BELLI

85TH CONGRESS, 1st Session | SENATE | DOCUMENT No. 46

BELLINGHAM HARBOR, WASH.

LETTER

FROM

THE SECRETARY OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED APRIL 18, 1957, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND AN ILLUSTRATION, ON A REVIEW OF REPORTS ON BELLINGHAM HARBOR, WASH., REQUESTED BY A RESOLUTION OF THE COMMITTEE ON PUBLIC WORKS, UNITED STATES SENATE, ADOPTED ON JULY 24, 1953

PRESENTED BY MR. CHAVEZ

JUNE 14, 1957.—Referred to the Committee on Public Works and ordered to be printed with an illustration

UNITED STATES
GOVERNMENT PRINTING OFFICE
93285 WASHINGTON : 1957

LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY,
Washington, D. C., June 11, 1957.

Hon. DENNIS CHAVEZ,
Chairman, Committee on Public Works,
United States Senate.

DEAR MR. CHAIRMAN: I am transmitting herewith a favorable report dated April 18, 1957, from the Chief of Engineers, Department of the Army, together with accompanying papers and an illustration, on a review of reports on Bellingham Harbor, Wash., requested by a resolution of the Committee on Public Works, United States Senate, adopted July 24, 1953.

In accordance with the provisions of section 1 of Public Law 14, 79th Congress, and Public Law 732, 79th Congress, the views of the State of Washington and the Department of the Interior are set forth in the enclosed communications, together with the reply of the Chief of Engineers to the Secretary of the Interior.

Although the Bureau of the Budget advises that there is no objection to submission of the proposed report to the Congress, it states that no commitment can be made at this time as to when any estimate of appropriation would be submitted for construction of the project modification, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. A copy of the letter from the Bureau of the Budget is inclosed.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

COMMENTS OF THE BUREAU OF THE BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D. C., May 23, 1957.

The honorable the SECRETARY OF THE ARMY,

MY DEAR MR. SECRETARY: Assistant Secretary Short's letter of May 14, 1957, submitted the proposed report of the Chief of Engineers on Bellingham Harbor, Wash., requested by a resolution of the Senate Public Works Committee adopted July 24, 1953.

The Chief of Engineers recommends modification of the existing project for Bellingham Harbor to provide in Whatcom Creek waterway a channel 30 feet deep, at mean lower low water, from water of that depth in Bellingham Bay to a point not nearer than 750 feet from the inner end of the waterway over the full width, at a cost to the United States of $83,700 for construction and $1,000 annually

for maintenance in addition to that now required, subject, in part, to the requirement that local interests contribute, in cash or equivalent work, 3.9 percent of the cost of channel dredging, a contribution presently estimated at $3,400.

I am authorized by the Director of the Bureau of the Budget to advise you that there would be no objection to submission of the proposed report to the Congress. No commitment can be made at this time, however, as to when any estimate of appropriation would be submitted for construction of the project modification, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

Sincerely yours,

CARL H. SCHWARTZ, Jr.,
Chief, Resources and Civil Works Division.

COMMENTS OF THE STATE OF WASHINGTON

STATE OF WASHINGTON,
DEPARTMENT OF CONSERVATION AND DEVELOPMENT,
Olympia, January 28, 1957.

Maj. Gen. E. C. ITSCHNER,
Chief of Engineers, Department of the Army,
Washington, D. C.

DEAR GENERAL ITSCHNER: Upon a thorough review of your proposed report on a review of reports on Bellingham Harbor, Wash., transmitted with your letter of January 15, 1957, we find that the project will in no manner encroach upon or interfere with any State interests, including States rights of water or property.

We are fully aware of the problems confronting the port of Bellingham, and any improvement in its facilities and services, that of deepening Whatcom Creek waterway, is worthy of Federal support and will be of much benefit to the port and the people of Bellingham, as well as the State as a whole. We, therefore, wish to support the interests of the local people and the State by wholeheartedly endorsing your favorable recommendations and asking that the fullest consideration be given to this project for an adequate appropriation for its completion at the earliest possible date.

Sincerely yours,

EARL COE, *Director.*

COMMENTS OF THE DEPARTMENT OF THE INTERIOR

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D. C., April 4, 1957.

Maj. Gen. E. C. ITSCHNER,
Chief of Engineers, Department of the Army,
Washington, D. C.

DEAR GENERAL ITSCHNER: This is in reply to your letter of January 15, 1957, transmitting to this Department for our comments copy of your proposed report together with the reports of the Board of Engineers for Rivers and Harbors and of the district and division engineers on a review of reports on Bellingham Harbor, Wash. Your report recommends deepening Whatcom Creek Waterway, a part of Bellingham Harbor, Wash., at an estimated cost to the United States of $83,700 for construction.

It is noted that the views of the United States Fish and Wildlife Service and the State fish and game agencies are summarized in the district engineer's report and that the reports of the Federal and State agencies are included in the appendix to the district engineer's report. It is suggested that the Chief of Engineers incorporate in the project plan recommendations of the fish and game agencies to confine dredging operations to the period extending from June of one year to February of the following year and to keep siltation to a minimum at all times during dredging operations. These measures would be beneficial to the existing salmon, steelhead, and cutthroat trout fishery.

Other interests of the Department would not be adversely affected by the proposed construction.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

LETTER TO THE SECRETARY OF THE INTERIOR

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., April 12, 1957.

The honorable the SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: Reference is made to the letter of April 4, 1957, from the Assistant Secretary furnishing the comments of the Department of the Interior on my proposed report on Bellingham Harbor, Wash.

I note the suggestion that the project plan for the proposed improvements incorporate the recommendations of the fish and game agencies to confine dredging operations to the period extending from June of one year to February of the following year and to keep siltation to a minimum at all times during dredging operations.

Let me assure you that, if the improvements recommended are authorized for construction, the development of detailed plans for the proposed work will be coordinated with the Fish and Wildlife Service and the Department of Fisheries of the State of Washington so as to minimize any harmful effects of construction on the fishery resources.

A copy of the letter, together with a copy of this reply, will be included with my report when it is submitted to Congress.

Sincerely yours,

E. C. ITSCHNER,
Major General, United States Army,
Chief of Engineers.

BELLINGHAM HARBOR, WASH.

REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., April 18, 1957.

Subject: Bellingham Harbor, Wash.
To: The Secretary of the Army.

1. I submit herewith for transmission to Congress the report of the Board of Engineers for Rivers and Harbors in response to resolution of the Committee on Public Works of the United States Senate, adopted July 24, 1953, requesting the Board to review the reports on Bellingham Harbor, Wash., submitted in House Document No. 1161, 60th Congress, 2d session, and subsequent reports, with a view to determining if it is advisable to modify the existing project in any way at this time, particularly with a view to deepening the harbor.

2. After full consideration of the reports, secured from the district and division engineers, the Board concluded; that deepening Whatcom Creek Waterway, a part of Bellingham Harbor, Wash., to permit fully loaded vessels to use the existing facilities and to eliminate tidal delays, is needed and warranted by present commerce; that the proposed modification is suitable and is economically justified; and recommended modification of the existing project for Bellingham Harbor, Wash., to provide in Whatcom Creek Waterway a channel 30 feet deep, at mean lower low water, from water of that depth in Bellingham Bay to a point not nearer than 750 feet from the inner end of the waterway over the full width; generally in accordance with the plan of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost to the United States of $83,700 for construction and $1,000 annually for maintenance in addition to that now required; provided that local interests agree to (*a*) furnish without cost to the United States all necessary lands, easements, rights-of-way, and suitable spoil-disposal areas for initial work and for subsequent maintenance, when and as required; (*b*) hold and save the United States free from damages due to construction and maintenance of the improvement; (*c*) construct and maintain any bulkheads required for retention of dredged material from initial construction and subsequent maintenance; (*d*) maintain at project depth approaches and berthing areas adjacent to the terminals bordering on the 30-foot channel; and (*e*) contribute in cash or equivalent work, 3.9 percent of the cost of channel dredging, a contribution presently estimated at $3,400; and provided further that no dredging shall be done by the United States within 50 feet of existing pierhead lines or the section of port wharf seaward of these lines.

3. After due consideration of these reports, I concur in the views and recommendations of the Board.

E. C. ITSCHNER,
Major General, United States Army,
Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

CORPS OF ENGINEERS, UNITED STATES ARMY,
BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., November 30, 1956.

Subject: Bellingham Harbor, Wash.
To: The Chief of Engineers, Department of the Army.

1. This report is submitted in response to the following resolution adopted July 24, 1953:

Resolved by the Committee on Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports on Bellingham Harbor, Washington, submitted in House Document Numbered 1161, Sixtieth Congress, Second Session, and subsequent reports, with a view to determining if it is advisable to modify the existing project in any way at this time, particularly with a view to deepening the harbor.

