

U. S. ARMY ENGINEER DISTRICT, SEATTLE  
CORPS OF ENGINEERS  
1519 ALASKAN WAY SOUTH  
SEATTLE 4, WASHINGTON

ADDRESS REPLY TO  
DISTRICT ENGINEER  
(NOT TO INDIVIDUALS)

REFER TO NPSGW-R

~~28 September~~ 1962

SUBJECT: Avon Bypass, Skagit River, Washington

2 - OCT 1962

TO: Division Engineer  
U. S. Army Engineer Division, North Pacific

1. Reference is made to request for funds for fiscal year 1964 for authorized Avon Bypass, Skagit River, Washington, contained in our letter dated 27 July 1962, subject, "Estimate of Appropriation Requirements for Advance Engineering and Design, F.Y. 1964."

2. The Avon Bypass was authorized by the Flood Control Act of 1936 as a project that would divert a portion of the flood waters from the Skagit River to Padilla Bay. At the time of authorization, local interests could not meet the requirements of local cooperation which included costs of necessary highway and railroad bridge crossings. Consequently, the project has been inactive. A reevaluation of the project was made with our basin review studies for the Skagit River, authorized by the Public Works Committees of Congress in 1960.

3. The flood plain of the lower Skagit River includes 62,950 acres of fertile, highly productive farmlands, approximately 46,000 acres of which are partially protected by levees operated by 16 organized districts. The total land value is estimated to be \$113,000,000. The area is highly developed for the full range of agriculture and for residential, commercial and industrial use in and adjacent to Mt. Vernon, Burlington, Sedro Woolley and LaConnor, the principal towns. Detailed damage appraisal surveys made during 1962, in connection with the basin review studies have revealed that large flood control benefits will result from additional flood protection of the lower basin. These basin review studies have indicated that the Avon Bypass is a necessary and integral part of any comprehensive basin plan for flood control and other water resource development. Flood protection in the lower basin could be obtained from the Avon Bypass combined with downstream levee and channel improvement and with upstream storage. Flood protection by upstream storage alone does not appear to be feasible. Storage sites are sharply limited in the basin and most of these have been developed for power only. Our basin studies have indicated that some flood storage

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*Location?* could be developed in a multiple-purpose storage project on the lower Sauk River. Flood protection from raising of levees alone is not practicable. Such protection would require major raising of approximately 45 miles of existing levees, construction of additional levees, and major relocation of the existing road system adjacent to the present levees. Foundation conditions along the levees would not permit excessive increase in river stages without a threat of blowouts beneath the levees, and levee maintenance would become difficult with increased river stages and resulting higher velocities. Raising the entire levee system would also develop adverse backwater effects and increase the flood damages in Burlington and Sedro Woolley.

4. During our studies, the county officials and local residents have been kept fully informed and are now strongly in support of reactivating the project because the lack of flood control is limiting the development of lands needed for an economy which is changing from raw material utilizations to diversified industry. Local interests are keenly aware of favorable prospects for economic growth and recognize the importance of the bypass to provide flood protection to the entire lower Skagit River Basin.

5. Project Description. - The project consists of an intake structure, diversion channel, and downstream control structure, and extension and improvement of the levee upstream of the intake structure as shown on Inclosures 1 and 2. Design of the diversion channel as shown has been developed to meet the present requirements of the basin. Studies indicate that the most economical channel can be constructed by locating the intake above the Great Northern Railroad crossing as shown on Inclosure 1. Channel restrictions through and downstream of this bridge cause head losses of several feet during flood periods. Locating the intake above this restricted river section would result in lower river stages in the vicinity of Burlington.

6. The diversion channel would extend westerly about 8 miles from the intake structure to Padilla Bay and would be alined through Gages Slough and follow the hillside north of the valley in order to utilize a minimum of valuable farmland. Ten bridge crossings would be required for the diversion channel at locations shown on Inclosure 1. These bridges would consist of two Great Northern Railroad crossings, the four-lane U.S. Highway 99 crossing, two state highway bridges and five county bridges.

7. Local interests have accomplished substantial levee and channel improvement along most of the Skagit River below Burlington. These levee improvements permit increased flows to be carried by the Skagit River and reduce the capacity requirements for the Avon Bypass from that originally considered. A design capacity of approximately 60,000 c.f.s. has been selected for the bypass after careful consideration of integrating this

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project with levee improvement and upstream storage that might be provided in the foreseeable future. The levee systems at present provide protection for floods of 5- to 10-year frequency. With the bypass in operation, the protection would be increased to about a 25-year frequency flood. Preliminary basin review studies indicate that the bypass could, in the future, provide protection in the lower basin for a flood with frequency of occurrence of once in over 50 years when used in conjunction with both additional levee improvement and future upstream storage. A higher degree of protection could be provided to the towns of Mt. Vernon, Burlington and Sedro Woolley by levee improvement.

8. The project channel would have a bottom width of 340 feet, side slopes of 3 to 1 and would be excavated to a depth of approximately 15 feet. Excavated materials would be used to provide levees and roadways along the channel. The water depth would be 27 feet for the design flow of 60,000 c.f.s. A gated intake structure approximately 350 feet wide would control flows into the channel. A control weir located at the lower end of the channel would prevent tidal water from entering the channel and would prevent erosion during periods of low tides.

