

FLOOD CONTROL - SKAGIT RIVER BASIN

TO: Commissioners, Skagit County, Washington
Howard Miller, Chairman
William Sullivan
Jack Wylie

NEED

There exists an immediate and urgent need for the establishment of a program to work out details for a plan of flood control on the Skagit River and its tributaries, especially the Baker, Sauk and Cascade Rivers; and, to secure support and assistance to put such a program into effect.

AREAS IN WHICH IMMEDIATE ACTION IS REQUIRED

1. Complete plans and seek Federal funding for the levees on the Lower Skagit River from Sedro Woolley west, including both the North and South Forks of the Skagit River.
2. Urge the U.S. Army Corps of Engineers to place in their budget for Fiscal year 1976, funds to start construction of this authorized project, support this request before Congressional Appropriations Committees; and make sure that the project is not "deauthorized" under provisions of the Water Resources Development Act of 1974 (Public Law 93-251).
3. Advance planning on the Baker River project including reaching an agreement with Puget Sound Power and Light Company under which the "Two Dams" on the Baker River can be part of the flood control provisions for the Skagit River.
4. Urge the U.S. Army Corps of Engineers to include in their budget for Fiscal Year 1976 advance planning funds for:
 - (a) A rock filled flood control dam on the Sauk River.
 - (b) Use of suitable areas of the floor of the Sauk River Valley for a "Natural spawning" area.
 - (c) A large Federally financed fish hatchery in the Sauk River Valley to benefit sports and commercial fisheries and to help answer the Indian fishing problem.

STEPS NECESSARY TO ACHIEVE RESULTS

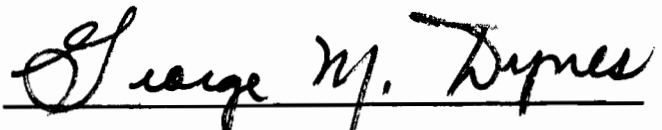
1. Establish and maintain close liaison with the Seattle District and North Pacific Division offices of the U.S. Army Corps of Engineers.
2. Secure the support of Senator Warren G. Magnuson, Senator Henry M. Jackson, Congressman Lloyd Meeds and other members of the Pacific Northwest Congressional delegation through keeping them informed of work being done and demonstrating that the Skagit County Board of Commissioners and the people of Skagit County are ready and able to go ahead with the projects mentioned.
3. Obtain the unqualified support and endorsement of the Pacific Northwest Waterways Association (the region's most comprehensive and influential resource development group) for the projects in Skagit County.
4. Achieve cooperation among Skagit County Engineer Lloyd Johnson, local Flood Control groups and the Skagit County Board of Commissioners in developing an acceptable plan with feasible local financing features.

PROPOSAL

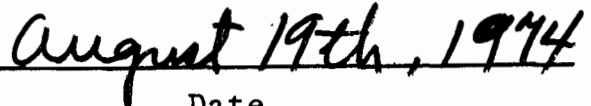
George M. Dynes would be appointed as a "special consultant" to the Skagit County Board of Commissioners for a period of one year to work on the program set forth above.

George M. Dynes would serve without salary, fees, or other personal compensation. A budget of not to exceed \$5,000.00 would be established to cover costs and travel expenses, all subject to approval by the Board of Commissioners. Dynes would work under the supervision of and report to the Skagit County Board of Commissioners.

George M. Dynes is a long-time resident of the Skagit Valley, is active in local flood control efforts, has served as a Commissioner of the Port of Skagit County, and is at the present time, President of the Pacific Northwest Waterways Association.



George M. Dynes



Date

PROJECTS

Priority #1.

Levees on Lower Skagit River.

- (a) Need: To bring up to recommended heights and uniformity the various nineteen (19) Dyking Districts' present dykes that border the Skagit River.
- (b) This project was authorized by Congress in the year 1960 - June 9th.
- (c) Estimated cost of project: \$8,000,000.00
 - (1) Federal: \$7,500,000.00
 - (2) County: \$ 500,000.00
- (d) Estimated Cost by U.S. Army Corps of Engineers.
 - March 1965 \$6,000,000.00
 - Non-Federal \$ 237,000.00

PROJECTS

Priority #2.

Baker River Flood Control Storage in Baker Lake.

- (a) Project to hold water back during flood dangers periods; - November to March; an additional 84,000 acre feet of storage.
- (b) This project must be authorized by Congress.
- (c) It is of the upmost important to "Tie" this project in with the Lower Levees on the Skagit River so we can have at least a 15-year flood occurrence period in the Skagit Valley as the Corps of Engineers are prohibited by Federal Law to undertake flood controls that give lower protection than the 15 years.
- (d) Costs: Approximately \$150,000.00 a year
 - (1) Skagit County - None
 - (2) Federal: \$150,000.00 a year.
- (e) Should work to try to get an exchange of power with the Bonneville Administration instead of a flat sum per year for Puget Sound Power and Light Company. Bonneville could use power instead of spilling water.

PROJECTS

Priority #3.

Sauk River Dam:

- A. (1) Project would need to be authorized.
- (2) Preliminary work with United States Army Corps of Engineers to see if project is feasible.
- (3) Get estimate from Corps of sum needed for preliminary study.

