

BAR AT ENTRANCE TO HARBOR AT YAQUINA BAY,  
OREGON.

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LETTER

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

*With a letter from the Chief of Engineers, report of the examination of harbor at Yaquina Bay, Oregon, with a view of obtaining 25 feet of water at mean low water upon the bar at the entrance.*

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DECEMBER 9, 1892.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

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WAR DEPARTMENT,  
*Washington, December 5, 1892.*

SIR: I have the honor to inclose herewith a letter from the Chief of Engineers, dated December 5, 1892, together with a copy of a report and map from Maj. W. H. Heuer, Corps of Engineers, dated November 3, 1892, of a preliminary examination of harbor at Yaquina Bay, Oregon, with a view to obtaining 25 feet of water at mean low water upon the bar at the entrance, made by him in compliance with the provisions of the river and harbor act of July 13, 1892.

Very respectfully,

J. M. SCHOFIELD,  
*Major-General, Acting Secretary of War.*

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

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OFFICE OF THE CHIEF OF ENGINEERS,  
UNITED STATES ARMY,  
*Washington, D. C., December 5, 1892.*

SIR: I have the honor to submit the accompanying copy of report, dated November 3, 1892, with map, by Maj. W. H. Heuer, Corps of Engineers, upon preliminary examination of harbor at Yaquina Bay, Oregon, with a view to obtaining 25 feet of water at mean low water upon the bar at the entrance, made to comply with requirements of the river and harbor act approved July 13, 1892.

The entrance to Yaquina Bay has been under improvement by the United States for a number of years, with a view to obtaining a channel of a least depth at high water of 17 feet (low-water depth of 10 feet), and this report shows that at present, with the jetties in their incomplete condition, the low-water depth on the bar is 14 feet, and this least depth has been maintained. Hence the work has thus far accomplished all and even more than was expected.

In concluding his report Maj. Heuer states that while it may be practicable to obtain a depth of 25 feet at low water over the bar at the entrance at Yaquina Bay, the result is so doubtful and the expense attending the work being so great as to be incommensurate with the advantages to be derived, that he does not consider the harbor worthy of improvement to that extent.

For reasons given in his own report Col. G. H. Mendell, Corps of Engineers, the Division Engineer, states that the suggested improvement is not regarded as worthy to be undertaken by the General Government.

This opinion is concurred in by me.

Very respectfully, your obedient servant,

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

Hon. S. B. ELKINS,  
*Secretary of War.*

PRELIMINARY EXAMINATION OF HARBOR AT YAQUINA BAY, OREGON,  
WITH A VIEW TO OBTAINING TWENTY-FIVE FEET OF WATER AT  
MEAN LOW WATER UPON THE BAR AT THE ENTRANCE.

UNITED STATES ENGINEER OFFICE,  
*San Francisco, Cal., November 3, 1892.*

GENERAL: The river and harbor act of July 13, 1892, required an examination of the "harbor at Yaquina, with a view to obtaining 25 feet of water at mean low water upon the bar at the entrance."

In accordance with the above act, and in compliance with your instructions, the examination was made by me in person in October, 1892, and the following report is the result thereof:

Yaquina Bay, Oregon, and the improvements made by the Government to the entrance are so well and carefully described by the Board of U. S. Engineers, printed in the annual report of the Chief of Engineers for 1889, part 4, page 2517 and following, that anyone desiring information as to the condition of affairs at that date has but to read that report. It will therefore only be referred to as occasion may demand.

The project for the improvement of the entrance to Yaquina Bay was made in 1881. The object was to concentrate the tidal flow of Yaquina Bay and direct it over the bar by means of a mid-tide jetty, a little less than 4,000 feet in length, to be constructed on the south side of the entrance to the bay. This was afterwards modified so as to construct two high jetties, one on each side of the entrance, the south jetty to be a little less than 4,000 feet long and the north jetty to be about 2,300 feet long. It was hoped that by this means a bar depth of 17 feet at high water (low-water depth of 10 feet) might be obtained and maintained.

