

9 July 1965

MEMO FOR: Record

SUBJECT: Reconnaissance of Proposed Flood Control Damsites in Skagit River Watershed

1. A preliminary reconnaissance survey of eight possible flood control damsites was made by Allen Cary, Foundations and Materials Branch and William McKinley, Planning Branch on 24, 25, 28, 29, and 30 June 1965. The following is information derived from this reconnaissance:

2. Cascade River Site.

Location: Approximately river mile 7.4, 5.5 road miles upstream from Marblemount Bridge. The axis is at the Baker National Forest Boundary.

Access: Access to site is available on right bank only by permanent improved road from Marblemount. There is a logging road indicated on the left bank from Marblemount to within about two miles downstream of the site.

Site Description: The site is at the downstream end of a wide valley where the canyon becomes relatively narrow between steep rocky walls. The canyon walls exhibit massive rock out crops for several hundred feet above the river level. The river bed elevation is approximately 800'. A U.S. Engineers Bench mark on the road near by indicated an elevation of 1260'.

Height Limit: There is no apparent limit to the height of dam that could be constructed at this site except, perhaps, the structural height limit for the type of dam considered. If the reservoir were at approximately elevation 1060' or below, the up-valley road would not be affected and relocation would not be required. If the reservoir level were elevation 1200', only two miles of road would be affected.

Type of Dam: The type of dam most practical for this site is dependent on the height necessary. Either a rock fill or concrete gravity structure would be most practical from the materials standpoint.

Facilities Location: The spillway structure would be best located on the left bank. Due to the steepness of the canyon side walls, it would probably be necessary to provide a spillway tunnel rather than benching on the side hill, although detailed topography may indicate otherwise.

Relocations: The only apparent relocations required would be the Marble Creek Camp ground and a portion of the road depending on reservoir elevation.

Materials Location: Rock for rock fill or concrete aggregate is available in any quantity in the valley upstream by quarrying. There is no obvious source of core material close to the site. River deposits near the mouth of the Cascade River should be investigated for suitability both for core material and for concrete aggregate.


Clearing: The reservoir is forested, to a large extent, with old growth fir and cedar. Portions of the area have been logged in the past and are now supporting stands of second growth fir and some deciduous growth and dense underbrush.

Power Location: The nearest available power lines are at Marblemount.

3. **Sulattle River Site (lower)**

Location: Approximately river mile 5.5 and approximately 1.5 miles downstream from Big Creek.

Access: Access to this site is available by gravel surfaced road from the right bank only. Access to the left bank would require only about 1-1/2 miles of road construction.

Description: This site would require a dam approximately 1/2 mile long. The left abutment would be at the end of the ridge that runs north from Prairie Mountain. The river lies immediately next to the ridge. The right abutment would be the ridge running northwest from Big Creek. Rock out crops are evident at both ends of the axis. **The floor of the valley is composed of glacial and river deposits of unknown depth.** 

Height Limit: There is no apparent limit to the height of dam which could be constructed at this site but detailed geology mapping may indicate some limitation.

Type of Dam: Due to the length of the axis and the possible cut-off problems, an **earth fill dam is the only practical type for consideration** at this site at this date.

Facilities Location: The spillway could be located on either bank on rock however, the left bank would be best at this site due to river location.

Relocations: There would be about 10^{1/2} miles of Forest Service roads to relocate.

1/20/63

Materials Location: Random fill appears available in the reservoir area. There is no suitable core material evident in the immediate area. Rock for rock fill should be available from quarry within a 3-mile haul.

Clearing: The entire reservoir area is covered with old and second growth fir and cedar.

Power Location: The nearest power is available at the Skagit River or Darrington approximately 12-13 miles away either direction.

4. **Suiattle River Site (upper)**

Location: This site is about 1-1/4 miles downstream from the confluence of Buck Creek, at river mile 15. within the Mt. Baker National Forest.

Access: Access to this site is available from both banks by gravel surfaced roads.

Site Description: In appearance this site is about the same as the lower river site. The axis is about 1/2 mile long. The valley floor is relatively flat, rising gently to the steep hills on either side.

Height Limit: The height of dam at this site would depend on the requirements as there is no apparent limit.

Type of Dam: An earth fill or earth and rock fill dam is the only practical choice here.

Facilities Location: Depending on rock, the spillway could be located on either abutment.

Relocations: Relocation of about 12-15 miles of Forest Service road and two camp grounds would be required.

Materials Location: Material for an earth fill dam is available within the reservoir area with the possible exception of the impervious core.

