LETTER OF TRANSMITTAL

WAR DEPARTMENT,
Washington, March 29, 1932.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES

DEAR MR. SPEAKER: I am transmitting herewith a report dated March 29, 1932, from the Chief of Engineers, United States Army, on the Columbia River and minor tributaries, made under the provisions of House Document No. 308, Sixty-ninth Congress, first session, which was enacted into law with modifications in section 1 of the River and Harbor Act of January 21, 1927, together with accompanying papers and illustrations.

Sincerely yours,

PATRICK J. HURLEY,
Secretary of War.

COLUMBIA RIVER AND MINOR TRIBUTARIES

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, March 29, 1932.

Subject: Report on the Columbia River and minor tributaries.

To: The Secretary of War.

1. I submit for transmission to Congress, my report with accompanying papers and illustrations on Columbia River and minor tributaries, made under the provisions of House Document No. 308, Sixty-ninth Congress, first session, which was enacted into law with modifications, in section 1 of the River and Harbor Act approved January 21, 1927. As defined in the document and in the River and Harbor Act of March 3, 1925, the primary purpose of this report is "the formulation of general plans for the most effective improvement of the river for the purposes of navigation, and the prosecution of such improvement in combination with the most efficient development of the potential water power, the control of floods, and the needs of irrigation." The survey is sufficient for the general purpose indicated.

NAVIGATION

2. Columbia River from a standpoint of navigation may be divided into three sections; namely, the tidal or lower section extending from the mouth to a point about 140 miles from the mouth; the middle section extending from the head of tidewater to the mouth of Snake River, a distance of about 180 miles; and the upper section extending from the mouth of Snake River to the international boundary, about 424 miles.

3. The project now authorized by Congress for the tidal section provides for a channel through the ocean bar at the mouth of the river 40 feet deep and not less than one half a mile wide; for a channel thence to the mouth of the Willamette River 500 feet wide and 35 feet deep, to be provided in cooperation with the improvement by the port of Portland of the Willamette River to Portland, Oreg.; and for a channel 25 feet deep and 300 feet wide to Vancouver, Wash., 4½ miles above the mouth of the Willamette River, to be provided in cooperation with the port of Vancouver. In a separate report submitted to Congress, February 12, 1932, modification of the project to provide a depth of 28 feet to Vancouver, with suitable turning basins, is recommended. If so modified the present project for navigation on the tidal section will be adequate. The effective improvement of the tidal section for navigation cannot be combined with the development of potential water power, the control of floods, or the needs of irrigation. This project for navigation needs no further mention at this time.

4. The middle section is obstructed by rapids. The Cascade Gorge at the head of tidewater completely blocked navigation before improvement. Navigation past the rapids of the gorge is now afforded by a canal with a lock affording a depth of 8 feet, which was completed in 1896. The next major obstacle to navigation is the Celilo Falls, 200 miles from the mouth. Navigation past the falls is provided by a lateral canal known as The Dalles-Celilo Canal, completed in 1919, with 5 locks with chambers 45 by 265 feet in dimension and affording a depth of 8 feet. From Celilo Falls to the mouth of Snake River the existing project provides for removing obstructing boulders and ledges to provide safe navigation of such channels as exist. The controlling depth over the shoals is about 4 feet at low water. Channels through all of the rapids are generally 100 feet or more in width. Because of the swift currents in the middle section of the river, including the approaches to the Cascade Locks, it can be navigated only by high-powered boats of relatively small-cargo capacity, and is not suitable for modern barge navigation.

5. There is no project for navigation above the mouth of Snake River except in the reach, Wenatchee-Bridgeport-Kettle Falls, about 240 miles in length, where open-river work has been prosecuted to obtain a depth of 5 to 7 feet. Rapids and swift water make navigation in this reach a difficult and costly means of commercial transportation. Such traffic as there is on the river is local, and under present conditions there is no prospect of developing a water-borne commerce on the upper Columbia.