Both jetties are completed as to length but not as to height; that on the south side requires some 1,300 feet of its outer end to be raised 4

or 5 feet in height; the north jetty requires about 630 linear feet of its outer end to be raised about 7 feet in height to complete the project as approved.

The total amount appropriated for the work has thus far been \$635,000. Capt. T. W. Symons in his special report, printed in the Annual Report of the Chief of Engineers for 1890, part 4, page 2974, estimates that the total cost of completion of the projected work will be \$370,560.30 additional (to what had been previously appropriated). Deducting appropriation of \$165,000 made in 1890, and \$85,000 made in 1892, there would still be required to complete the work \$120,560, or make the whole estimated cost of the work \$755,560.

Before work was commenced at Yaquina Bay there was frequently as little depth on the bar as 7 and 9 feet, with occasional temporary depths of 13 feet at mean low water. The mean rise and fall of the tide is 7 feet. The maximum rise of the tide is about 12 feet. At present, with the jetties in their incomplete condition, the low-water depth on the bar is 14 feet, and this least depth has been maintained. Hence the work has thus far accomplished all and even more than was expected.

When the project for improvement was made in 1881, it was well known that there was a large sunken reef of rocks located outside the bar, nearly parallel to and a little less than a mile distant from the shore. Also, that there were numerous sunken rocks lying just outside the entrance to the harbor. The jetties were designed so as to direct the outflowing tidal current over that portion of the bar which was least obstructed by rocks, which offered the best water, and which was the shortest and safest practicable route over the narrowest and ordinarily deepest part of the bar to the sea. The outer ends of the jetties were placed at a distance of 1,000 feet apart, for the reason that where the tidal flow was concentrated to this width inside the entrance good depths were maintained where scour was possible, and a lesser width would not have sufficed in the rapid current which would ensue for sea room for vessels entering and leaving the harbor. The entire tidal area within Yaquina Bay is said to be about 5 square miles, and the average tidal flow, as determined by Capt. Powell, is 40,000 cubic feet per second. The present cross-sectional area of waterway inside the jetties, referred to the plane of low water, is between 18,000 and 19,000 square feet, or say 22,000 square feet at half-tide stage. This would give a mean velocity of current of very nearly 2 feet per second, with maximum velocities perhaps as high as 8 feet, or about 5½ miles per hour. It is said that in the jetties at present there are currents as rapid as 10 feet per second or about 7 miles per hour. Hence further contraction in width of jetty channel would be inadmissible.

The maximum effect which the tidal currents directed by the jetties can produce on the bar has not yet been reached, for the reason that neither jetty has yet been raised to its full height, and as the crest of the bar is fully 3,000 feet beyond the present outer ends of the jetties the current is not concentrated on any special part of it.

Lying immediately in the throat of the jetties and extending out nearly to the bar, covered by a depth of 4 to 10 feet of sand, is a ledge of rock, whose top varies from 16 to 30 feet in depth below the plane of mean low water. This ledge or bed of rock, covering some 70 acres of area, was developed by careful borings made in 1885 and 1886. Before a channel carrying a low-water depth of 25 feet can be made, the rock within the channel must be removed, and this can not be done un-

til the sand which covers it has been removed by scouring action or otherwise.

The current within the jetties has not yet positively bared much of the rocky bed above referred to, and this may be attributed to the fact that neither jetty is yet built up its full height, and hence has not yet developed all the scouring power of which the current is capable, and partly to the fact that the scouring effect has not been of sufficiently long duration. Hence it would be unwise to extend the jetties further seaward until they were completed to their full heights and their effects observed. If at the end of a year after the completion of the jetties the currents shall fail to scour away from within the jetties the sand on top of the rocky ledge, it would be useless to extend the jetties seaward, and under such circumstances to obtain 25 feet depth at low water on the bar might be said to be impracticable. If, however, at the expiration of the time above referred to, the sand should be scoured away from the rocky bed within the jetties, then, and then only, could a proposition to extend the jetties further seaward be entertained.