2. Bellingham Harbor, on the easterly shore of Bellingham Bay in the northwestern part of the State of Washington is 90 miles north of Seattle, Wash. The existing Federal project for the harbor provides for a channel in Whatcom Creek Waterway 363 feet wide and 26 feet deep for the outer 3,800 feet, and 18 feet deep for the inner 1,300 feet; for an entrance channel in Squalicum Creek Waterway 200 feet wide and 26 feet deep from deep water to the main pierhead line; for maintenance of the southerly half and westerly end of Squalicum Creek Basin to a depth of 26 feet except the area within 75 feet of wharves, piers, or similar structures; and for a small-boat basin adjacent to Squalicum Creek Waterway including construction and maintenance of 3,900 feet of breakwater in two sections, removal of an existing breakwater built by the port commission and use of rock therefrom in the new breakwater, and maintenance of the two entrances to the basin to a minimum of 12 feet. All depths refer to the plane of mean lower low water. The mean range of tides is 5.2 feet. No work has been done on the small-boat basin. Costs to the United States to June 30, 1955, were $112,013 for new work and $143,073 for maintenance, a total of $255,086. The estimated annual cost of maintenance is $10,000. Local interests have spent in excess of $1 million in providing additional dredging in the waterways and construction of additional breakwaters, bulkheads, and moorage and terminal facilities. In 1947 the United States Navy dredged the I and J Street Waterway to provide an access channel, 15 feet deep and 80 feet wide, to a wharf then used in connection with a Naval Reserve armory.

3. Bellingham Harbor serves a tributary area of about 2,000 square miles which had a population of 62,488 in 1950. The population of Bellingham was 35,200 in 1954. The principal activities are agriculture, production of timber, manufacture of wood and paper products, fishing, operation of seafood processing and distribution plants, and refining of petroleum. There are 35 wharves and piers in the harbor; 9 are on Whatcom Creek Waterway, 6 on Squalicum Creek Waterway, 3 on I and J Street Waterway, and 3 in the small-boat basin. The remaining 14 are distributed along the rest of the waterfront. Waterborne commerce at Bellingham Harbor during the 5-year period, 1950 through 1954, averaged about 1,311,200 tons of which about 549,000 tons were rafted. The 1954 commerce amounted to 1,600,577 tons of which 1,159,673 tons were logs, pulpwood, or wood and paper products, 230,123 tons were petroleum products, and 48,930 tons were fish and fish products. Vessel traffic during 1954 consisted of 11,921 inbound and outbound trips by steamers, motor vessels, and barges, of which 82 had loaded drafts of 24 feet or more, and 11,762 had drafts of less than 20 feet.

4. Local interests desire that project depths in Whatcom Creek and Squalicum Creek Waterways be increased to 30 feet; that the channel in Whatcom Creek Waterway be widened up to 500 feet; and that the I and J Street Waterway be improved with depths up to 30 feet. They state that the larger ships calling at terminals on Whatcom Creek Waterway are frequently required to await higher stages of tide for entry or departure and that existing depths in Squalicum Creek Waterway do not allow movement of larger vessels to the shipyard facilities. Local interests state that there is a need for additional deepwater frontage for industrial development. They offer to furnish bulkheaded disposal areas for the dredged material, and meet the other requirements of local cooperation.

5. The district engineer reports that there is no justification at present for widening Whatcom Creek Waterway or deepening Squalicum Creek Waterway, and there are insufficient benefits to warrant improvement of the I and J Street Waterway. He finds, however, that project depths in Whatcom Creek Waterway are inadequate for the larger ships that regularly call at the port. He therefore proposes the dredging of that waterway to a depth of 30 feet below mean lower low water from deep water to a point not nearer than 750 feet from the inner end of the waterway over the full width except within 50 feet of existing pierhead lines or the section of port wharf seaward of these lines. He estimates the cost of the plan, based on December 1955 prices, at $88,200, of which $84,800, including $1,100 for aids to navigation, is Federal and $3,400 is a cash contribution by local interests. The annual carrying charges would be $4,735 of which $4,115 including $1,000 for increased cost of maintenance dredging and $125 for maintenance of navigation aids would be Federal, and $620 would be non-Federal. The annual benefits are estimated at $8,485 consisting of $7,820 from elimination of vessel delays and $665 from land enhancement. The benefit-cost ratio is 1.79. Due to the extent of land-enhancement benefits, the district engineer concludes that local interests should contribute in cash 3.9 percent of the cost of channel dredging, presently estimated at $3,400. The district engineer recommends modification of the existing project for Bellingham Harbor, Wash., in accordance with his plan for deepening Whatcom Creek Waterway, subject to certain conditions of local cooperation. The division engineer concurs.

6. Local interests were notified of the recommendations of the reporting officers and were invited to submit additional information to the Board. No communications have been received.

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VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

7. The Board of Engineers for Rivers and Harbors concurs with the views and recommendations of the reporting officers. Deepening of Whatcom Creek Waterway, a part of Bellingham Harbor, Wash., to permit fully loaded vessels to use the existing facilities and to eliminate tidal delays, is needed and warranted by present commerce. The proposed modification is suitable and is economically justified.

8. The Board therefore recommends modification of the existing project for Bellingham Harbor, Wash., to provide in Whatcom Creek Waterway a channel 30 feet deep, at mean lower low water, from water of that depth in Bellingham Bay to a point not nearer than 750 feet from the inner end of the waterway over the full width; generally in accordance with the plan of the district engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable; at an estimated cost to the United States of $83,700 for construction and $1,000 annually for maintenance in addition to that now required; provided that local interests agree to (*a*) furnish without cost to the United States all necessary lands, easements, rights-of-way, and suitable spoil-disposal areas for initial work and for subsequent maintenance, when and as required; (*b*) hold and save the United States free from damages due to construction and maintenance of the improvement; (*c*) construct and maintain any bulkheads required for retention of dredged material from initial construction and subsequent maintenance; (*d*) maintain at project depth approaches and berthing areas adjacent to the terminals bordering on the 30-foot channel; and (*e*) contribute in cash or equivalent work, 3.9 percent of the cost of channel dredging, a contribution presently estimated at $3,400; and provided further that no dredging shall be done by the United States within 50 feet of existing pierhead lines or the section of port wharf seaward of these lines.

For the Board:

CHAS. G. HOLLE,
Major General, United States Army, Chairman.

REPORT OF THE DISTRICT ENGINEER

SYLLABUS

The district engineer reports that the existing project depth of 26 feet in Whatcom Creek Waterway is inadequate for the larger ocean-going ships calling at the terminals on the waterway. He finds that prospective benefits would be sufficient to warrant deepening the waterway to a depth of 30 feet, but that there is insufficient present justification for widening the waterway as requested by local interests. Likewise, there is no present need for deepening of Squalicum Creek Waterway and benefits would not be sufficient to warrant Federal improvement of I and J Street Waterway. He therefore recommends that the existing project for Bellingham Harbor be modified only to the extent of providing a channel depth of 30 feet in Whatcom Creek Waterway from deep water to not nearer than 750 feet from the inner end and over the present width except that no dredging shall be done within 50 feet of existing pierhead lines or wharf extensions seaward thereof, all at a first cost of $83,700 to the Corps of Engineers and $1,000 for maintenance in addition to that required for the existing project, subject to certain conditions of local cooperation as outlined in the report.

CORPS OF ENGINEERS, UNITED STATES ARMY,
OFFICE OF THE DISTRICT ENGINEER,
SEATTLE DISTRICT,
Seattle, Wash., January 10, 1956.

Subject: Review of reports on Bellingham Harbor, Wash.
To: Division Engineer, North Pacific Division, Corps of Engineers, United States Army, 210 Customhouse, Portland, Oreg.

1. *Authority.*—This report is submitted in compliance with a resolution adopted July 24, 1953, by the United States Senate Committee on Public Works, which reads as follows:

Resolved by the Committee on Public Works of the United States Senate, That the Board of Engineers for Rivers and Harbors, created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports on Bellingham Harbor, Washington, submitted in House Document Numbered 1161, Sixtieth Congress, second session, and subsequent reports, with a view to determining if it is advisable to modify the existing project in any way at this time, particularly with a view to deepening the harbor.

2. *Scope of review.*—A review of survey scope was authorized by the Chief of Engineers on September 2, 1953. The report studies are based on data available in published documents and in the files of this office, on information furnished by local interests, and on hydrographic surveys, probings, and other field investigations conducted by this office in June and July 1955. During the course of the investigation interested local, port, city, county, State, and Federal agencies were consulted. Their requests, comments, and suggestions have been given full consideration.

