Pierce County

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Brian J. Ziegler, P.E.
Director
Brian.Ziegler@co.pierce.wa.us

March 27, 2014

George Heidgerken
Falls Development Corporation
3303 South 35 Street
Tacoma, WA 98409

Re: Chambers Creek Dam

Hello George:

I appreciated speaking with you a few weeks ago. Following our conversation, I received some additional information from my staff, some of which runs counter to our initial discussion. Because I stand by my commitment to keep you informed, I wanted to pass that information on to you.

As we discussed, our records indicate that Pierce County has no ownership of the Chambers Creek Dam. This is supported by our tax assessor records (parcel #0220294800 http://epip.co.pierce.wa.us/cfapps/atr/epip/taxvalue.cfm?parcel=0220294800). However, upon closer reading, the 1931 joint maintenance agreement is also a joint ownership agreement. Without shared ownership, there is no shared maintenance arrangement.

Pierce County did coordinate an engineering assessment in 2009. The results of that study, as well as the 1931 joint maintenance/ownership agreement between Glacier Gravel Company and Everett Pulp and Paper Company, are also attached.

For additional information about the tax records, please contact Jim Hall at the Pierce County Assessor-Treasurer's Office at (253)798-3673 or jhall@co.pierce.wa.us<mailto:jhall@co.pierce.wa.us>.

I hope you find this information helpful. Please let me know if you have any questions or would like to discuss this further.

Thanks and best regards,

Brian J. Ziegler, P.E.
Director

BJZ:CE:ljc

Attachments: 2009 Chambers Creek Dam Berger Abam Dive Report
Chambers Creek Dam Development Contract - Agreement Only

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ABAM

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13 August 2009

Ms. Anne-marie Marshall-Dody
Senior Planner
Pierce County
9850 – 64th Street West
University Place, WA 98467

Subject: Chambers Creek Dam Condition Assessment

Dear Ms. Marshall-Dody:

At your request, BergerABAM engineer-divers performed an inspection of the Chambers Creek Dam on 31 July 2009. The dive team was led by Michael Wray, PE, SE, and included Matt Perry and Nick Colson. The inspection included Level I, II and III inspections of the steel sheet piles, as well as Level I and II inspections of the concrete cap. The fish ladders north and south of the dam were not within the scope of this project and were not inspected.

The following sections explain the inspection procedure, our findings, and provide recommendations for necessary repairs.

INSPECTION PRECEDURE

Inspection Level Definitions

The following are definitions of standard levels of effort required on all inspections and were followed in this inspection. These definitions are based in industry standards developed by the American Society of Civil Engineers and published in Underwater Investigations – Standard Practice Manual No. 101, published in 2001.

Level I – General Examination

This level of effort is essentially a "swim-by" overview underwater, or a general overview above water, which does not involve cleaning of any structural elements and can, therefore, be conducted much more rapidly than the other levels of examination. The Level I examination typically detects obvious major damage or deterioration due to overstress, severe corrosion, or extensive biological growth and attack.

Level II – Detailed Examination

This level of effort is directed toward detecting and identifying damaged/deteriorated areas that may be hidden by biofouling organisms, silt, plant growth, or surface deterioration. Level II examinations will often require cleaning of structural elements. Because cleaning is time consuming, it is generally restricted to areas that are critical or that may be representative of the entire structure itself. The amount and thoroughness of cleaning to be performed is governed by what is necessary to discern the general condition of the overall facility. Simple instruments,

such as calipers, measuring scales, hammers, scrapers, screwdrivers, and ice picks, are commonly used to take physical measurements.

Level III – Highly Detailed Examination

This level of effort will often require the use of nondestructive testing (NDT) techniques, but may also require the use of partially destructive techniques, such as sample coring through concrete and wood structures, physical material sampling, or in-situ surface hardness testing. The purpose of this type of evaluation is to detect hidden or interior damage, loss in cross-sectional area, and material homogeneity. The use of NDT techniques is generally limited to key structural areas, areas that may be suspect, or to structural members that may be representative of the underwater structure. In this case, a Cygnus I ultrasonic thickness gauge was used to determine remaining cross section of the steel sheet piles.