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The work thus far has cost about \$600,000 and has resulted in giving an increased depth of water of about 4 feet on the bar. The work, while still incomplete, has more than accomplished the object sought, and it is possible that even better depths may be obtained on the completion of the work, for which it is believed the estimates are sufficient. There might be no serious difficulty in getting 25 feet low-water depths on the bar, if it remained in its present location, and through the jetties inside the bar, were it not for the underlying rock. Current action can be concentrated so as to scour sand and yet permit of safe navigation, but the rocks can only be advantageously removed by blasting, and as there will be violent wave action inside the jetties the water therein should be fully as deep as it is on the bar.

Deep water on a bar at the entrance to a harbor is always a desirable feature, but there should be some consistent relation for commercial purposes between the depth of water on a bar and that inside a harbor. Yaquina Bay owes its importance partly to its geographical location and partly because there happens to be a small harbor there and a railroad terminus. Inside Yaquina Bay are two very small towns, Newport and Yaquina. Newport is at the entrance and Yaquina, the railroad terminus, is 3 miles farther up the bay. Practically, all the commerce of Yaquina Bay is due to and must be carried over this railroad, some 130 miles in length. Coast Survey charts of 1868 and more recent surveys show that while there are depths of 25 to 30 feet in front of Yaquina there is no continuous channel greater than 17 feet at low water to Yaquina. Moreover, they show that the 18-foot channel, when it does exist, is in places less than 200 feet wide, and its average width is less than 300 feet. They also show that the total area of water within Yaquina Bay, having depths of 18 feet or more at low water, is only about 212 acres, or about one-third of 1 square mile.

The country within fifteen or twenty miles of Yaquina Bay is neither very populous nor rich in agricultural products. Its manufactures are limited to the railroad repair shop and a sawmill just above Yaquina. It is reported that, since the Oregon Pacific Railroad reached the Willamette Valley, grain rates from thence to market (San Francisco) have been reduced from about \$6.50 to about \$3.50 per ton, and it is estimated in a letter from the mayor of Corvallis, published in the annual report of the Chief of Engineers for 1884, page 2268, that the grain

available for export in six of the counties in Oregon for 1884 was 8,150,000 bushels, and that this grain, in consequence of the opening of the Yaquina route, was worth 8 cents per bushel more to the farmer than heretofore. The above figures show a saving to the farmer in one year of \$652,000, but they show the value to the community of a competing railroad, not of Yaquina Bay as a shipping point, for the statistics of tonnage published in the succeeding annual report show the total tonnage of Yaquina Bay to have been only 8,234 tons, of which over 7,000 tons were railroad supplies, etc., and that of the balance only 100 tons of wheat (about 3,333 bushels) were outgoing. As there were three other railroads entering the Willamette Valley at that time, and it is believed carrying most of the products to tide water at Portland, it is natural to infer that the reduction of freight rates was made in consequence of the railroad competition rather than of any harbor improvements at Yaquina Bay.

During the past year the exports from Yaquina Bay are reported by Mr. W. M. Hoag to have been only 20,063 tons, while the amount raised in five counties in Oregon, available for export by seagoing vessels, was 217,496 tons. During the past year only one steamer plied between San Francisco and Yaquina Bay, making a round trip every ten days. There was no lack of water either on the bar or inside Yaquina Bay to prevent 217,496 tons being carried out had it been available, but vessels will not generally go to a harbor unless the trip is commercially profitable, and the Oregon Pacific Railroad Company holds the key to the situation as to whether or not it shall be commercially profitable for vessels to go to Yaquina Bay.

While it may be practicable to obtain a depth of 25 feet at low water over the bar at the entrance at Yaquina Bay \* \* \* the result is so doubtful and the expense attending the work is so great as to be incommensurate with the advantages to be derived, and for this reason I do not consider the harbor worthy of improvement to this extent, or even beyond the approved project.

A statement of Mr. W. M. Hoag, for the receiver of the Oregon Pacific Railroad, giving reasons why the Yaquina Bay improvement should be continued to a 25-foot depth is herewith.

Respectfully submitted.

W. H. HEUER,  
Major, Corps of Engineers.

Brig. Gen. THOMAS L. CASEY,  
Chief of Engineers, U. S. A.

