EXHIBIT NO. ___(PKW-6)
DOCKET NO. UE-09___/UG-09___
2009 PSE GENERAL RATE CASE
WITNESS: PAUL K. WETHERBEE

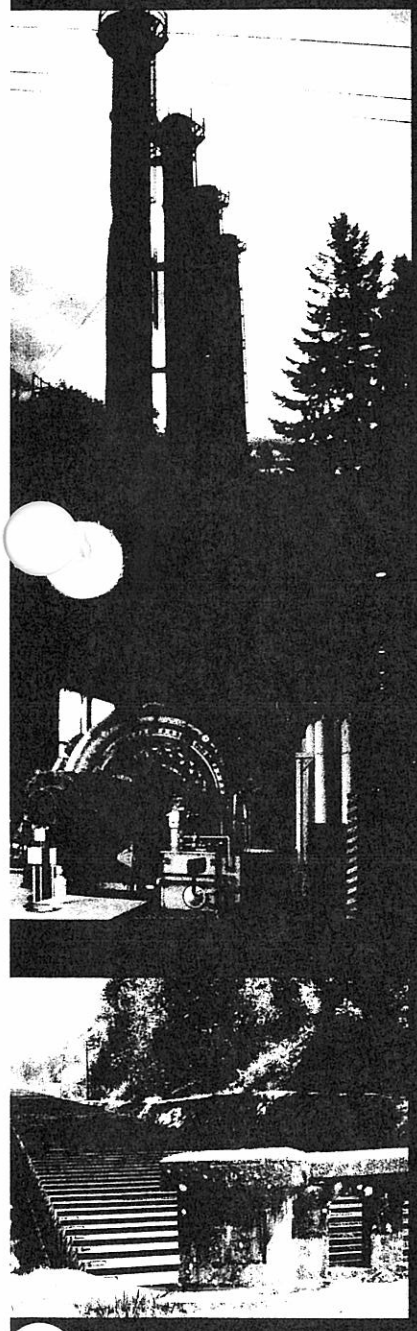
BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-09____** **Docket No. UG-09____**

FIFTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF PAUL K. WETHERBEE ON BEHALF OF PUGET SOUND ENERGY, INC.

MAY 8, 2009

Puget Sound Energy



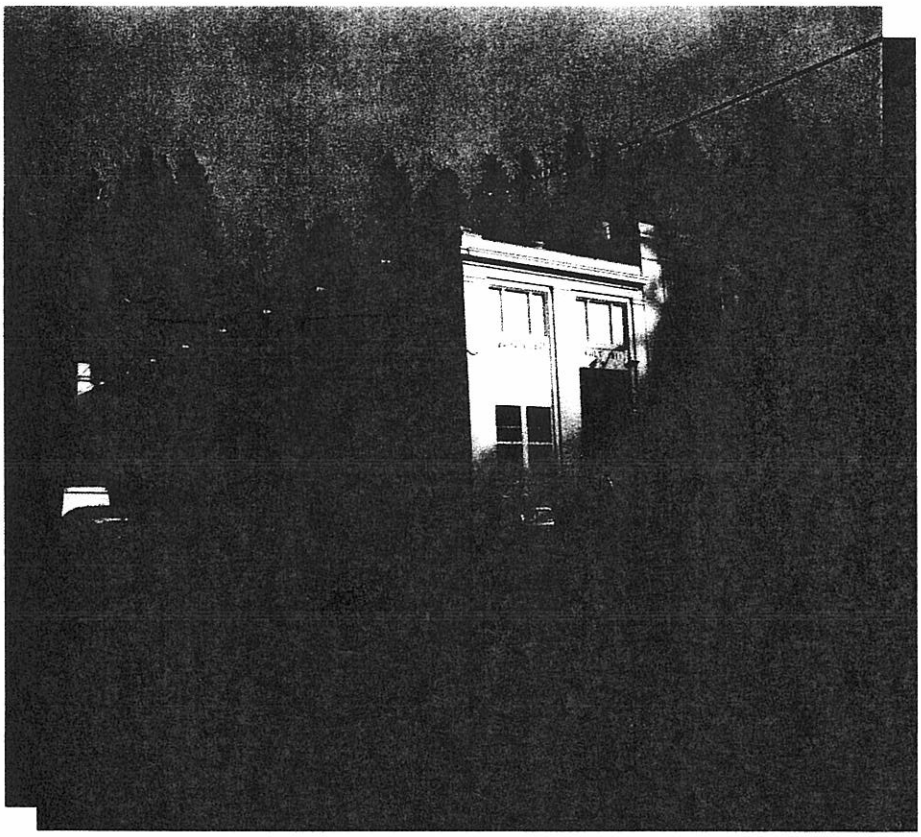
PUGET SOUND ENERGY

White River Project

Retirement Cost Estimate

Pierce County, Washington

August, 2006



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White River Hydroelectric Project Retirement Cost Estimate

PUGET SOUND ENERGY

August 4, 2006

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White River Hydroelectric Project Retirement Cost Estimate

1. Project Background

Puget Sound Energy (PSE) and the Cascade Water Alliance are currently under negotiations to transfer ownership of certain project features and associated land for use as a water supply project. PSE has requested a "reconnaissance level" cost estimate of actions that would be necessary to restore the identified lands to a condition suitable for redevelopment. This analysis considers costs associated with retirement of the following project features:

- Intake gates at diversion dam
- Concrete flume
- Wooden flume
- Unlined canal
- Sedimentation basins
- Dikes
- Fish screen facility
- 30 inch HDPE fish bypass pipeline
- Lined approach canal
- Intake to pipelines
- Valve house at pipelines
- Twin 10,000 foot long,10-ft diameter pipes
- Downstream valve house
- Printz Basin
- Tunnel intake
- 12-foot diameter tunnel
- Forebay and penstock gatehouse
- Penstocks
- Powerhouse
- Tailrace

This technical memorandum provides a "reconnaissance level" cost estimate of actions that would be necessary to restore the identified lands to a condition compatible with land use and development assumptions that are contained in an appraisal of the underlying property that is being prepared by Greg Goodman of Allen Brackett Shedd.

2. Project Features to be Retired

Retirement options considered for the project facilities described in the following sections fall into three broad categories depending on the anticipated land use.

Timberland

Retirement is generally based upon demolishing and disposing of facilities or demolishing facilities to below grade and filling the remaining voids with locally disturbed (or previously excavated) material. Following removal the disturbed area would be locally re-graded and reseeded/revegetated.

Residential

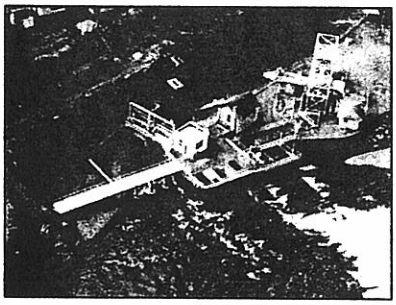
Retirement is generally based upon demolishing and completely removing facilities or for very deep structures, demolishing to below grade and filling the remaining voids with clean material. Following removal the disturbed area would be locally re-graded and reseeded/revegetated.

Flume

Retirement is generally based upon safely securing the facilities either through partial demolition and removal or abandoning in place with minor modifications.

2.1 Intake Gates at Diversion Dam

The intake gate and appurtenant structures at the diversion dam include two 14-foot by 17-foot steel lift gates, hoist machinery, a 14-foot by 14-foot reinforced concrete gate house, an 80-foot, 2-span, steel and timber bridge, an 18-foot by 20-foot light frame shop, and approximately 140 feet of 13-foot tall reinforced concrete retaining wall structure (Dwg F-5334, F-SW 365, F-SW 361, F-SW 358). The shop, adjacent fish facilities and diversion dam were not considered in the retirement evaluation. The land use category for this area is "Timberland."



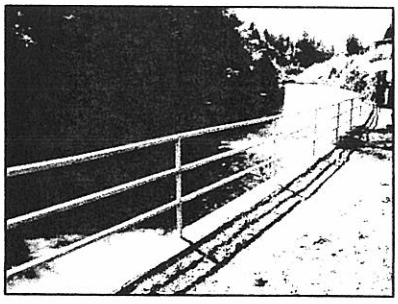
Intake Structures at Diversion Dam

Retirement

Restoring the intake gate area to a "timberland" condition will require the removal of the existing bridge across the forebay, the gate house, the gates, and the operating machinery. A cofferdam will likely be required to deconstruct the area. The forebay walls could either be demolished into the forebay itself and buried or left in place and filled along with the forebay. In either case, a new riverbank would be constructed where the inlet previously existed. The diversion dam and associated infrastructure are assumed to be left in place.

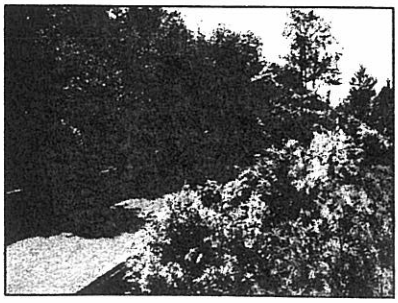
2.2 Concrete Flume

Immediately downstream of the intake structures the flow enters an approximately 1,700-foot long reinforced concrete flume. The flume begins at 33 feet, 6 inches wide and transitions after approximately 35 feet, to 28 feet wide (Dwg D7787). The walls are nominally 9 feet tall, however, in some locations increase to a maximum of 14 feet tall. The bottom slab is 30 feet, 10 inches wide and all walls and slab are 11 inches thick. The tops of walls of the flume are roughly at or below surrounding grade until it transitions to a wooden structure.



Reinforced Concrete Flume

Beyond the wooden flume there is a second section of concrete flume approximately 822 feet long. This section of concrete flume is also present where the channel profile dips below existing grade. A reinforced concrete arch bridge is present at Station F42+00. Note, the status of this structure with respect to the project retirement was not investigated with the Washington



Reinforced Concrete Flume and Arch Bridge

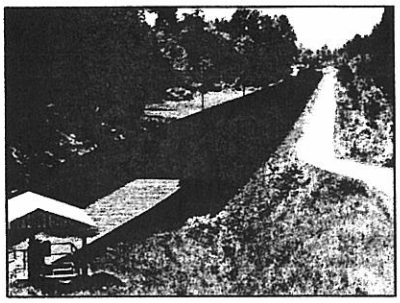
State Department of Archaeology and Historic Preservation (State Historic Preservation Office). The land use category for this area is "Timberland."