Inspection Process

The dive team used the low tides upon arriving at the site to complete a Level I and II examination of the concrete pile cap. For the Level II cleanings, biological growth was scraped every 10 feet in 3-square-foot patches at the bottom and top of the cap. Level I, II, and III inspections of the lower wall were also performed at low tide for convenience and safety. Level I, II, and III examinations of the upper wall were completed during the tidal exchange with a snorkel. At high tide, a diver wearing a helmet on surface-supplied air entered the water downstream of the dam and completed a Level I examination of the lower portion of the wall. The diver also took photos of typical Level II cleanings and damaged areas on the lower wall and concrete pile cap.

INSPECTION FINDINGS

The Level I examination of the concrete cap uncovered two horizontal cracks, but the cap was generally sound (see Photo 7 and Figure 1). The west crack appears to be approximately 70 feet in length and extends from the southern edge of the cap. The damage near the south fish ladder is the most extensive and includes some moderate spalling. The east crack is 18 feet in length and suffers from minor spalling of the concrete. It is possible these cracks formed at construction joints in the cap.

Level II cleaning of the pile cap did not show any unusual damage or wear of the concrete surface. Biological growth was uniform over the entire surface.

Level III examinations were performed on the upper and lower steel sheet piles to estimate the extent of cross sectional loss due to corrosion. Sheet piles in the lower wall, which we believe to be a Bethlehem Steel AP 3 or possibly a U.S. Steel MP 115 section (both of which have an original thickness of 0.375 inch), showed an average thickness loss of 34 percent with a maximum loss of 52 percent at 50 feet and 95 feet from the north fish ladder. Sheet piles in the upper wall, likely Bethlehem Steel SP 4 or U.S. Steel MP 112 sections (both of which again had an original thickness of 0.375 inch), had an average thickness loss of 38 percent with a maximum loss of 48 percent at 75 feet from the north fish ladder. It appears that a second sheet pile was driven in front (downstream) of the original sheet pile, which is visibly undercut from approximately 55 feet

from the north fish ladder to the south end. A thickness reading was taken of the inner wall at 55 feet from the north fish ladder revealed a remaining cross section of 0.340 inch, resulting in a section loss of only 10 percent

Numerous holes were discovered in the lower sheet pile wall. The majority of these holes were determined to be intentional weep holes (for drainage through the wall), though some are due to corrosion through the wall (see Photo 5). Some of the weep holes also acted as conduits for corrosion and are now much bigger holes than originally intended (see Photo 6). Both types of hole have lead to the loss of some material from behind the lower sheet pile wall, which was discovered both visually and by sounding.

Stones and other bottom debris were found attached by corrosive adhesion to the lower sheet pile wall up to approximately 2 feet above the current grade. This indicates scouring of the bottom, likely from times of high water flow. This does not appear to be posing any immediate threat to the dam, but should be monitored in the future.

RECOMMENDATIONS

Portions of the lower sheet pile wall with little or no remaining section should be repaired now. Repair methods may include sheet pile replacement for a long-term repair or welding steel plates over portions of the sheet pile sections as a short-term repair.

If not repaired, continued loss of material from behind the wall and continued corrosion can be expected. As some point a portion of the current sheet pile wall may fail, resulting in a noticeable failure of the dam cap structure.

CLOSING

We thank you for this opportunity to be of service and look forward to working with you again in the future. Should you need further assistance, such as development of repair plans and details, we would be pleased to help you wherever possible.

If you have any questions about this report or any other project related concerns, please call me at 206/431-2286.

Sincerely,

Michael G. Wray, PE, SE, LEED, AP
Senior Project Manager/Diver

MGW:llt
Attachments
Photos
Figures

Underwater Inspection Report
Chambers Creek Dam
Pierce County, University Place, Washington