- B. Salmon on the river (Skagit) and the Sauk River.
 - (1) Preliminary study regarding Federal hatchery.
 - (2) Preliminary study regarding natural spawning areas in the valley of the Sauk Valley.
 - (3) Preliminary study to control "silt" from Mud Mountain to eliminate silt in the Sauk.
 - (4) Federal hatchery to be "tied" into the question of Salmon Fisheries for the Indian Tribes.
 - (5) Dam to be used only for flood control. Would estimate closing dam on the average of once every fifteen years (15) for very short periods.
 - (6) Work to "delete" Scenic River Classification on Sauk River south to its tributary, the Suiattle River.

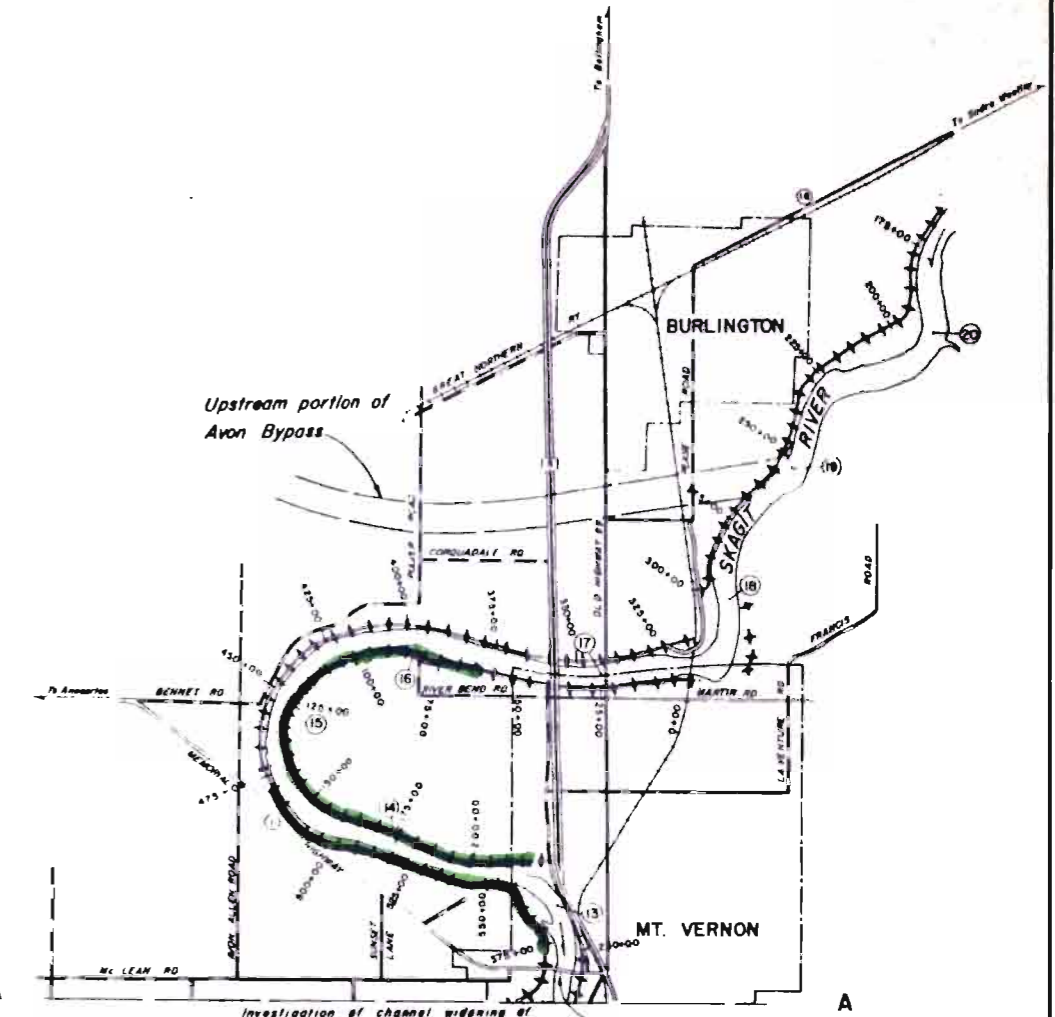
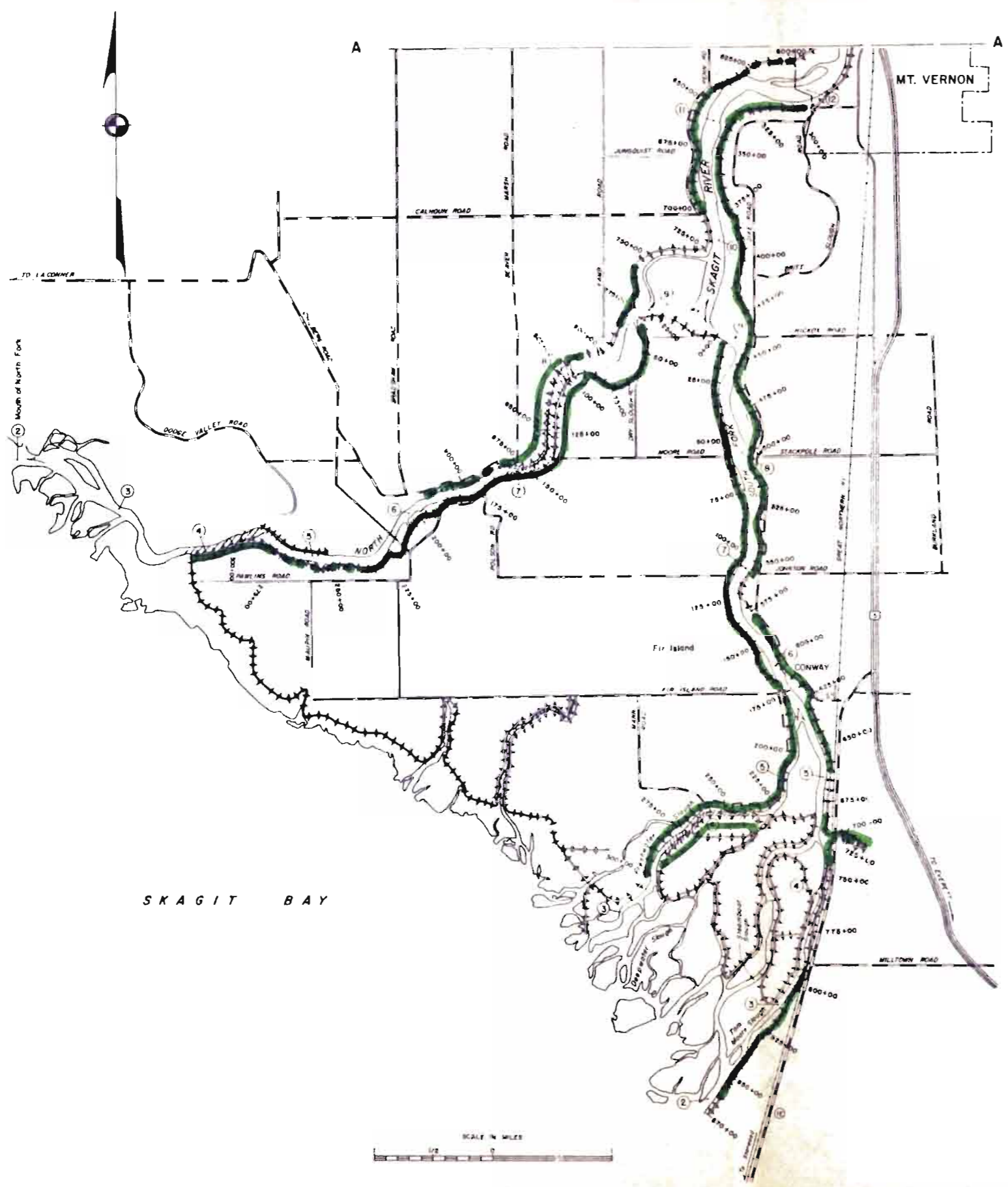
PROJECTS