Retirement

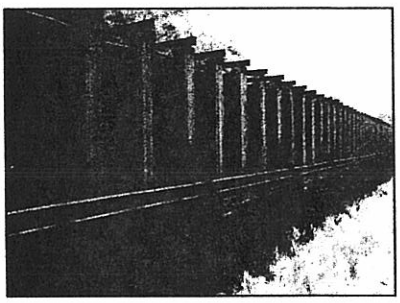
Restoring the concrete flume to timberland condition will require demolishing the flume walls and collapsing them onto the slab invert. The remaining depression would then be filled to roughly existing grade and reseeded. It is assumed that the fill can be performed with locally available disturbed soil and adjacent embankment material. The arch bridge is assumed to be removed.

2.3 Wooden Flume

The flume changes from concrete to wood as it daylights to roughly existing grade at Station 18+00. The wooden flume is approximately 3,300 feet long and consists of sections on grade, on trestles, and on partial or variable height, cross slope trestles (Dwg W.R.-305, H-SW 109, H-SW). The inside dimensions are a nominal 28 feet wide by 10 feet tall. The basic design for the at-grade or fill sections consists of 12-inch wide by 10-inch tall (lightly) reinforced concrete footings 7 feet, 6 inches long supporting pairs of transverse frames. There are six footings across the width of the flume with adjacent footings supporting alternating pairs of frames. The transverse frames consist of a 6-inch by 8-inch sill beam, 6-inch by 12-inch vertical posts and a structural steel (WF beam, plans unavailable) cap as a tension element (replacing an 8-inch by 8-inch timber cap in the original design). Original flooring consisted of 3-inch by 12-inch tongue and groove timbers. For sections in cut the foundation design differs slightly and two layers of flooring are used, 2-1/2-inch by 12-inch tongue and groove timbers below 2-inch by 12-inch flush edged timbers.



Wooden Flume



Wooden Flume

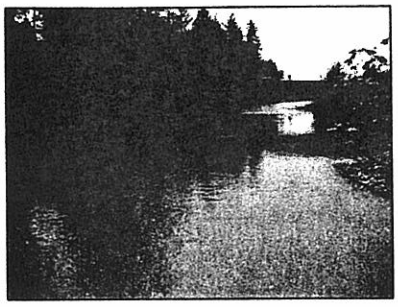
The original design appears to have been modified repeatedly over time although no current design drawings were available. The species of wood was not given on the original design plans nor is the use of a preservative although one is likely present. For the purposes of this evaluation it is assumed that the timbers are treated with a creosote-coal tar solution or a water-borne preservative containing zinc, chromium, copper, arsenic, or a combination thereof. The land use category for this area is "Timberland."

Retirement

Restoring the wooden flume area to timberland will require the complete removal, and assumed disposal of, all the existing timbers. Some re-grading and reseeding would be required after removal.

2.4 Unlined Canal

Downstream of the wooden flume the flow continues through approximately 6,800 feet of unlined canal including 4 sedimentation basins. The design cross section for the unlined canal is 74 feet wide and 13 feet deep with a semicircular bottom. The land use category for this area is "Timberland."



Unlined Canal

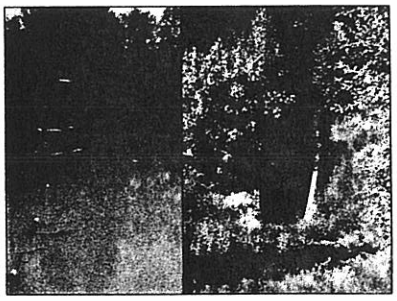
Retirement

Once drained, the unlined canal will require very little restoration to return to timberland. Miscellaneous small demolition, local re-grading and reseeding will be required.

2.5 Sedimentation Basins

The four sedimentation basins are, from upstream to downstream, Wolsoegal, Wickersham, McHugh, and Dingle (Dwg F-5265, D-10704, F-SW-359, F-5264). Together they have a combined sediment storage volume of approximately 2,194,000 cubic yards. Within Wolsoegal Basin there is a 72-inch diameter discharge intake, pipe, and valve. The pipe flows to a reinforced concrete discharge flume which tapers from 6 feet at the pipe exit to 13 feet, 8 inches with 7-foot high walls, over a length of 35 feet. The 13-foot wide section of discharge flume runs 54 feet with 5-foot walls the first 36 feet and 4-foot walls the remaining 18 feet. Two dikes, approximately 2,500 feet long and 1,400 feet long parallel the north sides of Wolsoegal and Wickersham Basins and portions of the unlined canal. The land use category for this area is "Timberland."

Sedimentation Basin (typ).



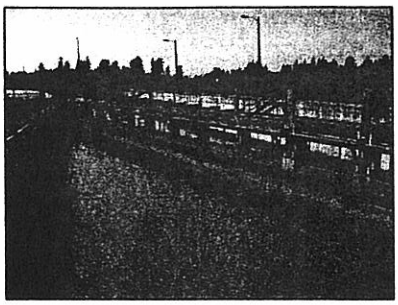
Discharge Intake and Flume

Retirement

Restoration of the sedimentation basins to timberland will require very little effort beyond removal of the discharge intakes, discharge pipe, and flume. Once drained, the basins will require local re-grading and reseeding.

