50TH CONGRESS, 2d Session. | SENATE. | Ex. DOC. No. 80.

# LETTER

FROM

# THE SECRETARY OF WAR,

TRANSMITTING,

*In response to Senate resolution of October* 12, 1888, *report on proposed improvement in Willamette River.*

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JANUARY 21, 1889.—Referred to the Committee on Commerce and ordered to be printed.

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WAR DEPARTMENT,
*Washington City, January* 19, 1889.

The Secretary of War has the honor to transmit to the United States Senate a letter of the 17th instant from the Chief of Engineers, and the accompanying copy of a report, dated the 31st ultimo, from Maj. W. A. Jones, Corps of Engineers, in response to Senate resolution of October 12, 1888, calling for "an estimate of the cost of the improvement of the Willamette River, between Portland and Oswego, in Oregon, by the removal of bars and deepening the channel so as to admit of the navigation of the same by deep-draught vessels."

WILLIAM C. ENDICOTT,
*Secretary of War.*

The PRESIDENT PRO TEMPORE OF
THE UNITED STATES SENATE.

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OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
*Washington, D. C., January* 17, 1889.

SIR: In answer to the reference to this office for report of a resolution of the Senate, dated October 12, 1888, calling for "an estimate of the cost of the improvement of the Willamette River, between Portland and Oswego, in Oregon, by the removal of bars and deepening the channel so as to admit of the navigation of the same by deep-draught vessels," I have the honor to submit herewith a copy of a report received January 14, 1889, from Maj. W. A. Jones, Corps of Engineers, containing the required information, which places the cost of the improvement in question at $200,000 for a navigable depth of 20 feet at low water.

The resolution of the Senate is herewith returned.

Very respectfully, your obedient servant,

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

Hon. WILLIAM C. ENDICOTT,
*Secretary of War.*

AUTHENTICATED
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## EXAMINATION OF WILLAMETTE RIVER BETWEEN PORTLAND AND OSWEGO, OREGON.

UNITED STATES ENGINEER OFFICE,
*Portland, Oregon, December* 31, 1888.

GENERAL: I have the honor to return herewith copy of Senate resolution, dated October 12, 1888, calling for an examination of the Willamette River between Portland and Oswego, Oregon, with the following report thereon:

*Report.*—In the river and harbor act of August 5, 1886, there was a clause appropriating $5,000 for this purpose.

This sum was not sufficient for commencing work, and survey and examination was made in the following winter of 1886 for the purpose of gathering the facts necessary to develop a plan for improvement with estimate of its cost. At this juncture the succeeding river and harbor bill failed to become a law, and hence the development of a project was deferred until such time as a bill should pass, but when it did pass it contained no provision for the continuation of this work, and hence it was not deemed important to present a project until after the works provided for in the act had been set in motion. The project is now presented as a reply to the Senate resoulution.

Two maps are presented herewith, one showing the river in the vicinity of Ross Island, just above Portland. The other showing the river as far up as Oswego. From these it appears that the obstructions to navigating deep-water ships between Portland and Oswego are all to be found in the vicinity of Ross Island.

*Project.*—The Willamette River at and immediately above Portland, Oregon, is a considerable stream. It has low-water widths of from 650 feet to 1,600 feet, and minimum depths on the bars below Portland of about 16 feet. These latter are under improvement for gaining a minimum of 20 feet at low water. The minimum low-water depth between Portland and Oswego is 8 feet and is found on the bar at the head of Ross Island, just above Portland. * * *

It is subject to two annual floods, one commencing in June, being back water from the Columbia River. The other comes in or near January, and proceeds from its own water-shed. These winter floods are often rapid in their approach and recession, resulting from excessive deposition or liberation of moisture over a small water-shed. The low-water season is short, occurring in September and October, between the wane of the Columbia River rise and the rise which usually follows the advent of the rainy season on the western slopes of the Cascade Mountains. Short spells of low water sometimes occur during freezing weather in winter. The extreme rise in summer has been 28 feet, and in winter about 26 feet. At low-water stages the river at Portland is affected by the tide. The influence ceases at stages higher than 12 above low water. At and near the low-water stage there is a rise and fall of the tide which varies between 0.5 and 2.8 feet, according to the normal tidal variations.