6. The tidal lower section of the Columbia has a large and important commerce. The present commerce on the middle section is unimportant, but there is every reason to anticipate a substantial commerce with large transportation economies if the river is improved for efficient and economical barge navigation. While the amount of this commerce, and the savings in transportation costs cannot be certainly estimated, yet the figures presented by the district and division engineers are considered a suitable basis for determining the value of the improvement from a navigation standpoint. These figures show a movement of 600,000 tons of freight, with an estimated saving of somewhat more than $1,000,000 per annum. The effective method for improving the middle section of the river for navigation is in combination with the development of potential water power. The estimated cost of the locks and channel enlargement necessary for navigation in such combined development is $16,100,000. The potential navigation on the middle section is of such value as to warrant the requirement that power developments be designed on the general lines recommended by the Board of Engineers for Rivers and Harbors to provide pools suitable for navigation; and the public benefits from navigation are sufficient to warrant the assumption by the Federal Government of the entire cost of the necessary locks and channel enlargement.

POWER DEVELOPMENT

7. The Columbia River and its tributaries are susceptible of being developed into the greatest system for water power to be found anywhere in the United States. The power can be developed at low cost. The sites determined by the Board of Engineers for Rivers and Harbors as most promising, all things considered, are at 10 localities, namely:

(1) Head of Grand Coulee, Wash.
(2) Foster Creek, Wash.
(3) Chelan, Wash.
(4) Rocky Reach, Wash.
(5) Rock Island Rapids, Wash.
(6) Priest Rapids, Wash.
(7) Umatilla Rapids, Oreg.
(8) John Day Rapids, Oreg.
(9) The Dalles, Oreg.-Wash.
(10) Warrendale, Oreg.-Wash.

8. Of these, the one at Rock Island Rapids is under construction by private enterprise.

9. The structures contemplated in the scheme for power development are all on a large scale, some on a grand scale, and the conditions at some of them as to foundations and flood discharge over the dams are without precedent. There is nothing, however, to cause a belief that the engineering difficulties cannot be surmounted.

10. There is a desire, which is natural, to make more extended engineering investigations at this time. I believe that there are enough data on hand on which to base any major decisions that may be required by Federal authority. Detailed investigations will be in order following these decisions, or they may be unnecessary.

11. The cost of this development will exceed that of any other single development of any kind for power that has ever been made. Assuming money at 4 percent the estimated costs of these power installations including interest during construction are as follows: Grand Coulee, $204,500,000; Foster Creek, $49,000,000; Chelan, $39,000,000; Rocky Reach, $38,000,000; Priest Rapids, $63,000,000; Umatilla Rapids, $60,000,000; John Day Rapids, $110,000,000; The Dalles, $89,000,000; Warrendale, $59,000,000. Total of these developments about $711,000,000. If money is 6 percent the total would be about $772,000,000. The Grand Coulee and The Dalles installations are outstanding because of size. The ultimate development to be foreseen would have an installed capacity of about 8,000,000 kilowatts. The Grand Coulee development alone would be able to meet any probable increase in power needs of the accessible area for a period of 30 years in the future.

12. There is evidence in this report to show that the power of the Columbia River may be developed economically, provided it be done in such increments as not to outrun the demands of the market. A combination or close coordination of the entire power industry in the region is necessary to secure economic results by guarding against overproduction.

13. The power interest on the Columbia River above the tidal or lower section is by far the most important feature in the development of the river.

FLOOD CONTROL

14. There is a problem of flood control on the lower Columbia. It is independent of other interests, though it will be ameliorated somewhat by the large power installations if they are made with provisions for storage. It can be solved by local interests whenever the economics of the situation justify the building of better levees.

IRRIGATION

15. From the data at hand about 2,000,000 acres of land along the Columbia River in the United States are susceptible of irrigation from that river.

16. The irrigation of the bulk of this land in the most economical manner depends on cheap power for pumping. Irrigation therefore depends on power installation to that degree.

17. There is a much more serious question of the economic feasibility of irrigation here than there is of power development. In fact the local reports demonstrate that the irrigation of land as pertains to the Columbia River area under consideration is not an economical proposition at this time and should await the future.

18. The policy of bringing more land under cultivation at present by large expenditures of general funds and in competition with other lands already under cultivation is questioned by agricultural authorities of the general government.

CONCLUSIONS

(*a*) Navigation interests on the lower Columbia River at present are sufficiently served by the projects heretofore adopted or recommended.

