permit views in the case to be formed by me which would be at all satisfactory or conclusive, even to my own mind.

In order that ships may enter and leave the harbor safely drawing 25 feet of water, there should be about 30 feet of water on the bar at high tide, or 23 feet at low tide. The records of this office show that there is rock underlying the bar sand of the proposed harbor entrance, at various elevations of from 18 to 31 feet below the plane of low water. The general average elevation of this underlying rock would be about 21 or 22 feet below the plane of low water.

If all the sand were scoured off the bar the least depth at high water would be as far as known 25 feet, average depth about 29 feet, and greatest depth about 38 feet.

The object of the jetties built and projected is to cause this scour to take place to as great an extent as possible, and the most that can be hoped from them or their possible extensions in the future would be to scour this bar sand away and keep it away, leaving the rocky bottom exposed. Then, and then only, could a determination be made of the amount and character of the rock to be removed to reduce the rock bottom to a depth of 23 feet below low water, and a satisfactory judgment

be formed as to the feasibility of keeping it to this depth, and an estimate of the cost of the work made.

Such being the case, I conceive that the time has not yet arrived for the formation of any definite views or judgment in the matter, and I am unable to make any satisfactory estimate of the additional appropriation sufficient to attain the result, *i. e.*, to permit the exit of vessels drawing 25 feet of water.

Very respectfully, your obedient servant,

THOMAS W. SYMONS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. A.