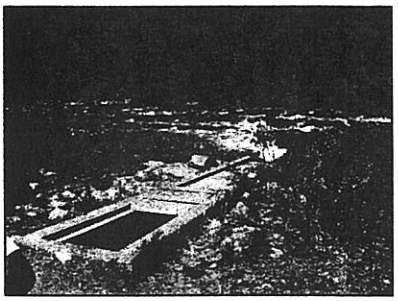
2.6 Fish Screens and Bypass

An approximately 3-acre fish screening facility is located at the tail end of Dingle Basin. The facility consists of a reinforced concrete transition structure, trash racks and trashrake with debris transporter, 26 bays of primary screens, primary screen brush cleaners, a sediment flushing system, secondary screens, backwash pumps, an overhead gantry crane, and an operation and maintenance building with garage and parking area (Dwg F-5264, 2494-7A, 2494-7B).



Fish Screen Facility

The facility has a 30-inch diameter HDPE fish bypass pipe that returns fish approximately 3,800 feet to the White River. The pipe depth varies from approximately 10 feet beneath Old Sumner-Buckley Highway to a minimum of 3 feet of cover. The discharge end of the bypass is an 8-foot tall by 70-foot long, buried, reinforced concrete "U" channel lined with HDPE. The land use category for this area is "Timberland."



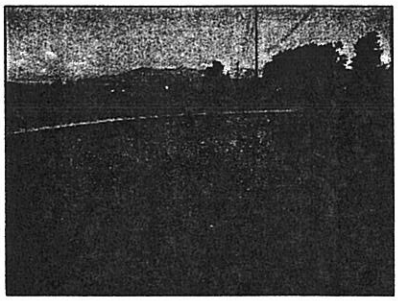
Fish Bypass Discharge at White River

Retirement

Restoration of the fish screening facility area to timberland will require the complete removal of the project features described above and the restoration and reseeding of the lands afterwards.

2.7 Lined Approach Canal

Downstream of the Fish Screen facilities the flow enters a section of concrete lined canal approximately 1,100 feet long (Dwg 2494-10(R)). The section is trapezoidal with a 10-foot bottom width and 1.5h:1v side slopes resulting in approximately a 74-foot wide canal. The section is primarily in cut with a service road paralleling both sides of the canal and 2h:1v sides beyond the road. The land use category for this area is "Flume."

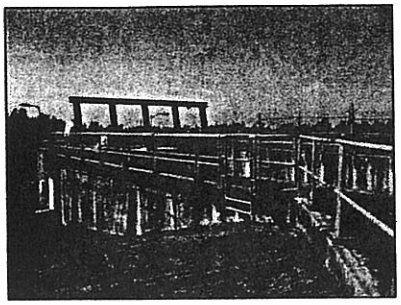


Lined Approach Canal

Retirement

Retiring the lined approach canal to a land use compatible with a flume will require very little modification. The ends of the canal and any low points should be modified to ensure drainage to keep the canal dry and the alignment should be fenced off. Egress ladders are also recommended at intervals along the canal.

2.8 Intake to Pipelines & Valve House



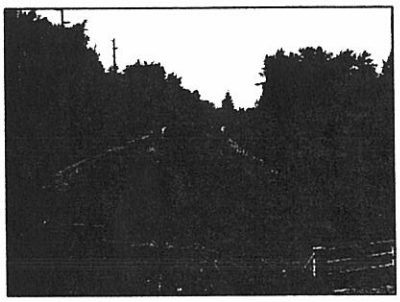
Intake to Pipelines

The lined approach canal terminates at the intake to the twin 10-foot diameter pipelines. The intake structure is a reinforced concrete structure approximately 90 feet long including approach walls, 45 feet wide, and approximately 35 feet tall (Dwg 2494-10(R)). The structure has a center pier 5 feet thick and nominal wall thicknesses of 2 feet. At the upstream end of the intake are structural steel trashracks approximately 30 feet tall by 33 feet wide. The structure also houses a small control room and storage room. The land use category for this area borders on "Flume" and "Residential."

Retirement

Restoration of the intake to pipelines and valve house to a land use compatible with residences will require the complete removal of the project features described above, filling the excavation left by the removal and reseeding.

2.9 Twin 10-foot Diameter Pipes



10-ft Diameter Pipes

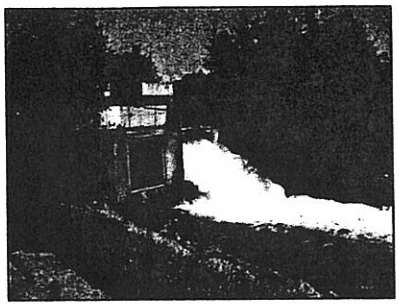
Twin 10-foot diameter buried steel pipes carry the flow from the intake structure approximately 10,000 feet to the downstream valve house (Dwg D-9537, D9539). The pipe crowns vary from approximately 8 feet below existing ground to 3 feet above grade with a mounded earth cover. Various ancillary structures attached to the pipes exist above and below grade including reinforced concrete manholes, anchor blocks, and thrust blocks. Although primarily linear, the pipes do make numerous slope changes and have a "Y" structure and an inverted siphon. A gravel service road parallels the pipes. The land use category for this area is "Residential,"

Retirement

Restoration of the 10-foot diameter pipeline right-of-way to a land use compatible with residences will require the complete removal of the project features described above, filling the excavation left by the removal, and reseeding.