Photos

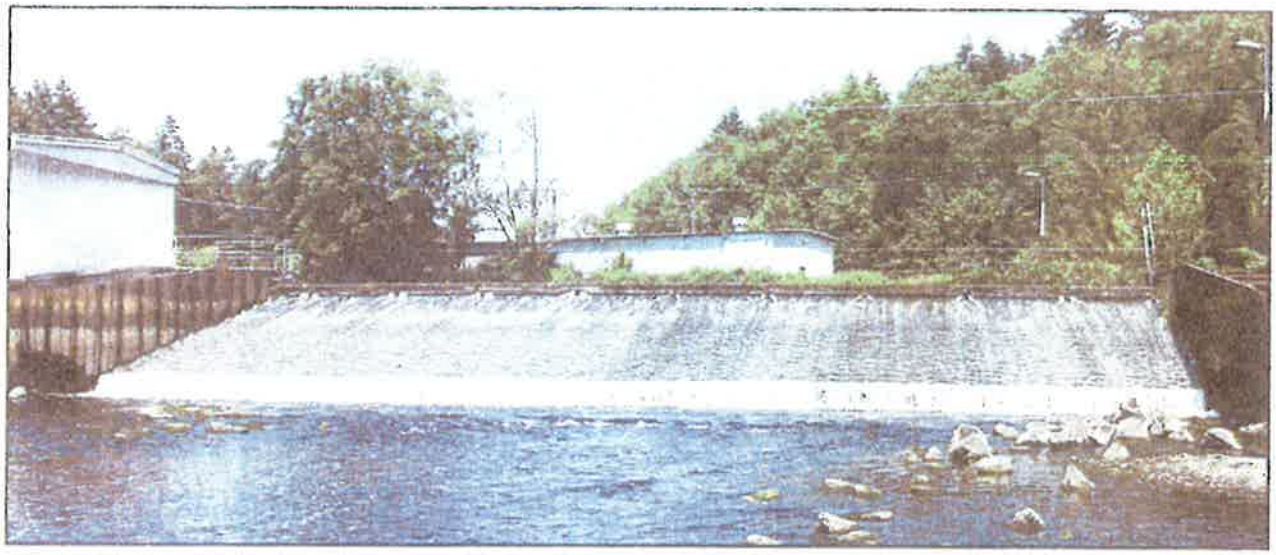

Photo 1 – Overview of dam from downstream.
The steel sheet piling on the left is referred to as the north fish ladder.

Photo 2 – Timber grate looking south

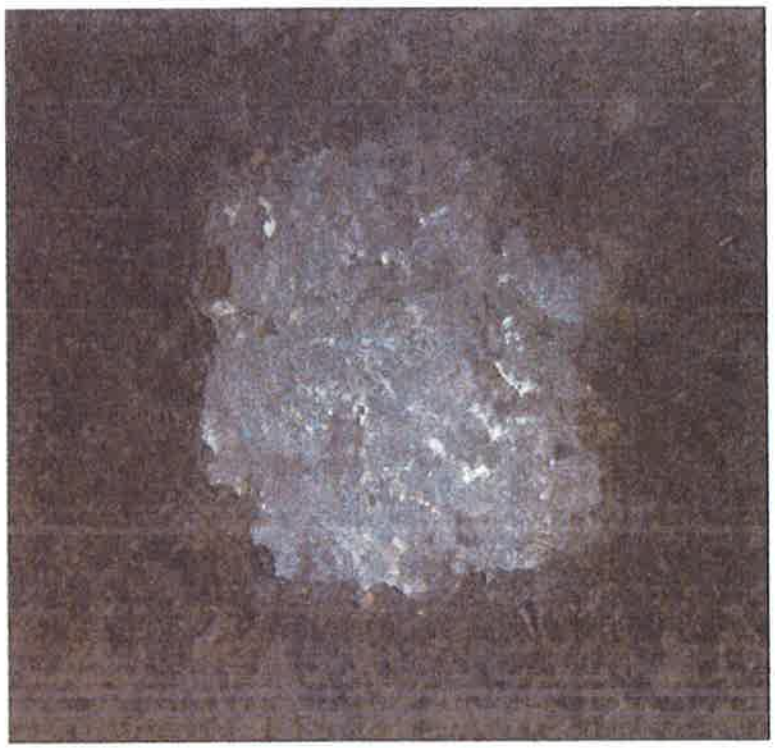

Photo 3 – Typical cleaning for a Level III examination of a steel sheet pile

Photo 4 – Typical cleaning for a Level II examination of the concrete pile cap

Photo 5 –Corrosion through the lower sheet pile wall

Photo 6 – Hole in lower sheet pile wall (weep hole corroded to approximately 4 inches wide by 3 inches high)