Priority #4.

Avon By-Pass.

- (1) Study to show with the Baker project, lower levees and the Sauk flood control dam that the Avon By-Pass is not needed.
- (2) In case studies show that the Sauk Dam is not feasible, a lower cost By-Pass be recommended.
 - (a) Approximately 1,320 feet wide from River south of Burlington extending westerly to Padilla Bay with stopping levees on each side. Levees at each end in case of high water over 130,000 to 140,000 C.F. per Section; to be blown to allow extra water that the North and South Forks of the Skagit cannot handle a chance to get into Padilla Bay.
 - (b) An estimate of use would be once in twenty-five years.
 - (c) Land to be used for farming purpose and if at all possible be leased from present owners to help eliminate as much as possible costs involved in project for Skagit County.
 - (d) Estimate Cost: Six miles of Dykes.
 - (1) Federal Cost: \$6,000,000.00
 - (2) Skagit County:
 - (a) Outright purchase \$1,500,000.00
 - (b) Lease \$ 500,000.00

priority #1



Investigation of channel widening at this location will be made during final design.

LEGEND

- ① — River mile
- Existing levee
- //// Channel improvement
- Levee to be improved

Sources:
 1 Base map for mouth of river to mile 18 taken from U.S.G.S. 7.5' quadrangles La Conner, Mount Vernon, Utsalady and Conway, all issued in 1956. Base map for inset taken from A.M.S. 15' quadrangle, Wickham, 1954. Location of levees corrected from aerial photos taken in 1963.