3. *Reports under review.*—This report reviews the following previous reports:

(*a*) *House Document No. 1161, 60th Congress, 2d session.*—The Chief of Engineers, in his report dated December 5, 1908, as published in this document, concurred in the recommendations of the Board of Engineers that Whatcom Creek Waterway be dredged to depths of 26 feet at low water in the outer portion and 18 feet in the inner portion, at an estimated cost to the United States of $92,250, and subject to certain conditions of local cooperation. This work was authorized by the River and Harbor Act of June 25, 1910.

(*b*) *House Document No. 187, 70th Congress, 1st session.*—The Chief of Engineers, in his report dated February 21, 1928, recommended a channel in Squalicum Creek Waterway 26 feet deep and 200 feet wide from deep water to the main pierhead line at an estimated cost of $25,000, subject to the provision that local interests dredge and maintain the southerly and southeasterly portion of the inner channel to the same depth and construct a suitable public terminal. The improvement was authorized by the River and Harbor Act of July 3, 1930.

(*c*) *House Committee on Rivers and Harbors Document No. 70, 74th Congress, 1st session.*—In report dated July 26, 1935, the Chief of Engineers recommended Federal maintenance of the inner Squalicum Creek section previously dredged by local interests to a depth of 26 feet and of a locally constructed breakwater to a crest height of 14 feet, all at an additional annual cost of $2,000. This modification was adopted by the River and Harbor Act of August 26, 1937.

4. *Description.*—Bellingham Harbor is in the northwestern part of the State of Washington, at approximate north latitude 48°45′ and

west longitude 122°30′. It is on the easterly shore of Bellingham Bay, about 80 nautical miles north of Seattle and about 40 nautical miles southeast of Blaine as measured by ordinary steamer route. Bellingham Bay is 12 miles long and 3 miles wide. The bay is open to the south and southwest. Lummi, Cypress, Guemes, and other islands off the bay entrance provide considerable protection against the open waters of Rosario Strait. Chuckanut Bay is a deepwater cove on the eastern shore of Bellingham Bay about 5 miles south of the main part of Bellingham Harbor. Samish Bay forms the southeasterly part of Bellingham Bay.

5. Bellingham Harbor has a deepwater approach ranging from 16 fathoms in the outer part to 4 fathoms near shore except in the northerly portion where tidal flats extend about one-fourth to one-half mile from shore and the bottom slopes gradually to deep water. These tideflats merge with the delta of the Nooksack River at the north end of Bellingham Bay. Squalicum Creek, I and J Street, and Whatcom Creek Waterways extend across the tideflats. The first and last of these waterways have been improved under a Federal project to accommodate deepwater traffic. Approaches to wharves in I and J Street waterway have been dredged by the United States Navy and local interests to depths up to 15 feet. A Federal pierhead line has been established in the harbor.

6. Bellingham Channel, between Cypress and Guemes Islands, is generally used by ships proceeding to Bellingham Bay from the Strait of Juan de Fuca and from Puget Sound. The channel varies from 17 to 60 fathoms in depth and from ½ to 1½ miles in width. Deep-draft vessels approaching the bay from the northward use the channel between Lummi and Sinclair Islands. This channel has a minimum depth of 30 fathoms and a minimum width of 1,200 yards. Light-draft vessels frequently use Swinomish Slough and Padilla Bay on the south and Hale Passage between Lummi Island and the mainland in proceeding to Bellingham Bay. Bellingham Harbor, bay, and approaches are shown on United States Coast and Geodetic Charts Nos. 6378, 6380, and 6300, and the map accompanying this report.

7. *Tides and currents.*—The mean range of tides in Bellingham Harbor is 5.2 feet, the diurnal range is 8.6 feet, and the estimated extreme range is 16 feet. Tidal currents in the harbor and bay have little velocity and do not interfere with navigation.

8. *Climate.*—The climate of the locality is mild and equable. Records of observations near Bellingham over a period of 43 years show a maximum temperature of 97°, a minimum of −4°, and a mean of 48.9°. Extreme temperatures are rare and of short duration, as indicated by the monthly averages ranging from a minimum of 36.5° in January to a maximum of 60.8° in August. The mean annual precipitation is 34 inches and the average snowfall 10 inches. Bellingham Harbor and approaches are ice free throughout the year. The prevailing winds are from the west and southwest during spring, summer, and autumn months, and from the southwest during winter months. Fogs may occur at any time of the year, but are most frequent during the spring and autumn months.

9. *Tributary area.*—The area tributary to Bellingham Harbor includes all of Whatcom County except Point Roberts and the city of Blaine and its environs. The topography of Whatcom County varies

from rich tidal plains along the east shore of Bellingham Bay and the valley of the Nooksack River in the western portion to the mountainous areas comprising the eastern portion.

10. *National and departmental reservations.*—The Lummi Indian Reservation, with an area of about 20 square miles, includes all of the peninsula west of Bellingham Bay and a portion of the adjacent mainland. Some 1,300 square miles of the eastern part of the tributary area are in the Mount Baker National Forest. The United States Navy has a small naval reserve facility near the inner end of I and J Street waterway.

11. *Cities.*—Bellingham, situated on the northeasterly shore of the bay, is the seat of county government and the principal outlet for the waterborne commerce of the tributary area. In 1954 the city had a population of 35,200, an increase of 1,088 from 1950. Bellingham is a port of entry, with offices of the United States Customs and Immigration Services. Patrol vessels of the United States Coast Guard are also stationed there. Other incorporated cities and towns in the tributary area are Everson, Ferndale, Lynden, Nooksack, and Sumas, all of which are situated inland. These communities are mainly dependent upon the agricultural, logging, or mining operations in their immediate vicinities, except Ferndale, where a new oil refinery has been added recently to the local industries. Distribution and trend of population in the tributary area are shown in table 1 as adapted from reports of the Federal census and Washington State Census Board.

TABLE 1.—*Population, area tributary to Bellingham Harbor*

Locality	Population			
	1930	1940	1950	1954 [1]
Bellingham (city)	30,823	29,314	34,112	35,200
Everson (town)	295	292	345	359
Ferndale (town)	752	717	979	1,083
Lynden (town)	1,564	1,696	2,161	2,278
Nooksack (town)	293	302	323	300
Sumas (city)	647	650	658	627
Remainder tributary area	22,646	25,344	23,910	(2)
Total tributary area	57,020	58,315	62,488	(2)

[1] State census board.
[2] Not available.

12. The population statistics reflect an overall growth except Nooksack and Sumas which show a slight decline since 1950. This decline compared with the continuing population increase in the larger communities is indicative of a shift toward industrial centers of the tributary area such as the new oil-refinery development at Ferndale. Future growth will probably depend largely on development of industries and resources other than forest products.

13. *Resources and industries.*—The principal resources of the tributary area are its forests, agricultural lands, fisheries, mineral deposits, and forest products. In recent years agriculture, fishing, and the processing of their products have become increasingly important. An oil refinery with a capacity of 35,000 barrels a day has been recently placed in operation at Ferndale. This plant receives crude petroleum by pipeline from Alberta, Canada, and will eventually have a pipeline connection with Texas oilfields.

14. *Forest resources and industries.*—Statistics compiled by the Pacific Northwest Forest and Range Experiment Station, United States Forest Service, as of the year 1945 showed the net volume of merchantable timber resources in Whatcom County to be approximately 8 billion board-feet. The major part of this total was on timberlands in Federal, State, and county ownership. Statistics compiled by the same agency as of January 1947 showed the unreserved sawtimber volume of the county to be 6.6 billion board-feet. An estimated distribution of this unreserved timber is given by species in table 2.

TABLE 2.—*Unreserved sawtimber in Whatcom County, January 1947*

Species	*Volume (million board-feet)*
Douglas-fir	1,763.6
Sitka spruce	4.5
Western hemlock	2,207.1
Cedars	918.2
Balsam firs	1,523.5
Other conifers	74.2
Hardwoods	99.3
Total	6,590.4

15. In 1952 production of logs in Whatcom County amounted to about 150 million board-feet, log scale. In addition to the local timber sources, considerable quantities of logs and pulpwood are utilized by local manufacturing plants from sources in Skagit and Clallam Counties and Canada.

16. The manufacture of forest products is one of the principal industries of the tributary area. In previous years the industry centered mainly on manufacture of lumber from the Douglas-fir species, but in recent years the use of hemlock and pulpwood species has become increasingly important. Industrial plants in the tributary area dependent on forest resources include about 20 sawmills, a pulp mill of about 450 tons daily capacity, a paper mill of 40 tons daily capacity, a plywood plant, several shingle mills, and many small wood-using plants. In 1954 about 45 percent of the 5,000 employees in manufacturing occupations covered by the State of Washington Unemployment Compensation Act were engaged in logging, lumber, and other wood-products manufacturing.