2.10 Downstream Valve House

The 10-foot diameter pipes terminate at a reinforced concrete valve house. The entire facility occupies approximately one acre including an intake transition from the pipelines, concrete valve house, and stilling basin with baffle blocks (Dwg D-9544). The building itself is constructed of reinforced and precast concrete, 35 feet wide by approximately 45 feet long. The stilling basin is 60 feet long by 35 feet wide with a 2-foot thick bottom slab and 6-inch thick concrete side slopes at 2.5h:1v. Ten, 6-foot long by 2-3/4-foot tall by 2-foot thick baffle blocks are staggered in three rows in the stilling basin. The land use category for this area is "Flume" bordering on "Residential."



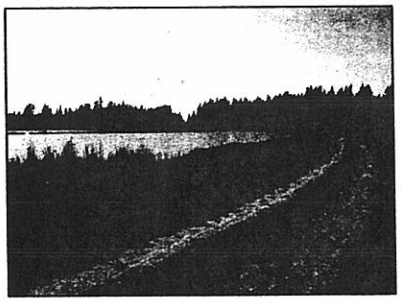
Downstream Valve House

Retirement

Restoration of the downstream valve house to a land use compatible with residences will require the complete removal of the project features described above, filling the excavation left by the removal, and reseeding. If the downstream end of the pipeline is to remain designated as a flume, the valve house could be secured and abandoned in place.

2.11 Printz Basin

Printz Basin is an approximately ½-mile long by ¼-mile wide basin east of Lake Tapps (Dwg F-3331,D-8802, D-8803, . The basin is bordered on the north by Dike 14, approximately 1,400 feet long and on the south by Dike 15 of approximately the same length. The land use category for this area is "Residential."



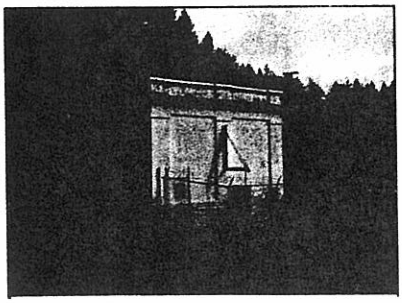
Dike 14 at Printz Basin

Retirement

Restoration of the downstream valve house to a land use compatible with residences will require very little modification. Once drained, the basin should require only local re-grading and reseeding

2.12 Tunnel Intake

The tunnel intake is located on the northwest shore of Lake Tapps. Access is by dirt road off of West Lake Tapps Road. The intake is a reinforced concrete structure consisting of a gate shaft, gate house, Stoney intake gate with bypass, and upstream trashrack structure (Dwg F-SW306 and Dwg F-SW312). The gate shaft is 20 feet by 20 feet in plan and approximately 55



Intake Gatehouse

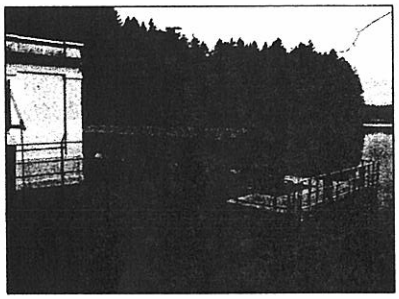
feet high from the ground level to the tunnel invert (Elev. 489.7 feet). A reinforced concrete gate house, 20 feet square in plan and 20 feet high, sits on top of the gate shaft and contains the gate operator for a 12.5 feet high by 12 feet wide Stoney intake gate (Dwg F-SW373). There is also a 24-inch square Stoney bypass gate in the face of the main gate for filling the tunnel. The intake gate and bypass are electric motor operated. Three vertical air shafts, downstream of the gate, provide venting of the tunnel during closing of the intake gate.

The trashrack structure is semi-circular in plan, 20 feet long and 50 feet wide and about 52 feet high. The vertical rack bars are divided into six bays, each with a motor operated cleaning device. Debris is deposited on the tunnel intake deck and removed manually. There is a floating access dock upstream of the trashracks.

The land use category for this area is "Residential."

Retirement

The tunnel intake structures to be retired consist of the gate house and shaft, the intake gate itself, the trashrack structure, and a floating access dock. The primary concern with retiring the tunnel intake structure is insuring that water flow into the tunnel is cut off and no future seepage due to rain or surface waters occurs.



Trashrack and Dock

Restoration of the tunnel intake to a land use compatible with residences will require the complete removal of the building, trash rack, fencing, and the upper part of the shaft. The upper portion of the shaft would be removed to a minimum of the root-ball depth of local trees, or approximately 10 feet below the surrounding surface. The interior would be filled to prevent future collapse. Demolition debris could be used as fill. The tunnel downstream of the gate would be plugged with concrete for approximately 18 feet (1-1/2 diameters). This would be accomplished by building a lost-form in the tunnel, closing the gate, and tremie pouring concrete through the ventilation shaft.