(Through Col. G. H. Mendell, Corps of Engineers, Division Engineer, Pacific Division.)

[First indorsement.]

U. S. ENGINEER OFFICE,  
San Francisco, Cal., November 11, 1892.

Respectfully forwarded to the Chief of Engineers, U. S. Army.

It is practicable to secure and maintain between jetties at Yaquina Bay a low-water depth of 25 feet and more.

If the bed of the entrance were alluvial the jetty channel might be deepened sufficiently by controlling the tidal currents. The bed of the entrance being of rock, the stated depth can not be obtained by tidal action, and only by blasting the channel and removing the débris at very great cost.

If the stated low-water depth of 25 feet were obtained in the channel over the distance controlled by jetties—extended to any reasonable

distance beyond their present termini—there would yet be found on the bar lying in front of the seaward ends of the jetties a less depth than 25 feet, and in our present state of knowledge no one could undertake with assurance of success, to create and maintain a low-water depth of 25 feet on the bar at Yaquina entrance.

For these reasons the improvement of Yaquina entrance, so as to give a depth of 25 feet on the bar at low water, is not regarded as worthy to be undertaken by the General Government.

G. H. MENDELL,  
*Colonel, Corps of Engineers, Division Engineer.*

MEMORANDUM OF MR. WM. M. HOAG, ON THE CLAIMS OF YAQUINA BAY TO FURTHER GOVERNMENT APPROPRIATIONS TO SECURE A DEPTH OF TWENTY-FIVE FEET AT LOW WATER.

CORVALLIS, OREGON, October 19, 1892.

1. The location of the port of Yaquina is the first element of importance. It is situated where the most direct ingress and egress is offered for shipping to the markets of the world; drawing to it the produce, both of the agricultural counties of Oregon and of her forests and mines. This is the condition of today, while the Oregon Pacific Railroad is yet in its infancy, and not yet connecting the port with the stock and sheep ranges of eastern Oregon and Idaho. No better situation can be suggested for the export of wheat, oats, flour, lumber, wool, and minerals. The following figures are quoted from the returns for the year 1891, as given by the U. S. Signal Service at Portland. The area of the Willamette Valley is divided between seven of the counties of Oregon, but the figures about to be given are for five only.

The tonnage so given is as follows:

	Tons.
Wheat.....	99, 930
Oats.....	106, 887
Barley.....	4, 347
Corn.....	1, 293
Wool.....	3, 877

From the totals furnished by the Signal Service a deduction of one-fourth has been made on wheat, oats, barley, and corn for seed and home consumption.

These figures aggregate 217,496 tons; or, on another form, the cargoes of more than 100 vessels.

The importance of the port in question is not a matter of estimate, but has been demonstrated by the experience of the past five years.

The first effect of the opening of the Yaquina route to shipping was to force the other transportation companies to reduce their fares and freights, so that the cost of getting a ton of wheat to market from the heart of the Willamette Valley was reduced from \$6.60, which had to be paid for taking it from Corvallis to Portland, a few years ago, to \$3.50, which now takes the wheat—not to Portland—but to San Francisco, where there is an advantage to the farmer in the price of not less than 10 or 11 cents a bushel, on an average of years.

The reason of the advantage of San Francisco over Portland in the matter of freights is a radical and essential one. It depends not on the Columbia Bar, although that has been an aggravating circumstance, but on the position of the two cities. San Francisco stands on the bay, with a direct access to the ocean, while Portland, on the Willamette River, 120 miles or thereabouts from the ocean, has to maintain a costly system of pilotage and towage to bring the ships, of whatever tonnage, to her wharves. Therefore the two questions of time and expense are both answered in favor of San Francisco by the shipowner when selecting a port to which to send his ships.

No wonder, therefore, that there should be the generally constant difference in freights in favor of the southern port. But there is another element in this question to be now considered. San Francisco herself is an expensive port for the ships. There are harbor dues, wharfage, State dues, water privileges to pay for, and therefore the question presents itself if these are necessary incidents to the shipping of the exports of whatever kind that are destined for a foreign market.