17. *Agriculture.*—About 15.3 percent of the land in Whatcom County was used for agricultural purposes in 1950. This land, valued at $58,400,000 including improvements, is largely confined to the Nooksack Basin in the western part of the county. The Federal census of agriculture for 1950 enumerated 4,436 farms in the county with a total acreage of 209,947, of which 71,821 acres were in crops. The value of farm products sold was $15,342,000, approximately 81 percent of which represented livestock and livestock products, mainly dairy and poultry products. Other important crops are hay, grain, fruits, and vegetables. The farm population in 1950 was 17,728, and the number of persons employed on farms was 6,296.

18. *Fisheries.*—Bellingham is well situated with respect to the fishing banks of Rosario and Georgia Straits, Bellingham Bay, Hale Passage, and waters of the San Juan Archipelago. It is near the inside water route to Alaska, and is one of the United States ports to which large quantities of canned fish are transported from Alaska for distribution. The Pacific American Fisheries, a corporation whose fishing operations are carried on mainly in Alaska waters, has its headquarters, supply, service, and repair facilities at Bellingham. Four canneries, a cold-storage plant, and several receiving stations are situated at Bellingham for receipt, processing, storage, and distribution of fish caught in local and coastal waters. In 1954 a total of 18,052 tons of fresh fish and shellfish, with a value of $5,900,000 at the fishermen's price level, were landed at these facilities. Because of its advantageous location, Bellingham has become increasingly important as a moorage, repair, and supply base for a large fleet of local and transient fishing craft.

19. *Minerals.*—The tributary area has extensive mineral resources, both developed and undeveloped. For many years Whatcom County was an important contributor to the coal production of the State. However, because of high production costs, only one of several mines in the county is presently in operation. The county production has declined from a previous annual average of 225,000 tons to an average of 70,500 tons over the past 5 years. Considerable deposits of limestone occur throughout the county. A limestone quarry about 20 miles east of Bellingham supplies a large cement plant on the waterfront of Bellingham Harbor. Clay, molding sand, sand, gravel, and stone deposits occur in large quantities and are used extensively. Many other nonmetallic minerals of minor commercial significance are found in the county. A number of metallic minerals also exist in the area, of which gold, silver, lead, and copper have been mined on a small scale.

20. *Recreation.*—Natural features of the tributary area and surrounding territory provide many tourist attractions and recreational opportunities. The waters surrounding San Juan Islands attract pleasure craft from all parts of Puget Sound and coastal areas of British Columbia. Many summer homes, beach resorts, and sports fishing facilities are found on the islands and the shores of the mainland adjacent to Bellingham. Salt-water sport fishing and boating are popular pastimes. Snowcapped Mount Baker in central Whatcom County, with an altitude of 10,750 feet, is one of the most popular winter sports and summer recreational areas of the Pacific Northwest. Many campgrounds, streams, lakes, and game-hunting areas are available in the tributary area. In addition to the Mount Baker National Forest, a State park and numerous municipal parks are situated in the area.

21. *Railroads.*—A coastal line of the Great Northern Railway extends from the main line at Everett, Wash., through Bellingham to Vancouver, British Columbia. It provides daily passenger and freight service. The Northern Pacific Railway and the Chicago, Milwaukee, St. Paul, & Pacific Railroad have branch lines to Bellingham. These three railroads serve the city and the waterfront. The last named railroad also operates a railway car ferry for line-haul freight traffic between Bellingham and Seattle, and owns a rail log dump jointly with the Northern Pacific Railway at Bellingham.

22. *Highways.*—Federal and State highways with local feeder roads provide access to most parts of the tributary area except the mountainous eastern part. United States Highway 99 (also State No. 1) passes through Bellingham. A branch of State Highway No. 1 ex-

tends from Bellingham to Mount Baker. Several motor freight companies operating on regular schedules provide service between Bellingham and other Washington cities, with connections to points outside the State.

23. *Air transportation.*—Bellingham municipal airport, situated about 4 miles northwest of the city has adequate facilities for commercial air lines. The United Air Lines serves the airport with direct or interconnected daily service to all sections of the United States, Canada, Alaska, and the Orient.

24. *Adjacent ports.*—Blaine Harbor is situated about 40 nautical miles north of Bellingham, near the Canadian border. This harbor serves a community of about 4,000 population including the city of Blaine with a population of 1,850 in 1954. The waterborne commerce of Blaine amounted to 26,930 tons in 1954, consisting mainly of canned and fresh fish and miscellaneous commodities.

25. Anacortes Harbor is on the northern point of Fidalgo Island, about 18 nautical miles south of Bellingham by ordinary steamer route. The city of Anacortes with a population of 7,200 in 1954 is adjacent to the harbor. In 1954 the commerce of the harbor amounted to 501,246 tons. Rafted logs comprised about 71 percent of this total and miscellaneous commodities the remaining 29 percent.

26. Everett Harbor on Port Gardner Bay is about 62 nautical miles south of Bellingham. This harbor serves the city of Everett, which had a population of 33,900 in 1954. The commerce of Everett Harbor amounted to 2,624,967 tons in 1954. About 85 percent of this total consisted of logs and wood products, and the remainder of miscellaneous commodities.

27. *Prior reports.*—In addition to the reports described in paragraph 3, the following reports relating to navigation improvements in Bellingham Harbor have been prepared and submitted by the Corps of Engineers.

(*a*) A preliminary examination report published in House Document No. 228, 53d Congress, recommended a survey with a view to removing Starr Rock as a menace to navigation. The River and Harbor Act of March 3, 1905, authorized a survey but because of excessive cost, removal of Starr Rock was not recommended (Chief of Engineers Annual Report for 1906, p. 2026). An unpublished preliminary examination report submitted by the Chief of Engineers on December 11, 1925, under authority of the River and Harbor Act of March 3, 1925, was also unfavorable for removal of the rock.

(*b*) A survey report published in House Document No. 80, 55th Congress, recommended dredging of Whatcom Creek Waterway to a depth of 12 feet. This improvement was adopted by the River and Harbor Act of June 13, 1902. An unpublished preliminary examination report submitted by the Chief of Engineers on March 10, 1924, under authority of the River and Harbor Act of September 22, 1922, was unfavorable for a survey with a view to deepening the waterway and providing a turning basin.

(*c*) An unpublished preliminary examination report submitted by the Chief of Engineers on May 4, 1932, under authority of the River and Harbor Act of July 3, 1930, was unfavorable for a survey with a view to diverting Nooksack River from the harbor, and to construction of a breakwater.

(*d*) A review report published in House Document No. 558, 82d Congress, recommended modification of the existing project to provide for a small-boat basin adjacent to Squalicum Creek Waterway. This modification was adopted by the River and Harbor Act of September 3, 1954.

28. *Existing Corps of Engineers' project.*—The original project, adopted by the River and Harbor Act of June 13, 1902, provided for dredging Whatcom Creek Waterway to a depth of 12 feet at mean lower low water over a width of 200 feet from deep water to the then existing railroad bridge and thence over the full width to the inner end of the waterway. Federal expenditures on this previous project were $56,581.93 for new work and $1,092.05 for maintenance.

29. The existing project for Bellingham Harbor was authorized by various river and harbor acts as follows: Whatcom Creek Waterway, June 25, 1910; Squalicum Creek Waterway, July 3, 1930, and August 26, 1937; small-boat harbor, September 3, 1954. The overall project provides for (*a*) a channel in Whatcom Creek Waterway 363 feet wide and 26 feet deep at mean lower low water in the outer 3,800 feet, thence 18 feet deep in the inner 1,300 feet; (*b*) a channel in Squalicum Creek Waterway 200 feet wide and 26 feet deep from deep water to the main pierhead line; (*c*) maintenance of the southerly half and westerly end of Squalicum Creek Basin to a depth of 26 feet except the area within 75 feet of wharves, piers, and similar structures; and (*d*) a small-boat basin adjacent to Squalicum Creek Waterway, including construction and maintenance of 3,900 feet of breakwater in 2 sections, removal of an existing breakwater built by the port commission in 1934 and use of the rock therefrom in the new breakwater, and maintenance of the two entrances to the basin to a minimum depth of 12 feet. Dredging of Whatcom Creek Waterway was completed in 1913 and of Squalicum Creek Waterway in 1931. No work has been done on the small-boat basin, the cost of which is estimated to be $1,388,000 at current prices.