The bottom slab of the intake structure should be punctured to allow for drainage such that structure doesn't become a sump. This should be done with 2-inch diameter holes drilled/cored through the bottom of the slab. The floating dock should also be fully removed.

2.13 12-Foot Diameter Tunnel

The tunnel connected to the intake is concrete lined, 12 feet in diameter and 2,842 feet long. The invert elevation is 489.7 feet at the tunnel intake and drops to elevation 477 feet at the penstock forebay well. A tunnel shaft (No as-built drawings were available), is located halfway between the intake and the forebay. The land use category for this area is "Residential."

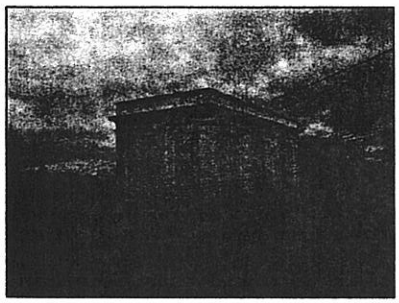
Retirement

Retiring of the 12-foot diameter tunnel to a land use compatible with residences will require plugging the upstream end of the tunnel in conjunction with the tunnel intake demolition and abandoning the remaining length in place.

The tunnel shaft located approximately halfway between the gate houses would be plugged with concrete and removed to 10 feet below grade. The surrounding area should be re-graded to direct local drainage away from the shaft location and reseeded.

2.14 Forebay and Penstock Gate House

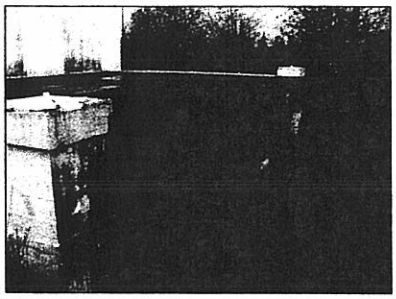
The forebay well, 30 feet in diameter and 73 feet deep, is the transition from the tunnel to three 96-inch diameter steel penstocks. Above ground there is a reinforced concrete gatehouse, 18.5 feet wide, 39 feet long and 19.5 feet high, and a cover for the forebay well (Dwg F-SW316 and Dwg F-SW315). The gatehouse contains the operators for three 96-inch diameter Coffin sluice gates for the penstocks that direct flow to the powerhouse. Each gate has two 24-inch vent pipes downstream of the gate. The land use category for this area is "Residential."



Penstock Gatehouse

Retirement

Retiring of the Forebay and Penstock Gate House to a land use compatible with residences will require removal of the upper portions of the structures.

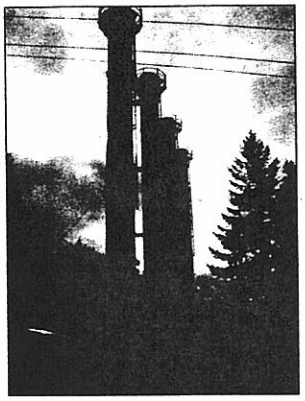


Forebay at penstock gatehouse

As with the intake gate house, the upper portion of the well and shaft would be removed to approximately 10 feet below the surrounding surface. The remaining well and gate shaft would be filled to prevent future collapse. Demolition debris could be used as fill. The incoming tunnel would not need to be plugged; however, the penstocks would be filled with concrete for approximately 12 feet (1-1/2 diameters). This would be accomplished by building a lost-form in the penstock, closing the gate, and either tremie pouring concrete down the access shaft or pumping through an access hole cut in the gates. An alternate approach would be to build a form in the tunnel and fill the entire bottom of the shaft with concrete.

The bottom slab of the intake structure should be punctured to allow for drainage. This should be done with 2-inch diameter holes drilled/cored on a 3-foot grid through the bottom of the slab. The local drainage into the forebay well will have to be re-routed and graded and the site reseeded.

2.15 Penstocks



Standpipes

Four 96-inch diameter penstocks run from the forebay to powerhouse. Penstock 1 (1,840 feet long) and Penstock 2 (1,798 feet long) were part of the original project in 1911. Penstock 3 (2,135 feet long) was added in 1918. Approximately, 300 feet downstream of the forebay, Penstocks 1 and 2 were tapped in 1924 -1925 forming Penstock 4 which is 1,791 feet long. Two 84-inch diameter butterfly valves, in concrete valve houses, control flow into the fourth penstock. At this location the penstocks are just below the ground surface. Each of the four penstocks is connected to a 6-feet diameter vertical, riveted steel standpipe, 80 feet tall, supported by guy wires (Dwg F-SW324 and Dwg F-SW342). The penstocks are buried from the standpipes to the powerhouse. At the powerhouse, there are two vertical surge chambers for each penstock, each 7 feet in diameter and 78 feet tall (Figure 9 – Dwg F-SW340). The land use category for this area is "Residential."

Retirement

The penstock structures to be retired consist of the four buried penstocks, bypass pipes, standpipes, valve houses, and two 84-inch diameter butterfly valves. Similar to the intake gatehouse, the primary concern with retiring the penstocks structures is insuring that no future seepage from rain or surface waters occurs to the powerhouse.

2.15.1. Penstock Pipes

Retiring the four 96-inch diameter penstock pipes to a land use compatible with residences will require the complete removal of the structures. After removal the excavated area would be filled with the locally disturbed material from the demolition and the site reseeded.