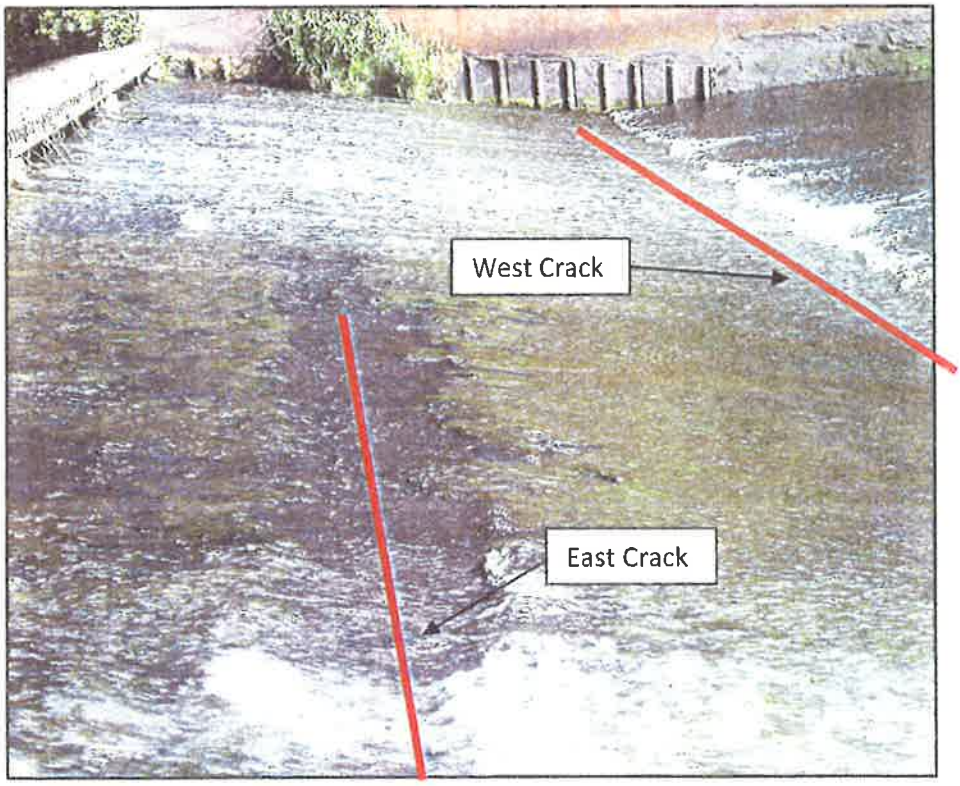

Photo 7 – Concrete pile cap looking south, showing two large cracks. Note the west crack continues beyond the photo