30. The costs of the existing project to June 30, 1955, have been $112,013.16 for new work and $143,073.41 for maintenance, a total of $255,086.57. Of the total for new work, $81,782.14 was expended on Whatcom Creek Waterway and the remaining $30,231.02 on Squalicum Creek Waterway. All of the total for maintenance was expended on the first waterway except a nominal amount for surveys on the latter waterway. The latest (1953) approved estimate for annual cost of maintenance is $5,000 for Whatcom Creek Waterway and $2,500 for Squalicum Creek Waterway. This latter figure is considered adequate, but review of maintenance experience in Whatcom Creek Waterway in the light of current prices indicates that the estimate of annual cost for that waterway should be about $7,500 for present project dimensions.

31. *Local cooperation on existing and prior projects.*—No local cooperation was required in connection with the original harbor project. The River and Harbor Act of June 25, 1910, required local interests to furnish necessary rights-of-way and easements for disposal of material dredged from Whatcom Creek Waterway and to construct necessary bulkheads and groins. The River and Harbor Act of July 3, 1930, required local interests to dredge and maintain the southerly half and westerly end of that portion of Squalicum Creek Waterway lying shoreward of the main pierhead line and to construct a suitable public terminal. All conditions of cooperation under the foregoing acts were met in full by local interests. The sum of $155,231

was expended by them for dredging. The River and Harbor Act of August 26, 1937, released them from responsibility for maintenance in Squalicum Creek Waterway.

32. The 1954 River and Harbor Act requires local interests to furnish all lands needed for the Federal boat-harbor improvement, including title to that portion of the breakwater already constructed by them and including the right to remove rock from the breakwater constructed by the port in 1934. In addition to the usual damage waiver, local interests must also remove the timber pile sections of the existing breakwater; provide and maintain a basin depth of at least 12 feet below mean lower low water; construction protective dolphins at the ends of the Federal breakwaters; and provide, maintain, and operate adequate moorage facilities, utilities, and a public landing with suitable service and supply facilities open to all on equal terms. The cost of the local cooperation features required by the 1954 act is estimated to be $537,000 based on 1955 prices. No work has been done on these features but the Bellingham Port Commission has assured its compliance with the requirements when needed.

33. *Other improvements.*—In addition to work done under requirements of local cooperation, the port commission in 1934 constructed, with the aid of Federal relief funds, a rubble-mound breakwater 1,400 feet long southeasterly of Squalicum Creek Waterway. The cost of this breakwater was approximately $139,000 of which the port contributed $51,000. It was later incorporated in the Federal project for maintenance and is now slated for removal under the modifications authorized by the 1954 River and Harbor Act. The port commission, in cooperation with the city of Bellingham, has also expended in excess of $1 million for harbor improvements, including additional dredging in the 3 waterways, and construction of additional breakwaters, bulkheads, moorage, and terminal facilities. In 1947 the United States Navy dredged about 20,000 cubic yards of material in I and J Street Waterway to provide an access channel about 80 feet wide and 15 feet deep to a wharf the Navy was using at that time in connection with a Naval Reserve armory. This wharf is not in use at present.

34. *Terminal and transfer facilities.*—There are 35 wharves and piers in Bellingham Harbor. Six of these facilities are situated on Squalicum Creek Waterway, 3 on I and J Street Waterway, 9 on Whatcom Creek Waterway, and 3 in the small-boat basin. The remaining 14 are distributed along the southerly waterfront except 1 northwest of Squalicum Creek Waterway and 1 between the boat basin and I and J Street Waterway. Structures in the waterways are mostly marginal-type shore wharves and those on open water are of the pier type. Most of these are of open-pile construction.

35. Four wharves serve general cargo terminals, 3 in Whatcom Creek waterway and 1 in South Bellingham. One of those on the waterway, owned and operated by the Port of Bellingham, is used by oceangoing ships in the foreign and domestic trades. This wharf has 1,345 feet of berthing space at depths of 28 to 30 feet at mean lower low water. Transit sheds thereon have 57,600 square feet of storage space. A grain elevator on the wharf is leased to a private concern and is not available for public use. The other general-cargo wharves on the waterway, one owned by the city of Bellingham and the other privately owned, serve small freight vessels in the Puget Sound and San Juan Island trade. The private wharf has a transit shed with 8,500 square feet of cargo space. The South Bellingham wharf is privately owned and suitable for oceangoing vessels. It has 1,022 feet of berthing space at depths up to 37 feet. It has 2 transit sheds with a total storage area of 11,000 square feet. All except the city wharf have rail connections.

36. The remaining 6 wharf facilities on Whatcom Creek waterway include 1 for handling oil, 1 for sand and gravel, a fish wharf, a pulp and timber company wharf, a mooring wharf for towboats, and a port-owned small-boat moorage. Only the pulp and timber wharf is suitable for oceangoing vessels.

37. Four of the six wharves on Squalicum Creek waterway are owned by the Port of Bellingham and are used for outfitting, repairing, and servicing small craft. One of the remaining two facilities is used for landing of fish in connection with a cold-storage plant, and the other for outfitting and repair of vessels at a shipyard.

38. One of the three wharves on I and J Street Waterway serves an adjacent fish cannery. The second, a small Navy wharf, is not in use at present. The third is a log dump in connection with a small sawmill at the inner end of the waterway. Wharves elsewhere in Bellingham Harbor are used in connection with the various local industries, mainly lumber and logging activities, fish processing, a cement plant, and moorage of small craft. Wharf and terminal facilities in the harbor are considered adequate for existing commerce except the moorage facilities for small craft. Construction of the harbor protection authorized by the 1954 River and Harbor Act will enable the port commission to complete its planned small-boat facilities which will relieve the present inadequacy. These improvements will allow removal of the small-boat moorage adjacent to the port general-cargo terminal in Whatcom Creek Waterway and provide space for expansion and rearrangement of the facilities for general commerce. Additional terminal space is available between I and J Street waterways.

39. *Improvements desired.*—The desires of local interests were ascertained at a public hearing held in Bellingham on May 17, 1955. The hearing was attended by 57 persons representing Federal, State, and local governmental agencies, ports of Bellingham and Anacortes, Bellingham Chamber of Commerce, local industries, railroads, shipping and boating interests, and others. Representatives of the port of Bellingham and other shipping interests requested that project depths in Whatcom Creek and Squalicum Creek Waterways be increased to 30 feet. They also expressed a desire for widening of the channel in Whatcom Creek Waterway up to a width of 500 feet, and for improvement of I and J Street Waterway with a view of promoting industrial development in the tideflat area adjacent to this waterway. No dimensions for the latter waterway were specified at the hearing but local interests have subsequently suggested depths up to 30 feet.

40. In justification of the improvements, local interests cited the difficulties experienced by vessels using the various waterways under existing conditions. They stated that the larger ships calling at terminals on Whatcom Creek were frequently required to await higher stages of tide for entry or departure, and that existing depths in Squalicum Creek Waterway do not allow movement of larger vessels to the shipyard facilities. Local interests also indicated a local need for additional deep water frontage for industrial development. Local

cooperation offered at the hearing consisted of bulkheaded disposal areas for the dredged material.

41. *Commerce.*—Waterborne traffic in Bellingham Bay and Harbor is shown for recent years in table 3 as derived from annual reports of the Chief of Engineers. In the past 5 years from 76 to 89 percent of the total vessel traffic and 43 to 57 percent of the rafted traffic passed through Whatcom Creek Waterway. From 7 to 13 percent of the vessel traffic in the same period and 0 to 3 percent of the rafted traffic passed through Squalicum Creek Waterway. Vessel traffic in I and J Street waterway averaged about 5,200 tons and rafted traffic 10,000 tons.

TABLE 3.—*Waterborne traffic, Bellingham Bay and Harbor*

[Tons]

Year	Vessel traffic	Rafted traffic	Total	Year	Vessel traffic	Rafted traffic	Total
1945	275,295	418,460	693,755	1950	569,553	638,099	1,207,652
1946	317,683	365,561	683,244	1951	617,395	530,988	1,148,383
1947	376,844	699,777	1,076,621	1952	705,457	501,784	1,207,241
1948	572,608	673,460	1,246,068	1953	849,113	543,154	1,392,267
1949	619,350	384,916	1,004,266	1954	1,069,603	530,974	1,600,577

42. The statistics in table 3 indicate a variation of vessel traffic generally consistent with fluctuations in economic conditions of the tributary area. The tonnages reflect an upward trend in recent years. Future waterborne commerce for the tributary area as a whole will be augmented by petroleum shipments expected to exceed 8½ million barrels a year over a wharf just north of Bellingham from the new refinery at Ferndale. This refinery has a capacity of 35,000 barrels a day and receives crude petroleum by pipeline from Canada. Rafted log traffic shows a relatively uniform annual volume for recent years following the period of postwar adjustment. No material increase is foreseen in the present annual volume. Gradual depletion of local resources is being met by increased receipts from other domestic and Canadian sources.