2.15.2. Standpipes

Retiring the four, 6-foot diameter, 80-foot tall, steel standpipes to a land use compatible with residences will require the complete removal of the structures and foundation. After removal the excavated area would be filled with the locally disturbed material from the demolition and the site reseeded.

2.15.3. Bypass Pipes

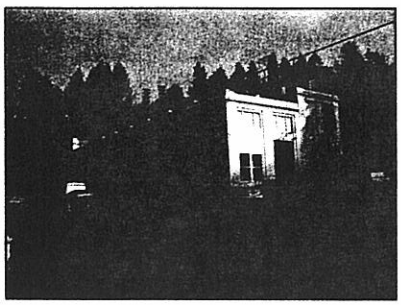
Retiring the bypass pipes at the standpipes to a land use compatible with residences will require the complete removal of the structures and foundation elements. After removal the excavated area would be filled with the locally disturbed material from the demolition and the site reseeded.

2.15.4. Valve Houses

Retiring the valve houses to a land use compatible with residences will require the complete removal of the structures and foundation elements. After removal the excavated area would be filled with the locally disturbed material from the demolition and the site reseeded.

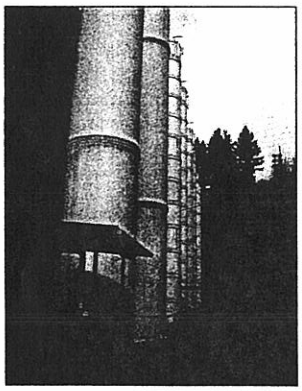
2.16 Powerhouse

The concrete powerhouse, located on East Valley Highway, is 85 feet wide, 225 feet long and 55 feet high (Dwg F-5334, Sh 02). The powerhouse contains four Francis-type horizontal shaft turbine-generator units. Units 1 and 2, installed in 1911, are each rated at 16,300 kVA and 18,000 HP. Unit 3 was installed in 1918 and Unit 4 was added in 1924. Units 3 and 4 are each rated at 25,000 kVA and 23,000 HP. Speed is controlled by four gate shaft type governors with oil pressure supplied by individual governor oil pumps. Each unit has a 30-inch relief valve discharging water from the scroll case into the tailrace in case of a sudden closing of the gates. Four 78-inch motor operated butterfly valves are located just upstream of the turbines. Two 8-inch bypass valves, one hydraulically operated and the other manually operated, are used to equalize the water pressure during the operation of each butterfly valve.



Powerhouse

There are also two 360 HP impulse turbines which originally supplied power to the excitation system. Presently, either unit may be used to supply direct current (DC) to operate the 80-ton powerhouse crane. The land use category for this area is "Residential."



Surge Chambers

Retirement

2.16.1. Transformer Supports

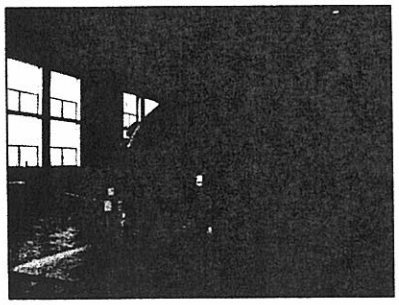
Retiring the area near the transformer supports located above the powerhouse to a land use compatible with residences will require the complete removal of the structures.

2.16.2. Surge Chambers

Retiring the eight 7-foot diameter, 78-foot tall vertical surge chambers located at the powerhouse to a land use compatible with residences could require either their complete removal or their restoration as a historical part of any future power house use. For the purposes of this evaluation, it is assumed that the structures will be completely removed.

2.16.3. Powerhouse

The concrete powerhouse has several retirement alternatives compatible with a residential land use. The options range from completely demolishing the building and restoring the property, to removing essentially everything in the building and leaving only a shell, to removing only hazardous materials and equipment and leaving the building for the most part, historically intact. For the purposes of this evaluation it is assumed that complete removal of the building, equipment, and project features will occur.



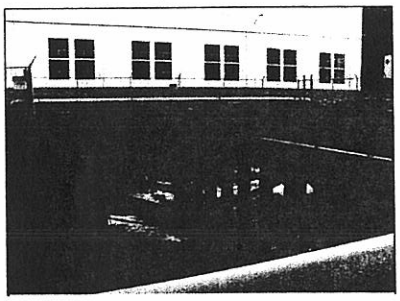
18,000 HP Generators

Material and equipment which will require removal or draining and decontamination, consists of: transformers, oil-filled circuit breakers (OCB), oil-cooled instrument transformers, oil filled governors, and any other oil insulating vessels and lines, and asbestos insulated electrical equipment.

Additionally, the draft tubes should be plugged at the lower end (with drain holes) to prevent entry and the butterfly valve operating mechanism should be disabled. The building should also be secured to prohibit future entry and all power and/or utilities disconnected.

2.17 Tailrace

The tailrace is approximately 0.5 mile in length and extends from the powerhouse to a section of the White River locally known as the Stuck River. The tailrace, just downstream of the powerhouse, is timber lined and covered by a wood deck. There is a timber structure in the tailrace between the powerhouse and the highway bridge. The remainder of the channel is unlined and trapezoidal in shape. Further downstream the tailrace is crossed by a concrete bridge for local access and a railroad bridge. The land use category for this area is "Residential."