SKAGIT RIVER, WASHINGTON
LEVEE AND CHANNEL IMPROVEMENT PLAN

U. S. Army Engineer District, Seattle, Wash. Jan 1964

Prepared by: *[Signature]*
 Engineer

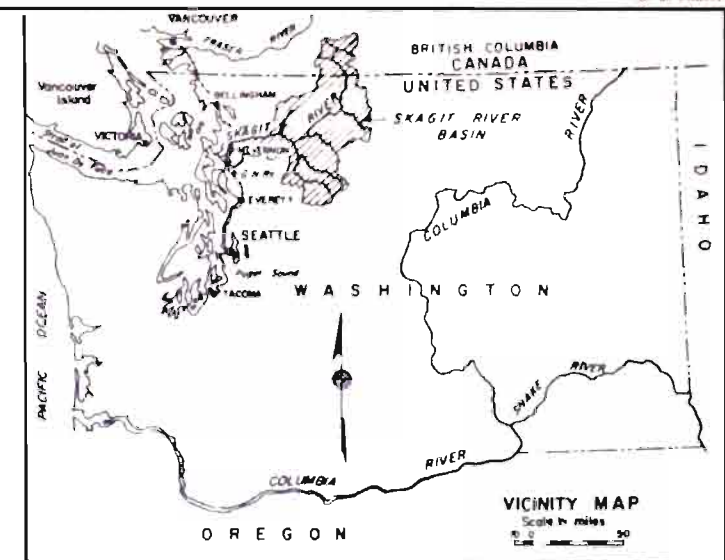
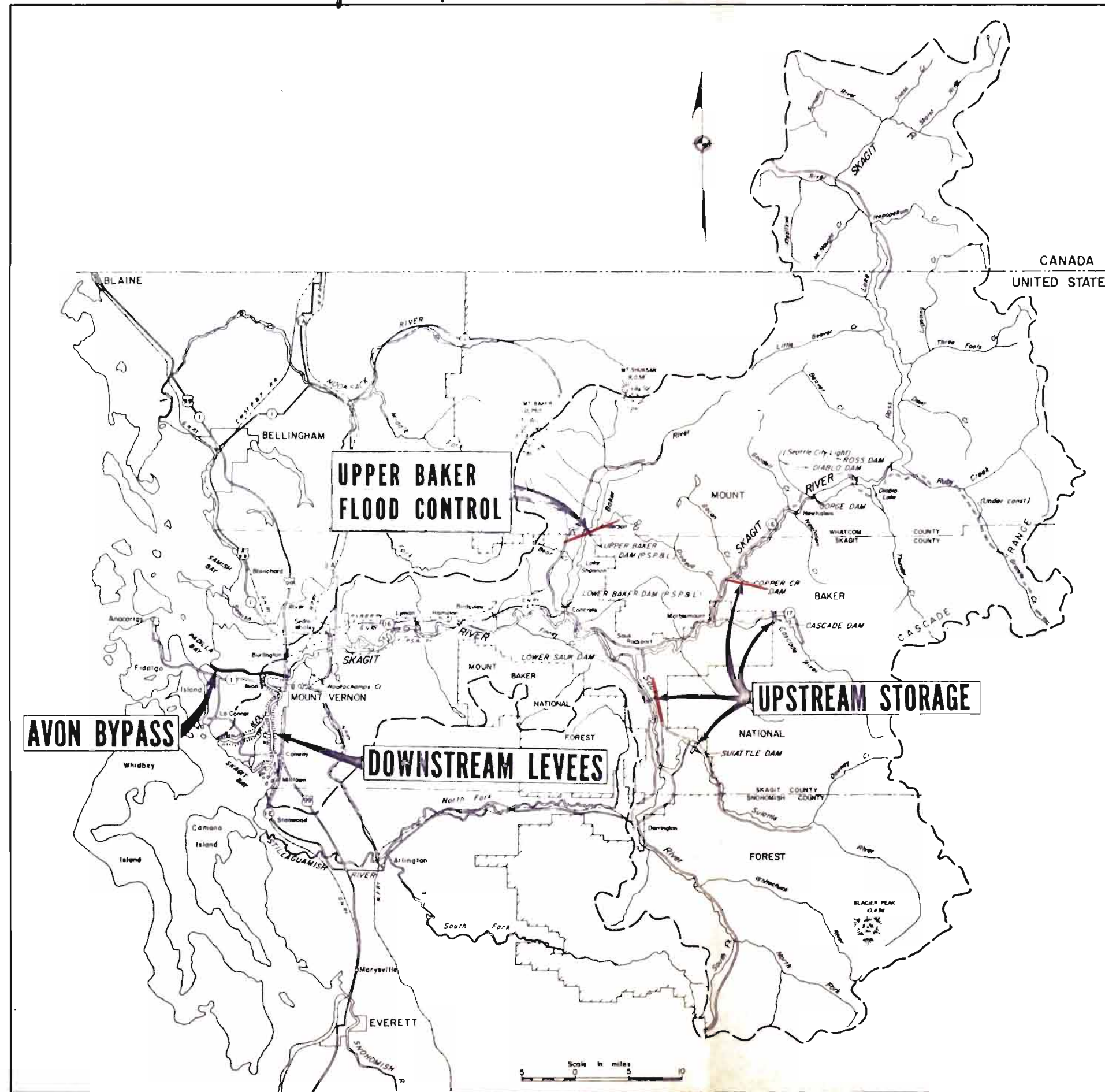
Recommended by: *[Signature]*
 Chief, West Planning Branch