43. Commodities produced, manufactured, or utilized in the tributary area that give rise to waterborne commerce include (*a*) wood and paper products, consisting mainly of logs, pulpwood, pulp, lumber, paper and other products; (*b*) nonmetallic minerals, chiefly sand, gravel, cement, sulfur, and petroleum products; (*c*) fish and fish products; and (*d*) miscellaneous commodities. Distribution by classes of commodities and types of traffic is given in table 4 for the year 1954. About 76 percent of the total vessel tonnage and 52 percent of the rafted tonnage for 1954 passed through Whatcom Creek Waterway. Squalicum Creek Waterway accounted for 8 percent of the vessel tonnage and 1.6 percent of the rafted tonnage. The remaining commerce was distributed along the general waterfront except about 8,000 tons of fish and 15,400 tons of rafted logs that passed through I and J Street Waterway.

TABLE 4.—*Freight traffic, Bellingham Bay and Harbor, year 1954*

Classes of traffic and commodities	Tons
Foreign imports	610,030
Logs	21,732
Wood and paper	208,470
Pulpwood	320,135
Crude petroleum	57,713
Miscellaneous	1,980
Foreign exports	75,253
Building cement	9,680
Logs, poles, and piling	39,090
Woodpulp	22,543
Miscellaneous	3,940
Domestic coastwise receipts	32,237
Canned salmon	18,046
Sulfur	14,026
Miscellaneous	165
Domestic coastwise shipments	63,383
Building cement	53,693
Wood and paper	8,969
Miscellaneous	721
Domestic internal receipts	513,149
Fish and fish products	5,397
Logs (rafted)	268,562
Wood and paper	1,907
Petroleum products	172,410
Sand, gravel, crushed rock, and limestone	55,697
Miscellaneous	9,176
Domestic internal shipments	244,002
Fish and fish products	8,323
Building cement	6,954
Logs (rafted)	221,221
Wood and paper	5,853
Miscellaneous	1,651
Local	62,523
Fish and fish products	17,164
Logs (rafted)	41,191
Miscellaneous	4,168
Grand total, all traffic	1,600,577

44. *Vessel traffic.*—A record of trips and drafts of vessels operating in Bellingham Bay and Harbor is given by waterways in table 5 for the years 1950 through 1954. The table indicates a continuing increase in the lower draft ranges and shows a few trips in the later years at drafts exceeding 30 feet. A distribution of trips in 1954 by classes of vessels is shown in table 6 for the various waterways.

TABLE 5.—*Vessel traffic, Bellingham Bay and Harbor, 1950–54*

Year and waterway	Trips [1] by loaded draft (feet)							
	30 to 32	28 to 30	26 to 28	24 to 26	22 to 24	20 to 22	Under 20	Total
1950:								
Whatcom		4	7	8	15	13	4,361	4,408
Squalicum						4	966	970
I and J							[2] 1,838	1,838
Other					4	3	1,923	1,930
Total		4	7	8	19	20	9,088	9,146
1951:								
Whatcom		3	4	19	8	23	4,373	4,430
Squalicum							1,388	1,388
I and J							[2] 1,602	1,602
Other			2	2	6	10	810	830
Total		3	6	21	14	33	8,173	8,250
1952:								
Whatcom		2	4	10	17	13	5,265	5,311
Squalicum							1,698	1,698
I and J							[2] 1,470	1,470
Other		3	3	11	9	8	1,300	1,334
Total		5	7	21	26	21	9,733	9,815
1953:								
Whatcom		5	10	13	21	21	6,561	6,631
Squalicum							1,550	1,550
I and J							[2] 1,502	1,502
Other	1	4	5	6	5	6	2,633	2,660
Total	1	9	15	19	26	27	12,246	12,343
1954:								
Whatcom	2	6	13	27	27	27	5,734	5,836
Squalicum							1,958	1,958
I and J							[2] 1,424	1,424
Other	1	3	4	26	11	12	2,646	2,703
Total	3	9	17	53	38	39	11,762	11,921

[1] In and out combined.
[2] Less than 8-foot draft.

TABLE 6.—*Trips and drafts by waterways, 1954*

Drafts (feet) by waterways	Trips (in and out combined)			
	Steamers	Motor vessels	Barges	Total
30 to 32:				
Whatcom	2			2
Other [1]	1			1
Total	3			3
28 to 30:				
Whatcom	5	1		6
Other [1]	3			3
Total	8	1		9
26 to 28:				
Whatcom	9	4		13
Other [1]	4			4
Total	13	4		17
24 to 26:				
Whatcom	9	14	4	27
Other [1]	7	4	15	26
Total	16	18	19	53
22 to 24:				
Whatcom	15	12		27
Other [1]	3	8		11
Total	18	20		38
20 to 22:				
Whatcom	16	10	1	27
Other [1]	8	4		12
Total	24	14	1	39
Under 20:				
Whatcom	18	4,019	1,697	5,734
Squalicum		1,836	122	1,958
I and J Street		1,424		1,424
Other	9	1,904	733	2,646
Total	27	9,183	2,552	11,762
Grand total	109	9,240	2,572	11,921

[1] Exclusive of waterways which had no traffic in these draft ranges.

45. Bellingham is a port of call as cargo offers by vessels of several of the many steamship lines serving major Puget Sound ports in foreign, coastal, and intercoastal trades. Several small freighters operating on Puget Sound and adjacent inland waters make regular calls at Bellingham. Much of the internal traffic is carried by barges and by towed rafts. One local and several outside towboat companies provide towing service. In addition to the towboat and barge traffic, a major share of the shallow-draft traffic consists of commercial fishing vessel landings at the various fish wharves.

46. *Difficulties attending navigation.*—Examination of local harbor conditions and vessel operations in the three waterways indicates no unusual navigation hazards or vessel damages. Search of Coast Guard records and inquiries from port and shipping officials revealed no records of groundings. The principal difficulty is the inadequacy of the existing project depths in Whatcom Creek Waterway for ships with loaded drafts of 24 or more feet that call at the Puget Sound Pulp & Timber Co. and port of Bellingham wharves en route from the ocean to Puget Sound or to complete loading on an outbound voyage. As these vessels can enter or depart only at higher stages of tide, delays

up to 8 hours are encountered in awaiting tidal stages of at least 4 feet above mean lower low water. It is estimated that about 20 percent of about 40 annual trips are subject to delays averaging 4 hours each. As berthing space at the 2 wharves has been dredged by local interests to a 30-foot depth to facilitate mooring, loading, and unloading operations at the lower tides, the delays are due entirely to approach-channel conditions. The existing project depth of 18 feet in the inner end of Whatcom Creek Waterway is adequate for all vessels calling at the municipal wharf and other wharves situated along this section of the waterway which serve oil, sand, and gravel; and fishing industries.

47. In addition to the vessels described in the preceding paragraph, a number of domestic and foreign ships in the Liberty, C–2, C–3, and equivalent classes unload at various Puget Sound ports, and proceed light or partially loaded to Whatcom Creek Waterway. Here they are loaded to drafts up to 24 feet because of inability to take on a full load, and then returned to Seattle or an adjacent deepwater port for completion of loading before embarking on an ocean voyage through the Strait of Juan de Fuca. This operation entails additional travel averaging 87 nautical miles on each of at least 10 vessel calls annually. At an average vessel speed of 16 knots this extra travel amounts to 54 hours of nonproductive vessel operation annually.

48. The existing channel width of 363 feet in Whatcom Creek Waterway results in some restriction of movement to and from the inner portion when a ship is berthed at the port of Bellingham wharf. This restriction necessitates more extensive use of towboats for vessel maneuvering than would be necessary with a wider channel. It also increases the difficulty of towing log rafts to the pulp and timber company wharf. Ships using the waterway usually require assistance by tugs for departure only as they must be towed out stern first. A channel width of say 450 feet would reduce tug use by an estimated 25 percent but the monetary saving would be far from sufficient to offset the cost of the extensive dredging involved. Channel deepening alone would result in no appreciable reduction in tug use.

49. The existing project depth of 26 feet in Squalicum Creek Waterway is entirely adequate for the present traffic which in the past 5 years has not exceeded a draft of 20 feet. Consultation with representatives of industries situated on the waterway indicated no prospective changes in this pattern in the foreseeable future. Soundings of the waterway taken in connection with this study indicate that the difficulties described by local interests at the public hearing as resulting from inadequate channel depths actually apply to the berthing areas outside the channel limits where depths range from 6 to 16 feet. The present controlling depth in the project channel is 23 feet. The project depth of 26 feet can be restored under the maintenance provisions of the existing project. There is no problem of traffic restriction in the waterway due to existing channel width.