Two sheets of river sections are submitted, showing low-water areas as follows in square feet: 32,000, 24,300, 23,350, 22,300, 18,000, 16,850, 14,510, 11,100, 6,900.

The least section is at the head of Ross Island. The next lowest is the bar section at Sellwood. A comparison of these sections indicates that along the channel to the west of Ross Island some local cause must exist preventing the river from cutting out a normal section. A

good many borings were made to ascertain this cause, and it was found that in the restricted section at this place the bottom was largely composed of coarse, well-compacted gravel and cobble-stones, while near the head of the island a field of bowlders was found. At Sellwood the bottom is soft sand.

The survey shows that closing the channels behind Ross Island would not produce any substantial reduction of section at low-water stages.

In this locality the river cuts through a bed of compact gravel, cemented with a matrix of clay and sand. It is quite probable that a good deal of the Ross Island Bar is this gravel-bed in place.

From the foregoing considerations it would seem reasonable to expect that any further restriction of the water-way might result in increased velocities without corresponding erosion of the bottom, but resulting in erosion of the banks; also it may be expected that if a channel be dredged out to a width of, say, 150 feet, with a depth of 20 feet at low water, there will still be left a section sufficiently small to anticipate a maintenance of the dredged channel. I therefore submit the project for dredging on the line shown on the map herewith. This will involve removal of the following quantities at the prices named. The figures given for gravel and bowlders may require modification after practical attempts at removal.

*Estimate.*

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|---|---|
| 179,388 cubic yards gravel, at 30 cents | $53,816.40 |
| 64,260 cubic yards sand, at 15 cents | 9,639.00 |
| 60,000 cubic yards bowlders, at $2 | 120,000.00 |
| Contingencies | 16,544.60 |
| Total | $200,000.00 |

The winter rise in the Willamette occurs in January and is followed by the spring and summer rise of the Columbia. So that for the period January-August, say seven months of each year, there is a sufficient depth of water for deep-water ships to go up to Oswego. During the remaining five months there will be found from 8½ to 10½ feet of water at high tide. That is to say, the guage-record kept for many years at Portland shows that for seven months of the year vessels drawing from 12 to 28 feet of water can go up to Oswego and that for the remaining five months vessels drawing 12 feet can go there.

Now, the only commercial interest I know of seeking this improvement is the Oregon Iron and Steel Company, whose works are established at Oswego, and are now engaged in the manufacture of pig-iron and cast-iron pipe. This corporation has a capital of $1,250,000, and a blast-furnace capacity of about 40 tons of pig-iron per day, say, 12,000 tons per year. At $30 per ton as an average for pig-iron and cast-iron pipe, the value of the annual output would be $360,000 per year. The cost of the improvement for giving this industry an additional navigable draught of 10 feet over five months of each year will be $200,000. All other commercial business on the river is amply accommodated with the present status.

Furthermore, there are now two draw-bridges across the Willamette River at Portland. It has been demonstrated that such draw-bridges in the majority of similar instances form the upper limit of navigation for deep-water ships, and it is possible that such may prove the case here. Hence it might be reasonable judgment to defer making expensive preparations for deep-water ships above these bridges until after it has been demonstrated such ships will use that part of the river.

The following are submitted herewith:

(1) Map of Portland Harbor in the vicinity of Ross Island.*
(2) Plan of the measurements for gauging the Willamette River.
(3) Two sheets of river sections.*
(4) Report of S. W. Walker upon operations for gauging the Willamette River.*
(5) Résumé by R. A. Habersham upon the observations for gauging the Willamette River.*

Respectfully submitted.

W. A. JONES,
*Major of Engineers.*

The CHIEF OF ENGINEERS, U. S. A.

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*Omitted.