Checked by: *[Signature]*
 Chief, Engineering Division

Approved by: *[Signature]*
 Chief, Paper Sound Basin Section

Approved by: *[Signature]*
 Chief, Engineering Division

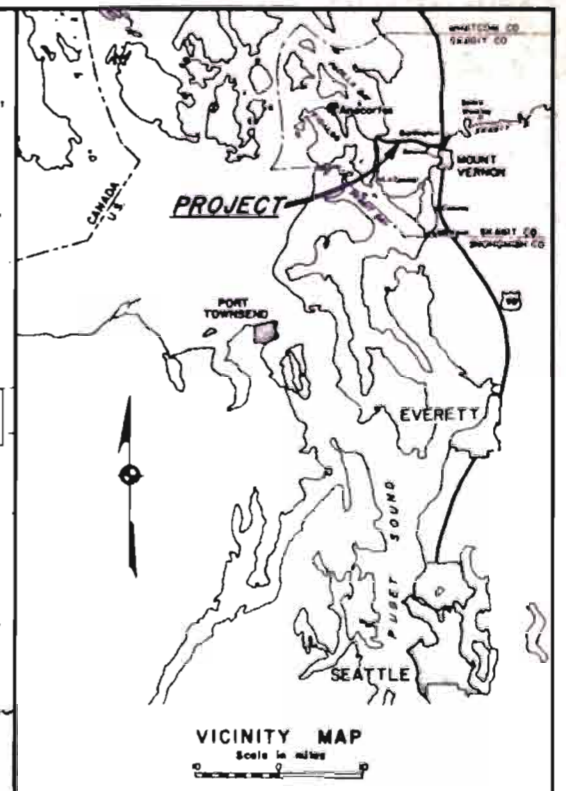
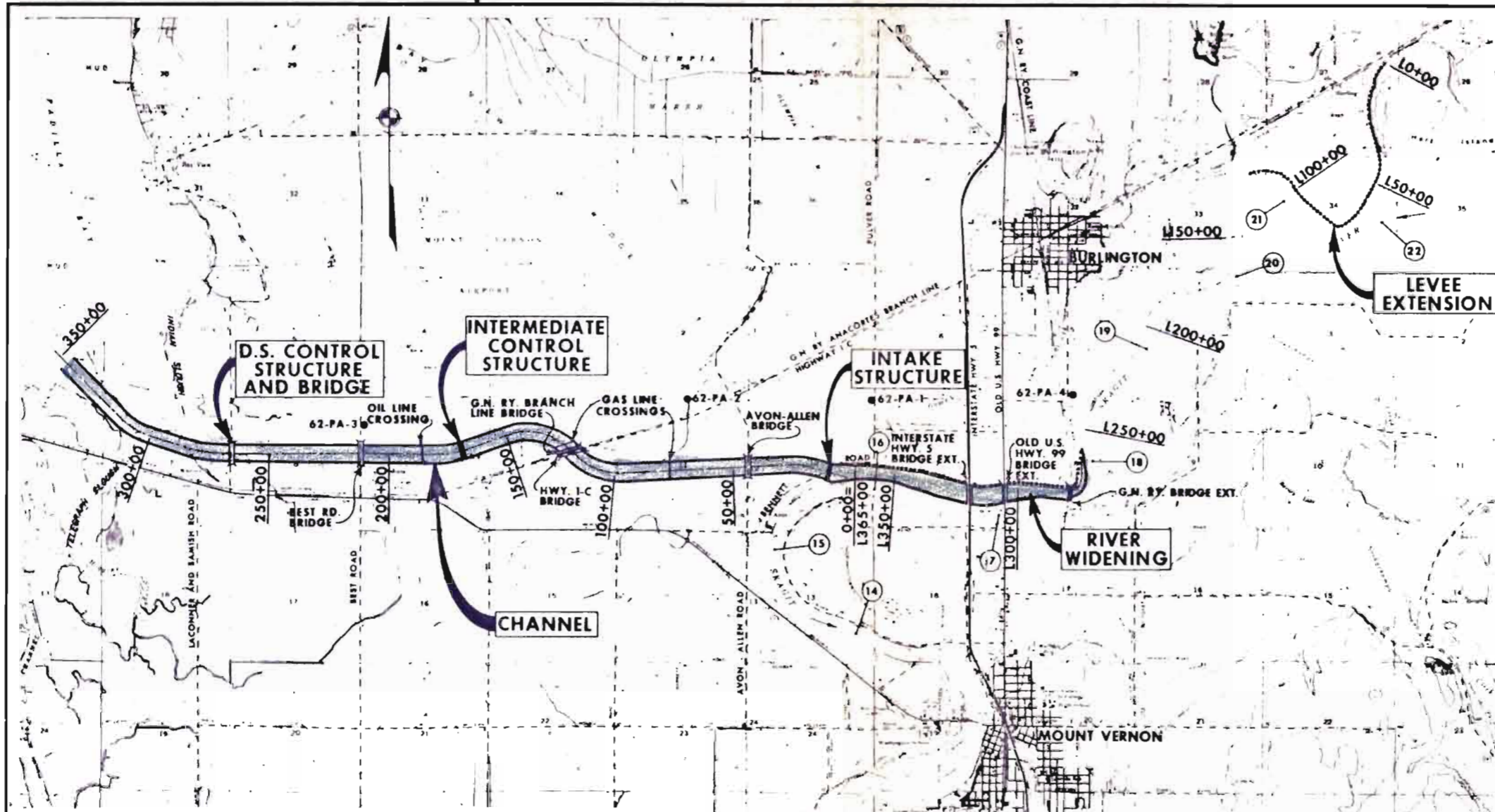
File No. E-6-6-212



- LEGEND**
- LIMITS OF DRAINAGE BASIN
 - HIGHWAY ROUTES
 - EXISTING DAMS
 - POTENTIAL STORAGE SITES
 - DOWNSTREAM LEVEES
 - ELEMENTS BASIN PLAN FOR FLOOD CONTROL

SYMBOL	DESCRIPTION	DATE	APPROVAL
REVISIONS			
U. S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS, SEATTLE, WASHINGTON			
SKAGIT RIVER, WASHINGTON			
AVON BYPASS BASIN MAP			
DESIGNED BY <i>W. J. ...</i> DRAWN BY <i>...</i> CHECKED BY <i>...</i> APPROVED BY <i>...</i>	DATE 1954		
SCALE 1" = 1 MILE		SHEET NO. 1 OF 1	
PROJECT NO. E-6-6-268		PLATE 1	