Photo 8 – Close-up picture of the east crack at its largest point

Photo 9 – Close-up picture west crack at its largest point

Figures

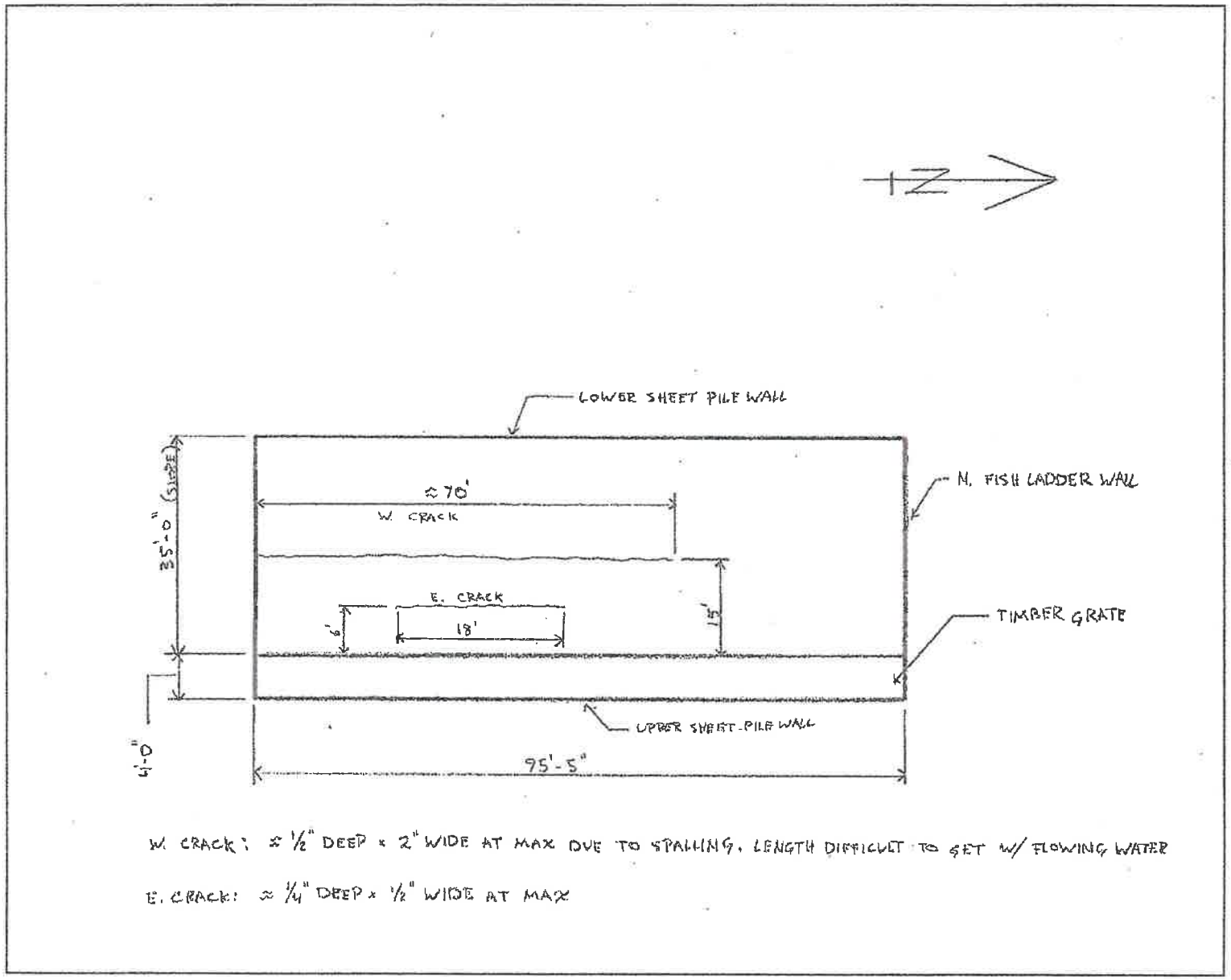

Figure 1 – Plan view of the dam showing the size and location of the pile cap cracks

DISTANCE FROM NORTH FISH LADDER	WALL HEIGHT	DISTANCE FROM TOP TO MEASUREMENT	THICKNESS	NOTES
2'-8"	32"	10"	0.27"	-
13'	31"	8"	0.25"	-
24'	37"	8"	0.19"	-
24'	-	24"	N/A	HOLE
25'	37"	20"	N/A	HOLE IN WALL. SOUNDS HOLLOW ABOVE WHEN STRUCK W/ HAMMER
35'	43"	12"	0.255"	-
44'	43"	8"	0.29"	-
45'	42"	4"	0.26"	-
50'	-	10"	.180"	GAP FROM CONCRETE TO SHEET PILE; SOUNDS HOLLOW AT SHEET PILE
54'	42"	9"	0.285"	-
55'	48"	15"	N/A	INTENTIONAL WEEP HOLE (2.5"x3")
65'	48"	8"	0.315"	WEEP HOLE @ 16" DOWN
75'	47"	22"	N/A	STONE EMBEDED IN RUST; FIST SIZE COBBLE, POTENTIALLY OLD GRADE ELEVATION
75'	-	8"	0.31"	-
85'	47"	11"	0.235"	-
94'	44"	12"	0.215"	-
95	-	10"	.180"	SOUNDS HOLLOW
95'	44"	12"	N/A	2 HOLES
95'	-	3"	N/A	HOLE
95'	-	23"	N/A	HOLE