Yaquina Bay stands at the one spot on the long stretch of coast between San Francisco and the Sound where easy, quick, and cheap approach from the ocean is combined with a safe and land-locked harbor, of ample size, and speedy access from

the interior country yielding the produce needing transport by deep sea-going vessels. When half an hour takes a ship from the ocean to the wharf, and the same time suffices to set the ship safely at sea again on her outward voyage, there can be no excuse for exactions by way of pilotage and towage. When only as much has to be paid to take the wheat from the warehouse in the Willamette Valley to the port where it pays only the same or a less rate than it does at San Francisco as would have to be paid to take it to Portland, where the higher freights prevail, it takes no argument to show where the wheat will go. Translate these words into figures and see what is the result.

Before Yaquina was connected by rail with the Willamette Valley, the charges were as follows: From Corvallis, a central point of the Willamette Valley, to Portland, \$6.60, or 20 cents a bushel. At Portland the excess over the ocean freight from San Francisco to market was at least 10 cents a bushel more. After the Yaquina route was opened the charges were, from Corvallis to San Francisco, \$3.50, or 10.6 cents a bushel, and the wheat gained the extra advantage of the saved 10 cents a bushel on ocean freight, so that the saving to the farmer was the full sum of 20 cents. Even this enormous advantage is only a part of the saving to the community; not only to wheat, but to all other exports it applies, and in no less degree to imports also.

During the year ending June 30, 1892, the Oregon Development Company, whose steamships sail between Yaquina and San Francisco, had but one steamship running, and this one ship carried between the ports in question during that time 26,739 tons. The proportion of imports and exports was 6,675 tons imports to 20,063 tons of export. Now apply the proportionate saving in transportation charges to the volume of business which is directly or indirectly affected by the introduction of this competing route and some idea will be gained of the magnitude of the questions involved.

Many of those who have studied this transportation question as it affects the whole communities of the Northwest maintain that, of the two improvements, that of Yaquina overshadows that at the mouth of the Columbia in intrinsic importance.

It may be suggested that the tonnage actually moved by the Yaquina route in the period mentioned is insignificant in volume compared with that passing to and from Portland. But in transportation matters the lower rates offered by a competing route will always be found to govern the situation, and especially where, as in the present case, the rates are based on shorter lines, easier grades, and reduced expense of handling cargo. That this is no vain contention is seen by the persistency with which the previously existing routes endeavored, first, to impede and obstruct the construction of the Oregon Pacific Railroad, and, afterwards, when the original tactics had failed, to induce the entrance of the new competing line into divers arrangements for dividing traffic and segregating districts.

This memorandum has proceeded thus far on the supposition that the Oregon Pacific Railroad had fulfilled its mission when it connected the Willamette Valley with the seaboard, but a glance at the map of Oregon will show the far wider scope of its projection. Fully one-half of the great State of Oregon, with its area of 96,000 miles, is without railroad connection with the world. The wide plains of eastern and southeastern Oregon are now devoted to the raising of countless flocks of sheep and herds of cattle; but the day of the cowboy and shepherd is fast passing away.

Settlement and diversified farming have now demonstrated that the Oregon Desert of the early maps has no existence, save in the representations by which the present occupants of the widespread expanse of country in question sought to frighten off intending settlers and prospectors. The very heart and center of Oregon is crossed by the line of the Oregon Pacific. After passing the Willamette Valley in its center the line enters the great timber regions of the Cascade Mountains. This district occupies an area of about 100 miles in length by 50 miles in breadth. A civil engineer of eminence after careful examination of the district in question reports that in his judgment it will yield from 100,000 to 300,000 feet of lumber per acre, affording profitable occupation for the railroad for fifty years to come.

Before the eastern boundary of the State is reached the road passes through the entire length of the Harney Valley, only second in Oregon to the Willamette in point of both size and general fertility. Thence it traverses the Malheur Valley before reaching the crossing of the Snake River and entering the State of Idaho. Either at or near the State boundary there is an intended meeting place with other roads traversing the continent. When, to the considerations demonstrating the present importance of Yaquina, are added those arising from a direct connection with eastern transcontinental roads, with all the developments of through passenger and freight traffic, then the engineering problem is the only one left for determination before accepting as proved the propriety of entering on the work of providing such a channel as shall suffice for the ships of deepest draft coming to the Pacific Coast.