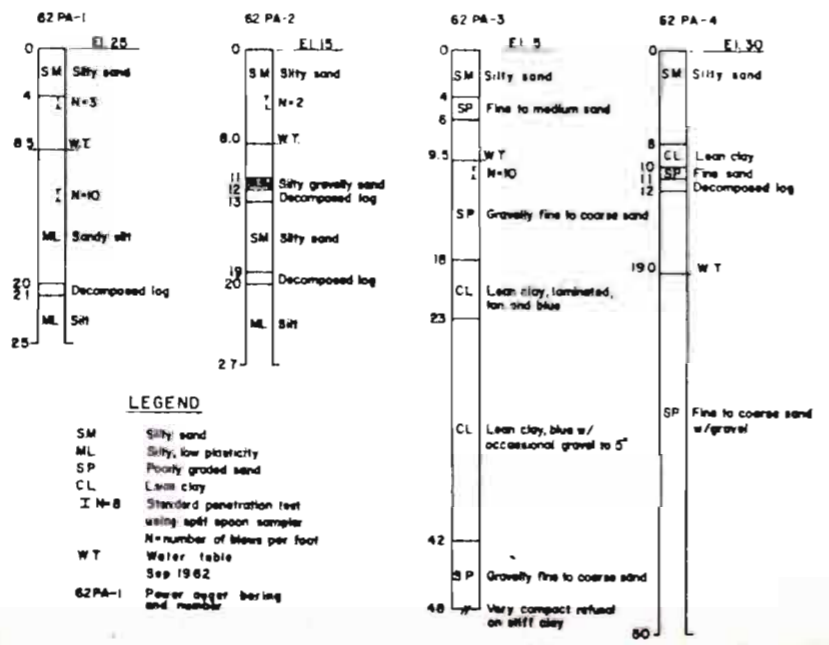
priority #4



LEGEND

- BYPASS R/W
- BRIDGE CROSSING
- LEVEE
- TEST HOLE & NUMBER
- RIVER MILE

EXPLORATION LOGS



LEGEND

- SM Silty sand
- ML Silty, low plasticity
- SP Poorly graded sand
- CL Lean clay
- I N=8 Standard penetration test using split spoon sampler
- N=number of blows per foot
- WT Water table
- Sep 1962
- 62 PA-1 Power auger boring and number



U. S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS, SEATTLE, WASHINGTON

SKAGIT RIVER, WASHINGTON
AVON BYPASS
PROPOSED PLAN

DESIGNED BY: [Signature]
CHECKED BY: [Signature]
DATE: [Date]

U.S. ARMY ENGINEER DISTRICT, SEATTLE, WASHINGTON
E-6-6-268
2 of 7

Table 3

NON-FEDERAL FLOOD CONTROL EXPENDITURES

SKAGIT RIVER

Year	State	County	Diking Districts	Drainage Districts	Others
1947 thru 1957	\$528,431	\$323,209	\$259,081	\$615,935	\$ 1,650
1958 thru 1959	136,308	73,390	153,991	108,430	-
1960 thru 1961	86,929	70,626	261,590	132,113	29,083
1962 thru 1963	20,590	24,595	257,074	141,155	-
Subtotal	<u>\$816,702</u>	<u>\$491,820</u>	<u>\$901,736</u>	<u>\$997,633</u>	<u>\$30,733</u>

Local Expenditures:

To 1947	\$2,355,000
1947 to 1963	<u>\$3,239,000</u>
Total	<u>\$5,594,000</u>

Table 2

SKAGIT RIVER DIKING DISTRICTS

Diking Dist. No.	Date organ- ized	Area Protected (acres)	Miles of levee		Maximum flow river levees will withstand (c.f.s.) <u>2/</u>	Probable interval of flooding in District (years) <u>3/</u>
			Bordering saltwater bays & channels	Bordering river channels <u>1/</u>		
1	1897	8,264	0	7.9	108,000	5
2	1897	2,669	0	6.4	91,000	3
3	1897	6,365	0	11.5	101,000	4
4	1897	1,577	4.1	2.5	123,000	8
5	1897	2,847	6.6	2.0	123,000	8
8	1897	632	2.1	0.9	108,000	5
9	1897	1,419	3.5	1.7	108,000	5
12	1897	13,379	12.6	6.5	108,000	5
13	1897	1,869	2.6	2.6	91,000	3
15	1903	885	1.8	1.9	91,000	3
16	1904	407	0	2.9	101,000	4
17	1910	1,263	0	4.5	143,000	14
18	1918	576	1.4	0.6	91,000	3
19	1919	1,961	2.7	1.8	123,000	8
20	1919	537	0	3.0	143,000	14
21	1922	391	2.1	0	91,000	3
Private Dikes	-	1,000	5.7	9.5	91,000	3
Totals		46,041	45.2	66.2		

1/ Skagit and Samish Rivers and primary and secondary sloughs.

2/ Assumes river at stage 1 foot below average low sections of levee.
(Mount Vernon gage) and sandbagging of extreme low areas.

3/ For failure of levee protecting District. This does not take into account
flooding from failure of cross levees.