Figure 2 – Notes from the Lower sheet pile wall

DIST. FROM N. FISH LADDER	WALL HEIGHT	THICKNESS	NOTES
2'	25"	.230"	-
15'	21"	.210"	-
25'	25"	.220"	-
35'	22"	.220"	-
45'	24"	.215"	-
55'	30"	.215"	OUTER WALL HEIGHT 24"; UNDERCUT BY 6" 5" BETWEEN INNER & OUTER WALL BOTH SHEET PILES.
55'	-	.340"	INNER WALL
65'	33"	.230"	OUTER WALL HEIGHT 24" 4" BETWEEN INNER & OUTER WALL.
75'	31"	.195"	OUTER WALL HEIGHT 24" 5" BETWEEN INNER & OUTER WALL.
85'	28"	.245"	OUTER WALL HEIGHT 24" 4.5" BETWEEN INNER & OUTER WALL.
95'	25.5"	.220"	OUTER WALL HEIGHT 24" 4" BETWEEN INNER & OUTER WALL.

Figure 3 – Notes from the Upper sheet pile wall

EXHIBIT 2

C O N T R A C T.

THIS CONTRACT made this 3rd day of October, 1931, between GLACIER GRAVEL COMPANY, a corporation, hereinafter called the "Gravel Company" and EVERETT PULP AND PAPER CO., a corporation, hereinafter called the "Pulp Company"

W I T N E S S E T H:

WHEREAS, the Gravel Company has obtained a permit for the diversion and appropriation of the waters of Chambers Creek in Pierce County, Washington, to the extent of 20 c.f.s., being Permit No. 1689 heretofore granted by the Supervisor of Hydraulics of the State of Washington, and

WHEREAS, the Pulp Company has recently purchased the plant and property heretofore belonging to the Cascade Paper Company situate near the mouth of Chambers Creek, and

WHEREAS, both parties are in need of a continuing supply of fresh water in the conduct of their respective operations and it is deemed expedient and economical to arrange for a joint diversion of the waters of Chambers Creek together with such storage as may be necessary to assure such supply,

NOW THEREFORE, in consideration of the sum of one dollar ($1.00) by each party paid to the other and of the mutual agreements herein contained, it is agreed by and between the parties as follows:

1. THE GRAVEL COMPANY WILL AT ITS OWN COST AND EXPENSE:

(a) Acquire a certain four acre tract and furnish so much of the same as may be necessary for the dam and appurtenant structures hereinafter referred to, said four acre tract being situated in Pierce County, Washington and more particularly described as follows, to-wit:

EVERETT PULP AND PAPER COMPANY
By A.H.B. Jordan, Vice-President.
W.J. Tim, Secretary.

GLACIER GRAVEL COMPANY
By J.T. Hefferman, Pres.
Willis U. Hefferman, Sec.

Beginning at a point 27[illegible] feet West and 750 feet North of the Southeast corner of the North one-half of Thomas Chambers Donation Land Claim No. 43, Section 28, Township 20, North, Range 2 East W.M., running North 400 feet; thence West 435.60 feet; thence South 400 feet; thence East 435.60 feet to the place of beginning, containing four acres more or less.

(b) Grant to the Pulp Company in writin such easements as may be necessary for the placing and maintenance of said dam and the necessary pipe lines and/or pumping station (with filter plant if desired) on and across such four acre tract for the purpose of withdrawing the Pulp Company's share of the water, and for the flooding of so much of said tract as will be occasioned by the dam and for the flooding of such of the Gravel Company's other lands or interest in lands now owned or hereafter acquired as may be required for the storage reservoir;

(c) Furnish such material from the Gravel Company's lands on the north bank of Chambers Creek as may be required for the construction of the dam;

(d) Take all such steps as may be necessary to secure from the Supervisor of Hydraulics of the State of Washington such permit as may be necessary for the storage of water occasioned by the construction of the dam; also to secure such formal permission for change of diversion point in connection with Permit No. 1389 as is necessary to conform to the plan of placing the dam on the four acre tract above referred to;

(e) Permit the Pulp Company to take from the storage thus created whatever water may be needed for the operation of its plant at the mouth of Chambers Creek up to a maximum daily diversion of four million (4,000,000) gallons and will also effectively assign to the Pulp Company the equivalent of four million gallons per day out of the Gravel Company's existing appropriation permit No. 1659, together with proportionate storage

EVERETT PULP AND PAPER COMPANY
By A.H.B. Jordan, Vice-President.
W.J. Fitz, Secretary.