Clearing: Practically the entire reservoir area is covered with old and second growth fir and cedar.

Power Location: Power would have to be brought in about 20-23 miles from either Darrington or the Skagit.

5. **Sauk River Site (upper)**

Two possible sites were investigated on the Upper Sauk, one just

on the Upper Sauk, one just below its confluence with the White Chuck River and the other 3.2 miles downstream. **The site must necessarily be below the White Chuck River to have any value for flood control.** The site at the confluence was not considered further because of the questionable foundation material (river deposits from the White Chuck River) on the right bank.

Location: 3.2 miles downstream of the White Chuck River.

Access: Access to this site is by gravel road to the right bank only. There was formerly a railroad on the left bank but this was removed and the grade has fallen into disrepair.

Site Description: This site is a relatively flat valley floor between steeply rising bluffs on either bank. The river swings toward the left bank in a wide meandering curve at this point. **The valley floor is composed of river deposits.** The banks both show rock out crops. An axis length of about 3000 feet would be required.

Height Limit: There is no apparent height limit for a dam at this site but detailed geologic mapping will be necessary to determine this.

Type of Dam: **An earth fill dam is the only practical type for this site.**

Facilities Location: The spillway could be located in rock on the left bank.

Relocations: About 6-7 miles of gravel surfaced road would have to be relocated.

Materials Location: Materials for construction could probably be obtained from the reservoir area with the exception of the impervious core although suitable silty glacial morainal material maybe available.

Clearing: Practically the entire reservoir is forested with old and second growth fir and cedar with some deciduous trees.

5. **Sauk River Site (lower)**

Location: River mile 5.5, approximately 5 miles from Rockport, Washington.

Access: Access is available to right bank by blacktop road and to left bank by gravel road.

Site Description: The site is located in the lower Sauk valley between rock abutments. The river hugs the left side of the valley. The valley floor is flat on the right side from the river to the steeply sloping hillside which grades into rock. The length of dam at this site would be 3-4000 feet.

Height Limit: The height of dam is governed by the elevation of Darrington upstream (about elevation 540'). The river elevation at the damsite is about 240'.

Type of Dam: The only practical type of dam for this site is an earth or earth and rock fill structure.

Facilities Location: The spillway would be located on the left abutment where rock is available.

Relocations: Relocations would be a problem at this location due to the many miles of state and county roads in the valley between the site and Darrington. There would be considerable private land to be acquired for reservoir and some relocation of Seattle City Light transmission lines.

Materials Location: Random fill and rock are apparently available in quantity close to the site. An investigation for core material should be made in the vicinity.

Clearing: The Lower Sauk valley was extensively logged and most of the area is in small second growth and deciduous trees.

Power Location: The closest source of power is from the vicinity of Rockport, Washington, about six miles distance.

6. Copper Creek Site (Skagit River)

Location: On Skagit at river mile 86.5, approximately 8.5 miles upstream from Marblemount and about 8 miles downstream from Newhalem.

Access: Access to this site is from the right bank only on State Highway 17A. Access to the left bank would require several miles of road construction from either Marblemount or Newhalem or construction of a bridge near the site. There is at present an abandoned log haul bridge that was built many years ago and is of questionable risk for foot traffic at present.

Site Description: This site is within a rather narrow valley section. The river has been forced to the right side of the canyon by a large presumed morainal deposit. The river gradient is quite steep through this area resulting in turbulent, fast water. The riverbed and banks contain many boulders to 10' and 15' diameter.

Height Limit: The river elevation at the site is approximately 380 feet. The obvious limit to the reservoir level is the tailrace at the Gorge plant at Newhalem, elevation 500 feet.

Type of Dam: Due to the unknown depth of river deposit and the character of the left bank abutment, an earth or rock fill dam would be best suited to this site. City of Seattle has drilled some holes on this site and their material will be obtained before further studies are made.

Facilities Location: The spillway would be best located on the right bank to take advantage of the existing rock foundation.

Relocations: Approximately 7 miles of State Highway 17A would require relocation in addition to 6 miles of city of Seattle steel tower transmission line.

Materials Location: Rock is available in the vicinity by quarrying. Random fill is available within 2-3 miles upstream of the site. There are deposits of fine silt near the site which may be suitable for core material. Concrete aggregate is readily available either from the river deposits or natural rock.

Clearing: Much of the valley above the site is covered by deciduous trees, brush and small second growth fir.

Power Location: There are no power lines within about four miles of the site except for the city of Seattle transmission lines. Construction of a pole line would be required from Newhalem for construction power.