Table 6

RECORD FLOOD DISCHARGES, SKAGIT RIVER
(Published Data)

Station	Skagit River near Concrete		Skagit River near Sedro Woolley		Skagit River near Mount Vernon	
	Drainage Area		Drainage Area		Drainage Area	
Date	Crest Discharge		Crest Discharge		Crest Discharge	
	cfs	cfs/sq.mi.	cfs	cfs/sq.mi.	cfs	cfs/sq.mi.
1815	500,000 ^{1/}	182	400,000 ^{1/}	135		
1856	350,000 ^{1/}	128	300,000 ^{1/}	101		
16 Nov. 1896			185,000 ^{1/}	62		
18-19 Nov. 1897	275,000 ^{1/}	100	190,000 ^{1/}	64		
16 Nov. 1906			180,000 ^{1/}	60	180,000 ^{1/}	58
18 Nov. 1908			97,000	33		
29-30 Nov. 1909	260,000 ^{1/}	95	220,000	74		
21 Nov. 1910			114,000	38		
29-30 Dec. 1917	220,000 ^{1/}	81	195,000	66		
12-13 Dec. 1921	240,000 ^{1/}	88	210,000	71		
27 Feb. 1932	147,000	54				
13 Nov. 1932	116,000	42				
22 Dec. 1933	101,000	37				
25 Jan. 1935	131,000	48				
27 Nov. 1949	154,000	56	140,000 ^{2/}	47	114,000 ^{3/}	37
10 Feb. 1951	139,000	51	150,000 ^{2/}	51	144,000	47
3 Nov. 1955 ^{4/}	106,000	39	113,000 ^{2/}	38	107,000	35
23 Nov. 1959 ^{4/}	89,300				91,600	30

^{1/} Calculated by U. S. Geological Survey.

^{2/} Estimated by Corps of Engineers.

^{3/} Mount Vernon gage installed October 1940.

^{4/} Include effect of 120,000 acre-feet of flood storage established at Ross Dam in 1953.

and is shown on Appendix plate B-10. The cumulative frequency curves for the annual regulated peak discharges near Sedro Woolley and Concrete are shown on Appendix plates B-8 and B-9.

FUTURE STUDY ACTION

After comments PRO and CON with regard to the alternative courses of action described in the first draft of the brochure have been received, they will be incorporated into a second draft brochure, to be discussed at a public meeting which will be scheduled later this fall. PRO and CON recommendations and comments with regard to these alternatives received at the meeting will be incorporated in a revised draft of the brochure and made available to the public. Comments received at succeeding workshops and public meetings will also be included in subsequent brochures.

At a final public meeting, tentatively scheduled for 1973, the results of detailed studies will be presented, before the Seattle District Engineer's report is forwarded. The final brochure and the environmental impact statement will accompany his report. The recommendations contained in the report will be reviewed by the Corps of Engineers' Division Engineer in Portland, Oregon, and the Board of Engineers for Rivers and Harbors and the Chief of Engineers in Washington, D.C. Comments will be requested from other Federal agencies and from the State of Washington. The report will then be submitted to Congress.

Comments on this brochure may be made at workshops or public meetings, by letter to the District Engineer (address on front page), or by informal comment to Peter Hengesteg, Study Manager.

STUDIES BY OTHERS

Washington Department of Ecology. Under Federal Law, Skagit County, like all other parts of the country, is required to submit a water pollution control and abatement plan, in order to qualify for grants for water and sewer improvements. The Department of Ecology is monitoring this study as it is carried out by county and municipal agencies.

U.S. Forest Service. This agency has the lead in studying the Skagit River to determine if it meets the requirements for inclusion in the National Scenic River System. Further, the study will identify the land and resource uses which would be adversely affected if the river were included in the National System and determine if the river or a portion thereof should actually be included in it.

FEDERAL PARTICIPATION

All alternatives requiring action are potentially eligible for Federal financial assistance. However, Federal participation under authority granted the Corps of Engineers would be contingent upon the following criteria:

- a. The alternative must provide sufficient benefits, including economic, social, and environmental considerations, to offset the costs.

FLOOD HISTORY

The Skagit River valley has a history of flooding dating back before 1900. Flood flows have been recorded intermittently since October 1908. Zero damage flow is considered to be 60,000 c.f.s. at Concrete. Since 1908 this flow has been exceeded 34 times. The flood of February 1951 had a peak discharge of 139,000 c.f.s. at Concrete, 150,000 c.f.s. at Sedro Woolley, and 144,000 c.f.s. at Mount Vernon. The flood remained near its peak for six hours at Mount Vernon, a fact which contributed significantly to the severity of the flood damages. During this flood many dikes failed, because they lacked sufficient cross-sectional dimensions to withstand saturation. Tabulated below are flows above 60,000 c.f.s. at the Concrete gage.