GLACIER GRAVEL COMPANY
By J. T. Hefferman, Pres.
Nellie G. Hefferman, Secy

rights under the storage permit if such further assignment be deemed expedient;

(f) Bear the cost of constructing and maintaining the Gravel Company's own diversion works and pipe lines leading from the impounding basin to its plant;

(g) Bear one-half the cost (including taxes) of maintenance of the dam, impounding basin and appurtenances in connection therewith (excluding those appurtenances necessary for the diversion of water by the respective parties from the storage basin);

(h) Permit the Pulp Company to take its water from the impounding basin at such point as will give the Pulp Company the impounded water which is freest from silt and other debris or impurities.

EVERETT PULP AND PAPER COMPANY
By A.H.B. Jordan, Vice-President.
W.J. Frey, Secretary.

2. THE PULP COMPANY WILL AT ITS OWN COST AND EXPENSE:

(a) Install and build upon the four acre tract in a location to be agreed upon by both parties, a dam which shall be of such design and construction as to effect the necessary storage and to meet with all requirements of the laws of the State of Washington and/or regulations of its duly constituted authorities, together with necessary appurtenances (other than those necessary for the diversion from the storage basin of the Gravel Company's share of the water);

(b) Acquire from Hewitt Land Company (or other parties other than Glacier Gravel Company) such lands, interest in lands, rights or rights of way (exclusive of water appropriation or storage rights) as may be necessary for creation of the storage basin;

(c) Construct and maintain its pipe line leading from the impounding basin to its plant together with all means of diverting its share of the waters from the impounding basin to said pipe line and plant;

GLACIER GRAVEL COMPANY.
By J. T. Heffernan, Pres.
Nellie G. Heffernan, Secy.

(d) Bear one-half the cost (including taxes) of maintenance of the dam, impounding basin and appurtenances in connnection therewith (excluding those appurtenances necessary for the diversion of water by the respective parties from the storage basin).

3. The term of this contract and of the easements herein provided for shall be perpetual.

4. The rights of either party arising out of this contract may be assigned by said party. This agreement shall be binding upon the successors and assigns of the parties hereto.

5. In securing from Hewitt Land Company the necessary lands, rights of way etc., the Pulp Company may arrange to permit said Hewitt Land Company to take from the storage basin, subject to prior rights of diversion by the Gravel Company and the Pulp Company pursuant to the existing permit and/or any assignment or partial assignment thereof, such quantity of water as the Hewitt Land Company, its successors or assigns may have the legal right to divert from the waters of Chambers Creek, not exceeding six million gallons per day. = 9.5 c.f.s. 9.283

6. This contract shall be subject to the Pulp Company's being able to obtain from Hewitt Land Company within ten (10) days hereof the necessary lands, rights and/or rights of way and in case the Pulp Company is not able to obtain such land, rights and/or rights of way within said time, this contract shall be void and of no effect.

7. In case at any time there should be less than 20 c.f.s. of water available for appropriation under Permit No. 1689 including any assignment or partial assignment thereof,

EVERETT PULP AND PAPER COMPANY
By [signature]
A.H.B. Jordan, Vice-President.
[signature] Secretary.

GLACIER GRAVEL COMPANY.
By [signature]
J. T. Heffernan, Pres.
[signature]
Nellie G. Heffernan, Secy.

it is agreed between the parties that the available water will be shared between them, the Pulp Company to take such proportion of the available water as four million gallons per day bears to 20 c.f.s.

IN WITNESS WHEREOF the parties hereto have caused these presents to be executed in duplicate by their officers thereunto duly authorized the day and year first above written.

GLACIER GRAVEL COMPANY

BY _____

Its Pres.

ATTEST: _____

Its Sec.

EVERETT PULP AND PAPER CO.

BY _____

Its Vice President

ATTEST: _____

Its Secretary