The essence and gist of what has been written may be summed up in a few words.

Yaquina is a safe and commodious harbor. It is connected already with the interior by the Oregon Pacific Railroad, which could there deliver grain for \$2 per ton from the Willamette Valley, if only the channel were sufficiently deepened to enable the grain ships to come to and lie alongside the wharves. For this the proposed depth of 25 feet will amply suffice; to provide less would be to leave the work but half done.

At Albany and Corvallis the railroad takes in the traffic of the whole Willamette Valley, consisting of seven of the richest counties of Oregon. From five of those counties last year the products available for shipment by seagoing ships aggregated about 217,496 tons, or enough to load one hundred ships. To these large figures should be added the incoming traffic. On the analogy of the amount carried between Yaquina and San Francisco this last year the volume of incoming traffic may be safely estimated at one-fourth of the outgoing.

The saving to the farmer on wheat alone by the opening of the Yaquina route is not less than 20 cents a bushel.

The saving on other traffic has been proportionate.

The Oregon Pacific Railroad is yet in its infancy and incomplete. When complete, not only will an immense scope of country be opened to railroad facilities—now entirely unprovided for—but a connection will be effected with transcontinental traffic.

Western Oregon, the district directly tributary to Yaquina, is now the most populous part of the State outside the city of Portland, and, according to statistics supplied by the emigration board, and printed by the Oregonian newspaper in its New Year's number of 1891, received in 1890 one-half of the 68,500 immigrants who came into Oregon in that year.

The real and full benefit of the work already done by the United States Government at Yaquina can not be gained until deep-sea ships can freely come and go there. Until this is done the port is one of transshipment only, and the cost of the two extra handlings and of the maintenance of a line of steamships to conduct the transport to San Francisco ought, if possible, to be saved to the producer, when the ocean transport could and would be more cheaply and more expeditiously commenced from Yaquina direct.

The railroad company has already provided facilities at Yaquina in pilotage and towage and in wharfage, where the loading and unloading of ships can be cheaply and quickly carried on.

The immense outlay incurred by the Oregon Pacific Railroad Company has been made in full reliance on the wisdom and foresight of the General Government in carrying out to the full the project of improving this harbor. The contemplated completion of the Nicaragua Canal will add enormously to the claims of Yaquina as a port of direct shipment to foreign countries. No harbor is better situated than Yaquina to secure a full share of traffic with China and Japan. This is also in contemplation with those who have invested in this enterprise.

In presenting this matter for consideration it is suggested that it should not be taken as a financial scheme submitted to capitalists as an investment, but as an improvement for the public benefit, the effect of which will endure long after the present generation has passed away. The whole State of Oregon is but in its infancy. But the attractions offered to incomers are so great that it is no vain prophecy that the present population will double itself in the next ten years.

Although the Willamette Valley is the oldest settled portion of the State, yet not one-third of its productive area is now under cultivation.

But even if the further improvement of Yaquina were considered as a commercial enterprise it would not be a bad showing that an expenditure of \$600,000 has returned \$230,000 in incomings of the nature of income in the first ten years of its existence. This, however, is the actual fact here, for the duties on steel rails alone brought in by the Oregon Pacific Railroad Company have yielded that amount. Let it also be borne in mind that for want of the completion of the improvement all those rails had to be reshipped at San Francisco for delivery at Yaquina.

The facts herein submitted show conclusively, it is hoped, that the \$600,000 already expended in this improvement bears but a small proportion to the commercial advantages already gained by the present generation of citizens of this State. It is freely admitted that to assure the vastly greater advantages dependent on obtaining a 25-foot channel to the ocean considerably larger expenditures are required.

But it is equally confidently submitted that the success already won is the best possible argument and inducement for the judicious outlay of whatever sum is needed to complete this great work.

WM. M. HOAG,

Manager for T. E. Hogg, Receiver O. P. R. R. & W. V. & C.