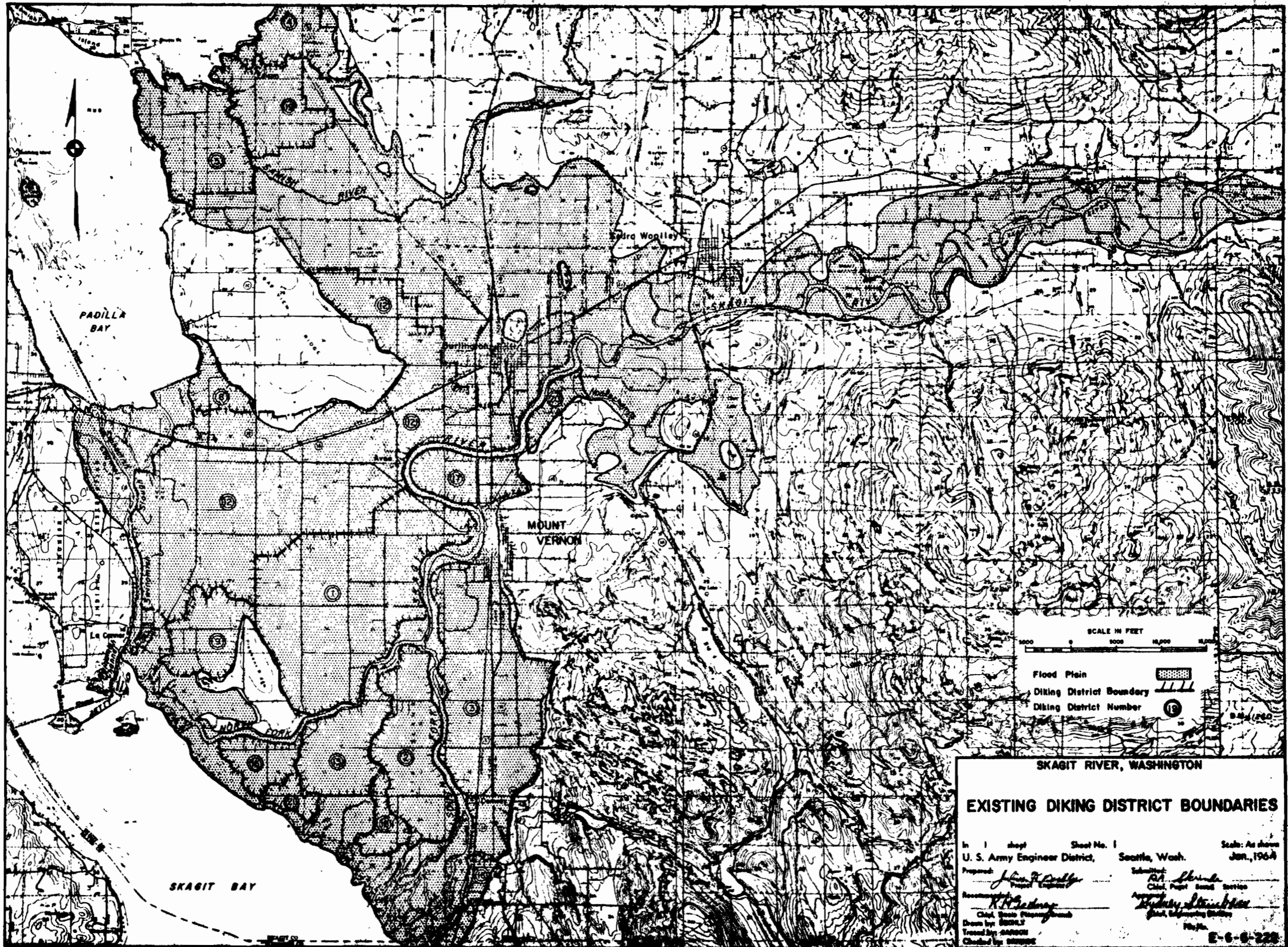
30 Nov. 1909	260,000	3 Dec. 1943	65,200
30 Dec. 1917	220,000	8 Feb. 1945	70,800
13 Dec. 1921	240,000	25 Oct. 1945	102,000
12 Dec. 1924	92,500	25 Oct. 1946	82,200
16 Oct. 1926	88,900	19 Oct. 1947	95,200
12 Jan. 1928	95,500	27-28 Nov. 1949	154,000
9 Oct. 1928	74,300	10-11 Feb. 1951	139,000
26 June 1931	60,600	1 Feb. 1953	66,000
27 Feb. 1932	147,000	3-4 Nov. 1955	106,000
13 Nov. 1932	116,000	20 Oct. 1956	61,000
22 Dec. 1933	101,000	30 April 1959	90,700
25 Jan. 1935	131,000	23-24 Nov. 1959	89,300
3 June 1936	60,000	16 Jan. 1961	79,000
19 June 1937	68,300	20 Nov. 1962	114,000
28 Oct. 1937	89,600	22 Oct. 1963	73,800
29 May 1939	79,600	21 June 1966	72,300
2 Dec. 1941	76,300	28 Oct. 1967	84,200

Ross Dam, on the main stem of the Skagit, has 120,000 acre-feet of storage for flood control. This storage was made available in 1949.

AUTHORIZED CORPS OF ENGINEERS FLOOD CONTROL PROJECTS

a. Levee and channel improvements. The project, authorized by the 1966 Flood Control Act, provides for improving the river channel and raising and strengthening about 34 miles of levees downstream of Burlington.

b. Avon Bypass. This project was authorized by the Flood Control Acts of 1936 and 1966. The project includes a diversion channel eight miles long from near Burlington to Padilla Bay, a four-mile levee, drainage structures, and widening of the Skagit River for two miles. The project is in a deferred status.



SCALE IN FEET
 0 5000 10000 15000

Flood Plain [stippled symbol]
 Diking District Boundary [dashed line symbol]
 Diking District Number [circled number symbol]

SKAGIT RIVER, WASHINGTON
EXISTING DIKING DISTRICT BOUNDARIES

In 1 sheet Sheet No. 1 Scale: As shown
 U. S. Army Engineer District, Seattle, Wash. Jan., 1964

Prepared by *John R. Dwyer* Submitted by *R.A. Shambaugh*
 Chief, Plans Section Chief, Plans Section

Reviewed by *R.H. Sedberry* Approved by *Walter A. Strickland*
 Chief, Plans Section Chief, Plans Section

Drawn by *REBLS*
 Traced by *BARON*
 Checked by *BARON*

E-6-6-228