7. **Thunder Creek Site.**

Location: Approximately 5.5 miles upstream from Colonial Creek Camp ground and about 1000 feet downstream from McAllister Creek.

Access: There is no access at this time except by good Forest Service trail on the right bank. About 6.5 miles of road and a bridge would be required for construction.

Site Description: The proposed site is the most upstream of six sites named in earlier investigations. This site is at the upstream end of a 4.5 mile stretch of a steep walled canyon. Upstream of the site, the creek has a considerably flatter gradient for about 4 to 5 miles which would allow for a greater volume of storage than any of the other sites. The rock walls of the site rise vertically, and about 50 feet wide, for 80 feet above the water level then widen somewhat to form relatively narrow benches on each bank. The canyon walls appear to be solid rock with talus slopes and debris on the benches. A careful investigation should be made for evidence of parallel channels cut in these benches.

Height Limit: There is no particular height limitation for a dam at this site although the canyon begins to widen considerably beyond a 200-foot height.

Type of Dam: Considering the material available, the best choice of dam for this site would be either a rock fill or a concrete gravity dam.

Facilities Location: The spillway could be located on either bank depending on the required dam height.

Relocations: The only relocations required would be about three miles of trail.

Materials Location: Rock is available by quarrying in the vicinity either for rock fill or for aggregate. Detailed investigation for core material would have to be made.

Clearing: Most of the reservoir area is forested in old growth fir, hemlock and cedar which should have some value to offset clearing costs.

Power Location: The site is located about 9 miles from Diablo Dam. It is probable that construction power would be obtained from portable generators rather than construct a power line.

8. **Faber Site. (Skagit River)**

Location: On Skagit River at mile 62, about 6 miles upstream from the confluence of the Baker River and about 5 miles downstream from the town of Rockport, Washington.

Access: Access is available on either bank of the river by state and county roads.

Site Description: The probable axis is about 2000 feet downstream from the site of the old Taber Ferry. The Skagit River curves in a wide bend from northwest to southwest and the axis is at the most northerly point of the bend. The valley is relatively narrow at this point, the proposed axis being about 2800 feet long. The river hugs the north or right bank which is the steeper, with rock out crops rising well above proposed pool level. The left abutment is more gently sloping and would be founded on glacial and old river deposits. The valley floor is composed of river deposits and probably glacial deposits of unknown depth.

Height Limit: The obvious limit to the height of dam at this site is the elevation of the town of Marblemount which is about 300'. The river elevation at this site is about 190' which would allow a head of about 110'.

Type of Dam: The only practical method of construction at this site is an earth fill structure considering the length and foundation conditions.

Facilities Location: The spillway would be located on the rock out crops on the right bank.