50. Prevailing depths in I and J Street Waterway range from 17 feet below lower mean low water at the outer pierhead line to about 5 feet above near the inner end of the waterway. The present traffic on this waterway consists of fish landings at a cannery wharf and log rafting in connection with a small sawmill operation near its inner end. The drafts of all vessels using the waterway in the past 5 years have not exceeded 8 feet, and there appears to be no prospect of

increased drafts in the foreseeable future. Past dredging by the United States Navy and by the port of Bellingham has provided an access channel up to 15 feet deep to the fish wharf. It has present minimum depths of 7 to 11 feet. No major difficulties have been reported on vessel traffic as far as the fish wharf but the depths from that point on to the sawmill are less than the maximum vessel drafts. This condition restricts log raft movements to the higher tide stages, thus involving delays and extra standby expense in connection with tows approaching or ready to depart on a falling tide. It is estimated that about 30 percent out of an average of 50 towing trips annually are subject to delays averaging 6 hours each while awaiting high tides.

51. *Water power and other special subjects.*—No problems involving control or conservation of water resources other than pollution abatement and use of dredged material for the tideland fill could be coordinated with the harbor improvement considered in this report. The Washington State Pollution Control Commission has requested clearance through its office with respect to disposal of material dredged from Whatcom Creek Waterway as this material has been found to have extensive organic sludge which can decompose into toxic hydrogen sulfide.

52. *Plan of improvement.*—In lieu of the extensive channel improvements requested by local interests for which no adequate justification could be found, the only improvements considered worthy of consideration at this time are (1) deepening of Whatcom Creek Waterway to a depth of 30 feet from deepwater to a point within 750 feet from the inner end, and (2) dredging a channel 100 feet wide and 12 feet deep in I and J Street waterway. The first feature would require about 225,000 cubic yards of dredging between the present 18- and 26-foot project depths and the proposed 30-foot depth, and over the full 363-foot width of waterway except in the section between pierhead lines where no dredging would be done nearer than 50 feet from these lines which coincide with the face of the wharves. The second feature would involve about 78,000 cubic yards with the channel so situated as to leave a clearance of 50 feet from the pierhead line on either side. Both quantities include 1 foot of overdepth dredging. All of the work would be channelward of the existing pierhead line as indicated on the accompanying map.

53. The material is mainly fine marine silt which would be deposited on tide flat areas owned by the Bellingham Port District. Necessary bulkheads for confinement of the fill would be provided by the port commission.

54. *Shoreline effects.*—The proposed work would not adversely affect adjacent shorelines. The only change would be the incorporation of the tide flat fill as part of the adjacent shoreland.

55. *Aids to navigation.*—Officials of the 13th Coast Guard District have indicated that one unlighted buoy would be required on the right-hand side of each channel entrance.

56. *Estimate of first cost.*—The cost of the proposed improvements is estimated on the basis of December 1955 prices to be as follows, including contingencies, engineering, and administration:

A. Whatcom Creek Waterway:	
(1) Corps of Engineers: Dredging, 225,000 cubic yards	$87,100
(2) U. S. Coast Guard: Aids to navigation	1,100
(3) Total 1st cost	88,200
B. I and J Street Waterway:	
(1) Corps of Engineers: Dredging, 78,000 cubic yards	31,300
(2) U. S. Coast Guard: Aids to navigation	1,100
(3) Total Federal work	32,400

57. Local costs for bulkheads are accounted for in the calculation of net benefits from use of the dredged material for development of new land. No land costs are involved as the dredging would be within the limits of public waterways and spoil disposal areas are owned by the port of Bellingham. Likewise, there would be no initial local costs for dredging in berthing and wharf approach areas as these are now being maintained at a depth of 30 feet. Any terminal facilities that may be added by local interests are considered to be wholly self-liquidating.

58. *Estimate of annual charges.*—As the project can be completed in less than 1 year, no interest during construction would be involved. Annual charges are as follows:

A. Whatcom Creek Waterway:	
(1) Federal work:	
(*a*) Investment	$88,200
(*b*) Less local contribution (par. 69)	3,400
(*c*) Net Federal investment	84,800
(*d*) Annual charges:	
Interest and amortization (50-year life, 2½ percent)	2,990
Maintenance:	
Dredging	1,000
Aids to navigation	125
Total Federal charges	4,115
(2) Non-Federal work:	
(*a*) Investment: Cash contribution	3,400
(*b*) Annual charges:	
Interest and amortization (50-year life, at 2½ percent on $3,400)	120
Maintenance dredging	500
Total non-Federal charges	620
(3) Total annual charges	4,735
B. I and J Street Waterway:	
(1) Federal work:	
(*a*) Investment	32,400
(*b*) Annual charges:	
Interest and amortization (50-year life, 2½ percent)	1,140
Maintenance:	
Dredging	1,000
Aids to navigation	125
(*c*) Total Federal charges	2,265
(2) Non-Federal work:	
(*a*) Annual charges: Maintenance dredging	200
(3) Total annual charges	2,465

59. The $1,000 item for channel maintenance in Whatcom Creek Waterway would be additional to the amount required under the existing project. The local maintenance items are for dredging in berthing areas.

60. *Estimate of benefits.*—Deepening of Whatcom Creek Waterway would facilitate movement of ships drawing 24 or more feet of water, and would allow loading of ships to their full load draft. A channel 12 feet deep in I and J Street Waterway would facilitate movement of towboats and other small craft. Benefits evaluated in the following paragraphs relative to Whatcom Creek Waterway include savings in vessel operating costs and increased land rentals resulting from use of dredged material for fill. Benefits evaluated for I and J Street Waterway include savings in log-towing costs, and increased land rentals.

61. *Whatcom Creek Waterway.*—It is estimated that future vessel traffic in Whatcom Creek Waterway under existing conditions would average about 40 trips annually in the draft range of 24 or more feet. A 30-foot project depth would eliminate vessel delays now affecting 20 percent of the trips in this draft range. With an average loss of 4 hours per trip about 32 hours of nonproductive time would be eliminated annually which would amount to a saving of $2,720 at an average in-port vessel operating cost of $85 an hour.

62. A 30-foot channel depth would enable ship operators to schedule their calls at Puget Sound ports so that loading for an outbound sea voyage can be completed at Bellingham thereby eliminating at least 54 hours of unnecessary travel time which, at an average hourly vessel operating cost of $105, would result in a direct saving of $5,670 annually. This saving is based on the present practice of vessels proceeding light from a Puget Sound port to Bellingham for a partial load, then returning to Seattle or other nearby ports for completion of their loading. If, as an alternate procedure, these vessels were to be partially loaded in a Puget Sound port first and then taken to Bellingham for final loading, they probably would travel both in and out of Whatcom Creek Waterway with drafts of 24 or more feet. Under these conditions, it is considered likely that some delay in awaiting tides would be encountered on both entry and departure so that the time loss per round trip could average 6 hours or a total of 60 hours for 10 trips. At an in-port operating cost of $85 an hour, the monetary savings under this procedure would amount to $5,100 annually. This lower figure is taken as the monetary value of benefits allocable to this traffic group.

63. Placement of the dredged material from Whatcom Creek Waterway on tide flat areas adjacent to the port of Bellingham terminal and near the inner end of I and J Street Waterway would provide the most economical means of disposal as part of the dredging operation. Confinement of the material by bulkheads to be provided by the port of Bellingham would enable development of these areas for industrial use. It is estimated that about 17 acres of usable land could thus be created with a net increase of $665 in annual rental value to the landowners.

64. Summarizing the benefits described in the preceding paragraphs gives a total annual figure of $8,485 that would be realized from deepening of Whatcom Creek Waterway. About 92.2 percent of this total would be allocable to navigation and 7.8 percent to land enhancement.

65. *I and J Street Waterway.*—A channel 12 feet deep and 100 feet wide in this waterway would eliminate delays in towing operations averaging 6 hours each for 15 trips annually. At an hourly cost of $15 for towboat operation, the annual saving would total $1,350. The dredged material placed as fill on the adjacent tideflat area would produce 3.5 acres of industrial land with an increased annual rental value of $770. The total benefit would thus be $2,120 exclusive of any minor benefits that might be realized by other users of the waterway. About 64 percent would be for navigation and 36 percent for land enhancement.