(*b*) Power development on the Columbia River is feasible and the economy of the development appears favorable, provided all power development in the region is coordinated to insure against overproduction.

(*c*) Irrigation as a part of the combined development of the Columbia River is not at the present time economical, considered alone. In the power development there should be a reservation placed on power at the cost of production for purposes of irrigation in the future.

(*d*) Flood control is a minor interest and susceptible of easy solution by local interests.

19. I recommend as follows:

(*a*) That the project for the improvement of navigation on the lower Columbia River be as heretofore adopted or recommended.

(*b*) That the existing projects for the improvement of the Columbia River between Vancouver and the mouth of Snake River be modified to provide for the construction by the Federal Government of locks having a depth of not less than 9 feet over the sills at low water and of suitable dimensions for modern barge traffic, at any dams built in this section of the river under authority of the Federal Water Power Act and in accordance with the comprehensive plan of improvement for navigation in combination with the development of water power; together with a channel enlargement for navigation purposes, all at an estimated cost of $16,100,000, with $300,000 annually for maintenance and operation.

(*c*) That the project for navigation on the upper Columbia River, the section between the mouth of the Snake River and the international boundary, remain as adopted at present, except that power installations, which shall be made on this section, shall conform to such requirements as to navigation in the future with a view of slack-water navigation of a depth of not less than 9 feet, as the Secre-

tary of War on the recommendation of the chief of engineers may prescribe.

(*d*) That the power developments on the Columbia River shall be made on application of local governmental authority or private interest under restriction of the Federal Water Power Act with the prescription of reserved demands of power at cost of production, in such amount as may be made and determined in the interest of irrigation by the Secretary of the Interior.

(*e*) That Federal projects for works for irrigation to be supplied with water from the Columbia River or its tributaries, shall be prepared by the Secretary of the Interior, when their preparation is authorized by direction of law.

(*f*) That no license be issued for the purpose of constructing dams or for power development on the Columbia River which is not in accordance with the general plan for combined development for navigation and power as recommended by the Board, subject to such modifications as may be approved by the chief of engineers and the Secretary of War in conformity with the purpose of that plan to secure the most effective improvement best adapted to the purposes of navigation in combination with water-power development.

20. This report has been submitted to the Commissioner of Reclamation of the Department of the Interior who concurs generally with the views expressed therein. The following letter from the Commissioner of Reclamation expresses his views:

March 19, 1932.

MY DEAR GENERAL BROWN: The opportunity you have given me to read your report on the development of the Columbia River made by the Corps of Engineers of the Army, is highly appreciated and in response to your invitation, I submit the following comments:

The only portion of the investigations dealt with in this report which concerns the work of the Bureau of Reclamation is that relating to the utilization of the river at Grand Coulee, through the construction and operation of power and irrigation works. With your conclusions regarding this, I am in accord and it is a pleasure to be able to state that there is a complete agreement between the engineers of the War Department and those of this Bureau regarding the plans which should be adopted for irrigation and power development, and the estimates of cost.

To your views of conditions as they exist at this time, I should like to add my belief that no development of the land and water resources of the arid region equals this in importance and in the beneficial results which would come. It will enable the largest single water supply of the arid region to be utilized to give cheap power to industries, and make feasible the irrigation of the largest and finest body of unreclaimed land left in the arid region.

I am in agreement with your conclusions that this development to be solvent must be based on the revenues from power and that these revenues must contribute to the cost of the irrigation works to avoid injurious burdens on irrigation farmers; also, that there is not at present a demand for these farms or for the crops to be grown on them. Development, if inaugurated immediately, would not, however, be in opposition to this view. It will require at least 10 years after the works are authorized, to build the dam and the power plant, and another 10 or 15 years to absorb the power thus made available. These things must precede the large expenditure to build the works required for irrigation. By that time the increase in population of the cities of Spokane, Seattle, Tacoma, and Portland, and all the other cities and towns of the Northwest, will provide a local market for the products of these farms. They will be an essential element in the economic and prosperous development of this region.

Very truly yours,

(Signed) ELWOOD MEAD, *Commissioner.*

LYTLE BROWN,
Major General, Chief of Engineers.