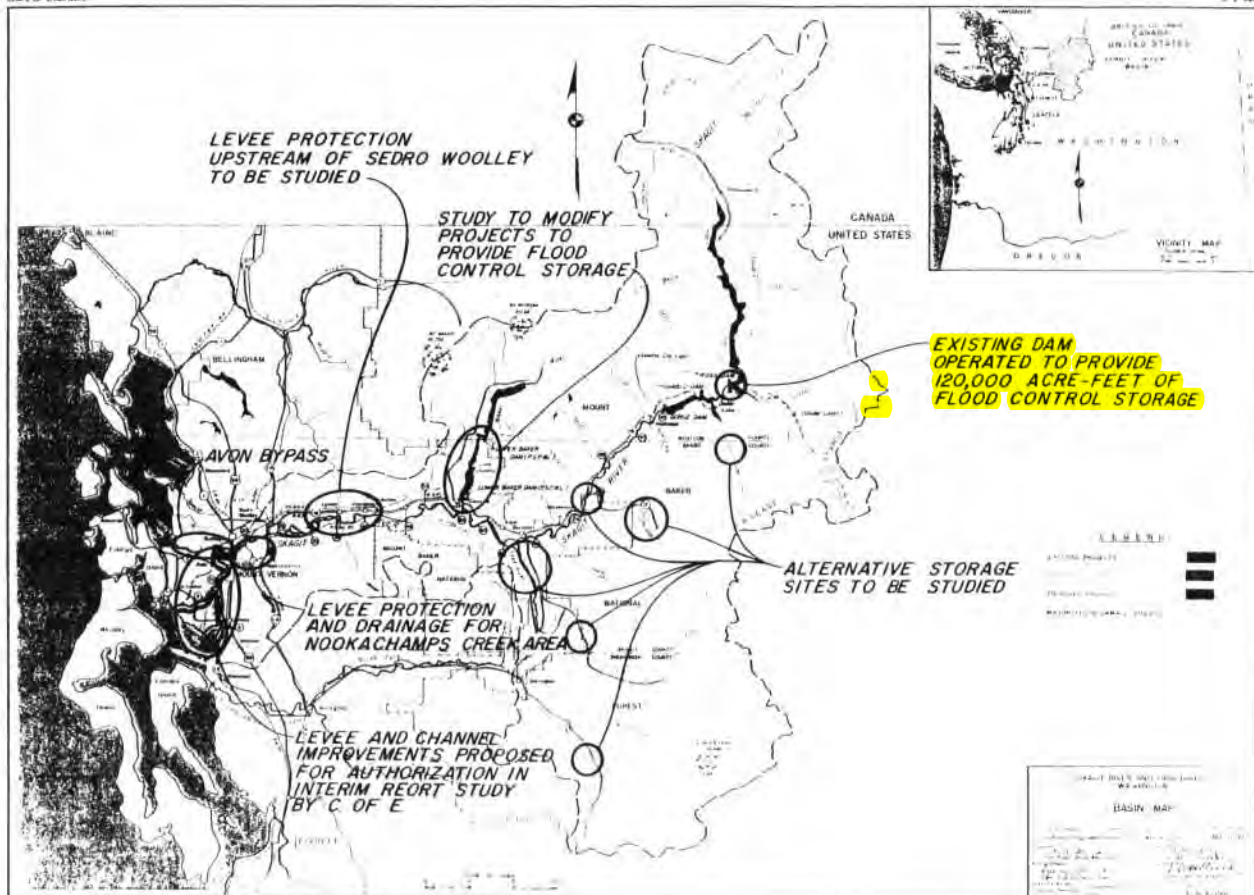
Relocations: Several miles of State Highway 17A, the town of Rockport, and an unknown amount of county road would have to be relocated in addition to two miles of city of Seattle transmission line. There would be other miscellaneous relocations involved such as camp and rest areas, etc.

Materials Location: Random fill is available in the reservoir area within a short distance of the dam. Core material is presumed to be present in the glacial tills near the south abutment. Investigation would have to be made as to amount and suitability. Rock could probably be obtained from quarry in the vicinity.

Clearing: The floor of the valley in the proposed reservoir area is sparsely forested with deciduous trees and some second growth fir and patches of dense brush.

Power Location: Power is assumed to be available along State Highway 17A as there are power lines to serve Rockport and Marblemount.

W.R. MC KINLEY
Project Planning Branch



2 JUL 1965

NPSEN-BP-P

Mr. Lloyd Johnson
County Engineer
Skagit County
Mount Vernon, Washington

Dear Mr. Johnson:

Please refer to your letter of 18 June 1965 in which you requested our views on possible effects of the Wild River Study for Skagit River on Corps of Engineers studies in the Skagit River Basin.

Studies by the Corps of Engineers for review of requirements for flood control and allied improvements on Skagit River Basin were authorized by resolutions of the House and Senate Committees on Public Works in 1960 and initiated in 1961. Subsequently, a comprehensive study of the Puget Sound and Adjacent Water region was authorized by the Flood Control Act of 1962. This comprehensive study was intended to take full consideration of all types of water and related land resource development needs. Participation in the latter study includes some 30 other Federal and State of Washington agencies having major responsibilities in these fields. Under this latter study authorization, we have joined with these other Federal and State agencies in comprehensive planning for the Skagit River Basin, including consideration of flood control, hydropower, irrigation, fish and wildlife enhancement, augmentation of low flows for municipal and industrial water supply, pollution abatement, recreation, primitive areas, wild river studies, and other needs in the basin. The comprehensive study was funded for a start in 1964 and is scheduled for completion in 1969.

Our studies to date have shown that a high level of flood control for the 68,000 acre Skagit River delta flood plain downstream from Sedro Woolley is essential if the area is to grow and to develop at a rate consistent with established State and national objectives for sound future economic development. In 1962, the value of lands and improvements in the delta area were estimated at \$113,000,000.

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Mr. Lloyd Johnson

There are three essential elements to be added to the present river system to achieve a high level of flood protection in the delta area. These are levee and channel improvements from Mount Vernon to the mouth; construction of the authorized Avon Bypass project to divert a portion of floodwaters from the Skagit River near Burlington to Padilla Bay; and provision of upstream storage.