9. Project Costs. - Construction costs of the Avon Bypass are estimated at approximately \$19,000,000, as shown below, of which about \$15,000,000 would be Federal construction costs and \$4,000,000 would be non-Federal construction costs.

Federal:

Stripping area: 307 acres at \$1400/acre	\$430,000
Excavation and disposal: 7,756,000 yds <sup>3</sup> at \$0.70/yd <sup>3</sup>	5,429,000
Seeding area: 557 acres at \$400/acre	223,000
GNRR branchline bridge (including shoofly)	730,000
GNRR mainline bridge (including shoofly)	495,000
Intake weir structure (upstream)	1,504,000
Downstream weir structure	2,108,000
Internal drainage facilities	11,000
Levee extension and improvement	433,000
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Subtotal Federal costs	\$11,363,000
20% contingencies	2,273,000
10% for Engr and SIOH	1,364,000
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Total Federal construction costs	\$15,000,000

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Non-Federal:

Right-of-way: 725 acres at \$1000/acre	\$725,000
1 LaConnor - Samish Rd. Bridge	355,000
2 Highway 1-C (Best Road) Bridge	359,000
3 Avon-Allen Rd. Bridge	300,000
4 Pulver Rd. Bridge	308,000
5 Highway 1-C Bridge (parallels GMY)	374,000
6 U. S. No. 99 Bridge ( 2 - 2 lane)	719,000
7 Old U. S. 99 Bridge	312,000
8 Whitmarsh Rd. Bridge	302,000
Miscellaneous bridges, houses, barns and utility relocs.	246,000
Total non-Federal construction costs	\$4,000,000
TOTAL FEDERAL CONSTRUCTION COSTS	15,000,000
TOTAL PROJECT CONSTRUCTION COST	\$19,000,000

Derivation Annual Charges:

	<u>Federal</u> <sup>1/</sup>	<u>Non-Federal</u> <sup>2/</sup>	<u>Total</u>
First cost	\$15,000,000	\$4,000,000	\$19,000,000
Interest during 2-yr construction period	433,000	200,000	633,000
Investment cost	15,433,000	4,200,000	19,633,000

Annual Charges: (100-year amortization period)

Interest & amortization	471,000	212,000	683,000
Operation & Maintenance	0	50,000	50,000
Interim replacements	0	4,000	4,000
Total Annual Cost	\$471,000	\$266,000	\$737,000

1/ Federal interest rate 2-7/8%

2/ Non-Federal interest rate 5%

10. Project Benefits. - The average annual flood damages in lower Skagit River flood plain are estimated to be \$1,920,000 under 1962 prices and conditions. Considering low cost growth over a 50-year period without flood protection, the average annual damage would be \$2,520,000. The Avon Bypass would practically eliminate all damages until flood flows reach a frequency of occurrence of once in 25 years. Beyond that point, flood damages would be reduced by the difference in stage corresponding

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to the quantity diverted through the bypass. The reduction in annual damages creditable as annual benefits to the Avon Bypass is estimated to be \$1,280,000.

11. In addition to reducing flood damages, the project would have many benefits which have not been evaluated. Local interests have expressed a desire to use the project for recreational purposes. During nonflood periods, the bypass can be operated to produce a lake approximately 6 miles long with water depths over 10 feet which could be utilized for swimming and boating. Local residents have also expressed an interest in pumping water from the project for irrigating large areas of fertile soil adjacent to the diversion channel that are too remote to be irrigated by pumping from the Skagit River. The agricultural area along the bypass is shown on Inclosure 2. The Fish and Wildlife Agencies are extremely interested in incorporating provisions for fishery enhancement in the project. Full utilization of the project for other water resources will require augmentation of low water flows by upstream storage.

12. The U. S. Department of Labor, Bureau of Employment Security has designated Skagit County as an area of substantial and persistent unemployment. The Avon Bypass will provide additional flood protection in the Skagit Valley that would stimulate much needed industrial growth in the basin and would be an important factor in the overall economic development program for the area pursuant to the Area Redevelopment Act (Public Law 87-27).


13. Benefit-cost Ratio. - A comparison of the average annual flood control benefits of the Avon Bypass of \$1,280,000 with average annual costs of \$737,000 gives a benefit-to-cost ratio of 1.7.

14. Local Cooperation. - Direct initial costs of local requirements would be approximately 4 million dollars for construction of eight highway bridges, provisions of utility crossings, and for lands and rights-of-way. The Board of Skagit County Commissioners has indicated a willingness and ability to meet these requirements, by letter, of which a copy is attached as Inclosure 3.

15. Recommendations. - It is recommended that the Avon Bypass project be reactivated and that all possible effort be made to provide advance planning funds in FY-1964.

3 Incl (in trip)

1. Vic Map E-6-6-171, sht 1 of 1
2. " " E-6-6-172, sht 1 of 1
3. Bd of Skagit County Comm ltr  
dtd 1 Aug 62 (cy)

  
ERNEST L. PERRY  
Colonel, Corps of Engineers  
District Engineer