66. *Comparison of benefits and costs.*—The annual benefits and costs of the proposed improvements are compared as follows:

	Waterway	
	Whatcom Creek	I and J Street
(*a*) Annual benefits	$8,485	$2,120
(*b*) Annual costs	4,735	2,465
(*c*) Ratio, benefit-to-costs	1.79	0.86

67. As indicated by the foregoing comparison, only the Whatcom Creek Waterway improvement would be economically justified.

68. *Proposed local cooperation.*—As shown in this report, the improvement of Whatcom Creek Waterway would benefit the local community as well as the public at large. It is therefore proposed as an essential feature of Federal participation in accomplishing the improvement that local interests be required to furnish assurances that they will, without cost to the United States (*a*) furnish all necessary easements, rights-of-way, and suitable disposal areas for initial work and for subsequent maintenance when and as required; (*b*) hold and save the United States free from damages that may result from construction and maintenance of the project; (*c*) construct and maintain any bulkheads required for retention of dredged material; (*d*) maintain at the project depth approaches and berthing areas adjacent to the terminals bordering on the 30-foot channel; and (*e*) contribute in cash, or equivalent work, 3.9 percent of the cost of channel dredging; presently estimated at $3,400. The Port Commission of Bellingham has indicated willingness to comply with these terms. Similar terms would be applicable to I and J Street Waterway if its improvement were economically justifiable.

69. *Allocation of costs.*—As shown in paragraph 64, about 7.8 percent of the net benefits represent returns from increased land values resulting from deposition of dredged material from Whatcom Creek Waterway on nearby tideflats. In accordance with existing policy, a local contribution would be required equal to 50 percent of the share of project cost allocable to land enhancement. The total cost of the improvement, exclusive of navigation aids, is $87,100, all of which is for Federal dredging. The land-enhancement share would amount to 7.8 percent or $6,800, of which one-half, or $3,400, would be contributed by local interests in addition to other requirements of local cooperation. The net Federal first cost for dredging would then be $87,100 minus $3,400, or $83,700.

70. *Coordination with other agencies.*—During the course of this investigation, representatives of the following Federal, State, and local agencies were consulted: United States Coast Guard, United States Fish and Wildlife Service, Washington State Departments of Fish and Game, Washington State Pollution Commission, and Port Commission of Bellingham. All of these agencies have approved the plan in general. The regional director of the United States Fish and Wildlife Service has indicated that the project would not have any adverse effect on fish and wildlife resources. The director of the State fisheries department voiced approval of the improvements considered. The director of the State game department indicated that dredging in the waterways and deposition of material on adjacent tideflats might have some adverse effect on fish life but that any losses could be minimized if dredging operations are confined to the period extending from June of one year to February of the following year. A State pollution-control commission representative stated that investigations have indicated the presence of extensive organic sludge deposits particularly in Whatcom Creek Waterway. The commission therefore favors use of the dredged material for fill purposes and desires clearance through its office in the event it becomes necessary to waste any of the material in the harbor area. The proposed project features and items of local cooperation were discussed with the local port commission. The commission has generally approved the plan and indicated its acceptance of the terms of cooperation.

71. *Discussion.*—Bellingham is a port of call for oceangoing freight vessels that serve Puget Sound ports in the foreign and domestic trades. The volume of vessel traffic has increased steadily in recent years but public and private shipping interests situated on Whatcom Creek Waterway, which has an existing project depth of 26 feet, find themselves at a disadvantage in competing with ports on Puget Sound where waterways and approach channels to deep-water terminals have project depths of 30 feet or more, as for example, East Waterway at Everett; Duwamish, East and West Waterways at Seattle; Hylebos and Port Industrial Waterways at Tacoma; and the main approach channel to the port terminal at Olympia.

72. The established waterways are conveniently situated with respect to the business center of Bellingham, and the adjacent tideflat and shore areas are readily adaptable for industrial and port expansion. Considerable space is available for deep-water terminal expansion adjacent to Whatcom Creek Waterway. Ample space is available adjacent to I and J Street Waterway, but at present there are only two small industries, both dependent on shallow-draft transportation and there is no definite prospect at this time of any additional industries seeking sites along this waterway. Likewise there is no immediate prospect of any need for deep-water transportation facilities on Squalicum Creek Waterway. The existing project depth of 26 feet is ample for the needs of existing industries situated on the waterway. Available deep-water sites elsewhere in Bellingham Harbor are too exposed to severe storm action or are not readily accessible by land because of steep upland slopes.

73. In addition to the continuing increase in deepwater ship traffic, much of the present-day traffic in Whatcom Creek Waterway is carried in the larger Liberty and Victory type ships for which a 26-foot channel depth is inadequate. Ship operators who attempt to

complete loading at the waterway terminals on an outbound voyage or to call there for initial discharge of cargo on an inbound voyage are frequently obliged to wait for high-tide conditions. Others find it necessary to make a side trip to the waterway with a partially loaded ship and then return to Puget Sound ports for completion of loading.

74. Local interests have requested deepening of the three waterways and widening of one with a veiw to reducing these unnecessary shipping expenses and operating difficulties and with a view to promoting additional ship traffic and industrial development in the harbor. A study of the need for the requested improvements revealed little or no justification for increasing channel depths in Squalicum Creek Waterway, and inadequate justification for even a shallow-draft channel in I and J Street Waterway. However, deepening of Whatcom Creek Waterway to a depth of 30 feet except in the inner portion and within 50 feet of established pierhead lines would result in annual benefits valued at $8,485 that substantially exceed the estimated annual charges of $4,735. These benefits are considered to be conservative as they are based on current traffic volumes and do not reflect future normal growth or additional developments likely to result from the improvement. Placement of the dredged material as fill confined by bulkheads to be provided by local interests will add assurance to this future development and will provide an economical means of disposal for the material. This method would be agreeable to local agencies concerned with safeguarding fish and other marine life. The economy of the Bellingham area is based on resources and activities similar to those in communities on Puget Sound adjacent to deepwater harbors. The improvement would place Bellingham in a comparable position with these communities from the standpoint of water transportation.

75. *Conclusion.*—From data presented and discussed in this report it is concluded that—

(*a*) Existing project depths in Whatcom Creek Waterway are inadequate for the larger ships that regularly call at public and private terminals situated on the waterway.

(*b*) Benefits accruing from a project modification providing a 30-foot channel depth would exceed the costs, and would be sufficiently general to warrant expenditure of $83,700 by the Corps of Engineers for initial work and an additional amount of $1,000 annually for maintenance.

(*c*) There is no need at present for widening of Whatcom Creek Waterway or deepening of Squalicum Creek Waterway. Likewise, there would not be sufficient benefits at this time to warrant improvement of I and J Street waterway even to the extend of providing a channel 12 feet deep and 100 feet wide.

76. As the proposed work for Whatcom Creek Waterway can be completed in less than 1 year, funds for it should be allotted in one lump sum.

77. *Recommendation.*—In view of the foregoing, it is recommended that the existing project for Bellingham Harbor, Wash., be modified to provide for dredging Whatcom Creek Waterway to a depth of 30 feet below mean lower low water from deepwater to a point not nearer than 750 feet from the inner end of the waterway and over the full width except that no dredging shall be done within 50 feet of existing pierhead lines or the section of port wharf seaward of these

lines, all at a first cost of $83,700 to the Corps of Engineers and an annual cost of $1,000 for maintenance in addition to that now required for the existing project.

78. Before any Federal expenditure is made local interests should be required to furnish assurances that they will (*a*) furnish all necessary easements, rights-of-way, and suitable disposal areas for initial work and subsequent maintenance as required; (*b*) hold and save the United States free from damages that may result from construction and maintenance of the improvement; (*c*) construct and maintain any bulkheads required for retention of dredged material; (*d*) maintain at project depth approaches and berthing areas adjacent to the terminals bordering on the 30-foot channel; and (*e*) contribute in cash or equivalent work 3.9 percent of the cost of channel dredging, presently estimated at $3,400.

N. A. MATTHIAS,
Colonel, Corps of Engineers, District Engineer.

[First endorsement]

OFFICE, DIVISION ENGINEER,
NORTH PACIFIC DIVISION,
CORPS OF ENGINEERS,
Portland, Oreg., April 30, 1956.

Subject: Review of reports on Bellingham Harbor, Wash.
To: Chief of Engineers, Department of the Army, Washington, D. C.

I concur in the views and recommendations of the district engineer.

L. H. FOOTE,
Brigadier General, United States Army,
Division Engineer.

ILLUSTRATION FURNISHED WITH REPORT OF THE DISTRICT ENGINEER

Sheet 1. Vicinity map.

APPENDIX FURNISHED WITH REPORT OF THE DISTRICT ENGINEER

(Not printed)

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