To date, we have completed report studies on levee and channel improvements from Mount Vernon to the mouth. These improvements would increase flood protection in the delta from a present, once in a 3-year minimum flood frequency protection to 8-year minimum protection. The report is now being reviewed by the Chief of Engineers for transmittal to Congress, and will be available for public distribution in the near future.

Funds are included in the President's budget to begin planning studies of the Avon Bypass Project in Fiscal Year 1966. This project alone would increase protection of the delta from the present minimum 3-year flood protection to 14-year flood protection. The Avon Bypass with the proposed levee and channel improvements would provide 35-year flood protection for the delta.

Finally, we plan to evaluate feasibility of upstream multi-purpose storage in 1966, 1967 and 1968. This storage would be planned to control flow of the main river and tributaries so that 100-year or higher flood protection could be realized for the Skagit River delta in conjunction with other flood control improvements in the delta area.

The inclosed map shows sites that we plan to study separately, or in combination, with respect to upstream storage. Ross Dam is the only existing dam in the basin that provides flood storage. Because Ross Dam controls only about 30 percent of the Skagit River watershed, very little flood storage, in addition to the 120,000 acre feet of flood storage now provided, would be effective in controlling floods in the Skagit River delta. Studies would be made of incorporating flood storage in the existing Puget Sound Power and Light Co. projects on Baker River, as noted on the map. Flood storage on Baker River could be effective in reducing flooding in the delta.

Also shown are areas at Nookachamp Creek and upstream of Sedro Woolley for which levee improvement studies are planned. The map shows the Avon Bypass and proposed levee and channel improvements in the delta, referred to above.

Our experience to date has demonstrated that the Skagit River is in an extremely complex river basin with important resource potentials for future water supply, low flow augmentation, irrigation, recreation, hydropower, fishery enhancement and other water related benefits. The basin has a very important fishery resource. However, unless plans are made now to preserve

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Mr. Lloyd Johnson

the high quality of stream runoff in the lower portion of the basin as well as the fish habitat upstream, this resource could well be lost or diminished in the future. We believe there are outstanding possibilities for establishment of Wild River areas in the basin. However, if these areas are selected indiscriminately without consideration of their effect on the basin resources, many of the resources may be lost and the cost of alternatives for these resource developments may become prohibitively high.

Inasmuch as substantial effort is now committed to Skagit River Basin studies by all the participating Federal and State agencies in the comprehensive study, it appears that any long range planning should await completion of these studies. A decision to commit a portion of the river basin to a Wild River category appears premature at this time.

We appreciate the opportunity of discussing our basin planning with you at this time. If we can be of further service, please do not hesitate to call on us.

Sincerely yours,

1 Incl (6 copies)
Marked Drawg E-6-6-196

cc: Skrinde
Hilda
Proj File

C. C. HOLBROOK
Colonel, Corps of Engineers
District Engineer

SKRINDE ^{RAJ}
GEDNEY
STEINBOCK
C.C. HOLBROOK
ED-BP-P



ENGINEER'S OFFICE
SKAGIT COUNTY
STATE OF WASHINGTON
MOUNT VERNON

June 18, 1965

Charles C. Holbrook, Colonel
U. S. Army Engineer
Seattle District
Corps of Engineers
1519 Alaskan Way South
Seattle 4, Washington

Dear Sir:

The people of Skagit County are vitally interested in the Wild River Study on the Skagit River. These people realize that a portion of the river may be declared a wild river, but we are hoping that such a move will not prevent future flood control maintenance works.

We would like to know the status of the Puget Sound Conference Studies on the Skagit River basin. Please notify us of the schedule of findings to date, together with the progress of your work.

It is our hope that the Wild River Hearing on the Skagit River will be delayed until the Puget Sound Conference Studies are completed. If you will bring us up to date on the studies we will make every attempt on the national level to postpone any hearings establishing wild rivers. **One hundred year flood protection is vitally necessary for continued progress in Skagit County.**

An early reply from you regarding the studies will be appreciated.

Very truly yours,

Lloyd H. Johnson
LLOYD H. JOHNSON
County Road Engineer

LHJ/vy

P 000741

What discussion took place re Fisher or Sack & Syd

File Skagit R. Basin
29 June 1965
Per. Stralberg

NPSN-BP-B

30 June

MEMO FOR: Record

SUBJECT: Meeting with Seattle City Light Officials on Skagit River Basin Studies.

1. On 25 June, a meeting was held with representatives of Seattle City Light. Attending were:

Seattle District

Seattle City Light

R. A. Skrinde
J. F. Bechly

R. Hojdal
Mr. Strandberg

2. The purpose of this meeting was to inform Seattle Light representatives of our proposed upstream storage studies in the Skagit River basin, determine sites at which City Light has made studies, and obtain data on power studies made by the city.

3. Mr. Skrinde briefly discussed Puget Sound and Adjacent Waters Comprehensive Study, State and Federal agencies participating in the study and the probable completion date for the study. He discussed status of Corps studies completed in the Skagit River basin and studies we plan to accomplish in the next 2 years on investigations of upstream storage.

4. A general discussion followed on the individual potential storage sites in the basin, which is summarized below.

a. Copper Creek Site on Main Stem. - Mr. Strandberg stated that City Light will be completing a report within the next few weeks for the purpose of obtaining a FPC study permit for the Copper Creek dam site. The dam at the Copper Creek site would be a low-head dam with limitations on full pool imposed by the Newhalem townsite upstream. He indicated that there would be very little potential for flood control development at this site because of the low-head dam. Mr. Strandberg also indicated that in the event future studies would justify the raising of Ross Dam to provide additional power for peaking load capacity, Copper Creek site would probably be considered for a reregulation type project. Mr. Strandberg said that Raymond Hill, a consulting engineering firm, is now making studies of the Copper Creek site on a contract from the city of Seattle. The urgency for the permit stems from the Wild River Study.

NPSEN-BP-B

SUBJECT: Meeting with Seattle City Light Officials on Skagit River Basin Studies

b. **Cascade Site.** - Mr. Strandberg indicated that City Light is considering potential combination of the Copper Creek and Cascade River damsites with the single powerhouse at the Copper Creek site and a 3-mile tunnel from the Cascade site. **Preliminary studies have shown marginal feasibility for this project.**

c. **Thunder Creek.** - This site was discussed in some detail because of its high potential for power development. Mr. Strandberg was enthusiastic over potential recreation developments for a reservoir at the Thunder Creek site. There are three possible alternatives for developing the Thunder Creek site for power: (1) a 3-mile-long diversion tunnel from the Thunder Creek site into Ruby Creek and thence to Ross Dam; (2) tunnel to the Diablo powerhouse near the mouth of Thunder Creek to develop 800 feet of head for power to be generated at Diablo powerhouse; (3) an 8-mile-long tunnel from the McAllister Creek arm of the proposed Thunder Creek Reservoir to a powerhouse along Skagit River in the vicinity of Newhalem, to develop 1500 feet of head. Mr. Strandberg indicated that there were some 500 or 600 c.f.s. flow available for power development at the Thunder Creek site. Gross storage for a maximum pool elevation of 2,068 feet would amount to about 100,000 acre-feet of water. Present City Light plans call for an earthfill dam in addition to a small concrete saddle dam at this site. He would like to see a concrete gravity dam investigated at this site.

d. **Ross Dam.** - Mr. Strandberg indicated that raising Ross Dam would develop an additional 60,000 kilowatts of power; however, **raising of Ross Dam does not appear economically justified at this time.**

5. Mr. Hoydal said that he would furnish any available information we may want on power studies made by Seattle City Light, alternate plans of development that have been studied, maps the city may have or any other information that may be useful for our studies.

6. Mr. Strandberg was concerned that the Wild River Study would preclude future dam construction, primarily for the Thunder Creek Project. Mr. Skrinde informed him of Skagit County's interest in deferring a hearing on the Wild River Study for Skagit County until after completion of the PS&AW Comprehensive Studies.

J. F. BECHLY

W. E. CRANE & ASSOCIATES, INC.

- ENGINEERS
- SURVEYORS

Phone EL 3-1119
9800 Highway 99
Everett, Washington

April 7, 1965

Design United States Corps of Engineers
District Engineer, Skagit River Branch
Flood Control Section
1519 Alaskan Way South
Seattle, Washington

Reports Gentlemen,
Could we obtain through your office flood information regarding the stretch of Skagit River through Sections 12 and 13, T35N, R7E, W.M., and Section 7, T35N, R8E, W.M.

Maps We are specifically concerned with the maximum recorded high water and the projected high water elevations on Cape Horn in Section 12. Enclosed is a map showing the area concerned.

Subdivisions Any information, including areal photos of Flood condition, will greatly be appreciated.
Respectfully requested,
W. E. CRANE & ASSOCIATES, INC.

Lot Surveys *Arnold R. Kegel*
Arnold R. Kegel, P. E.
ARK/en