Tailrace

Retirement

Similar to the powerhouse, the tailrace has several retirement options compatible with residential land use and would depend on the retirement option selected for the powerhouse. For the purposes of this evaluation it is assumed that complete removal of the existing timber decking and filling of the tailrace to the highway bridge with compacted fill will occur.

3. SUMMARIZING TABLE

Item	Retirement
Intake at diversion dam	• Demolition of basin walls, demolition and removal of gates, building, bridge, machinery, fill basin
Concrete Flume	• Demolition of walls, fill, regrade and reseed
Wooden flume	• Complete removal, reseed.
Unlined canal	• Retire in place with miscellaneous demolition, disposal and re-grading
Sedimentation basins	• Retire in place with miscellaneous demolition, disposal and re-grading
Dikes (2,500 ft, 1,400 ft)	• Retire in place with miscellaneous demolition, disposal and re-grading
Fish screen facility & fish bypass pipeline	• Complete removal
Lined approach canal	• Retire in place with miscellaneous demolition and disposal.
Intake to pipelines	• Complete removal
Valve house & Twin 10,000 foot long,10-ft diameter pipes	• Complete removal
Downstream valve house	• Complete removal
Printz Basin	• Retire in place with miscellaneous demolition, disposal and re-grading
Intake tower	• Close gate, core bottom slab, plug tunnel, remove trashracks, floating dock, building and upper portion of structure, fill remaining shaft.
Tunnel	• Plug ends, abandon in place
Shaft	• Plug with concrete, remove structure, fill remaining shaft, redirect local drainage
Forebay and Penstock Gate House	• Close gate, core bottom slab, plug penstocks, remove upper portion of structure, fill remaining shaft, and re-direct local drainage.
Bypass Pipes	• Complete removal
Standpipes	• Complete removal of standpipes, shaft, and pedestal, fill and redirect local drainage.
Valve house	• Complete removal
Penstocks	• Complete removal
Transformer Supports	• Complete removal
Surge Chambers	• Complete removal
Powerhouse	• Complete removal
Tailrace	• Complete removal, fill to highway bridge

4. Cost Estimate

The cost estimate is based on a "reconnaissance level" estimate of actions that would be necessary to restore the identified lands to a condition suitable for resale and redevelopment. It does not take into account any specific future use of the project land or facilities.

For areas identified as future residential land use, the cost of retirement for surface and near surface features is typically based on full removal. For deeply buried features the cost generally represents the complete removal of project features to approximately 15 feet below ground and filling all vertical shafts and excavations such that the land would have the ability to perform the identified land use in the future. All costs are given in 2006 dollars.

4.1 Assumptions and Limitations

The cost estimate was based on two, 1/2-day site visits, plans provided by Puget Sound Energy, and was performed to a reconnaissance level. In many cases incomplete as-built information, specifically regarding modifications since original construction, were not available. No field or laboratory testing was performed and no environmental assessment was performed.

This evaluation does not include considerations or costs associated with the following:

- Hydrologic inflow or outflow changes to Lake Tapps related to retiring the project.
- Environmental studies for state or federal permits.
- Environmental mitigation not specifically identified.
- Retiring or future use of the White River substation and/or transmission facilities.
- Loss of power revenues.
- Additional right-of-way or temporary construction easements required for described retirement activities.

4.2 Basis of Quantities and Unit Costs

Quantities for well defined items, e.g., steel and concrete demolition, backfill material, or new fill concrete, are based on as-built plan dimensions. Unit costs for such items are based on documented bid cost for similar work, recent in-house project bid data, and representative DOT bid summaries.

For less well defined or unknown condition items such as the removal of oil containing vessels, or asbestos insulation, a "worst case" condition was assumed. Quantities and unit prices (usually lump sum) for these items were based on past projects and in-house experience.

The salvage value of equipment, steel, timber, or machinery was not considered in the estimate because a condition or hazardous material assessment was not performed as part of this study. Much of the steel structures, such as the standpipes, surge chambers, and

possibly the penstocks would have salvage value. Due to the possible existence of lead paint, however, and the offsetting cost of disposal, no salvage value was considered.

4.3 Summarizing Table

The following table summarizes the estimated cost for retiring the identified project features. A contingency of 25% was used due to the limited nature of this evaluation.

FACILITY	COST
MOBILIZATION	$958,000
INTAKE RADIAL GATES AT DIVERSION DAM	$499,228
CONCRETE FLUME	$250,311
WOODEN FLUME	$1,355,681
UNLINED CANAL	$40,000
SEDIMENTATION BASINS	$272,215
DIKES	$15,000
FISH SCREENS	$1,902,919
30 INCH HDPE FISH BYPASS PIPELINE	$109,075
LINED APPROACH CANAL	$106,000
INTAKE TO PIPELINES AND VALVE HOUSE	$93,320
10 FT DIAMETER PIPES	$3,565,157
DOWNSTREAM VALVE HOUSE	$154,150
PRINTZ BASIN	$200,000
INTAKE TOWER	$131,636
TUNNEL	$48,000
SHAFT	$22,280
FOREBAY AND PENSTOCK GATE HOUSE	$137,145
BYPASS PIPES	$10,000
STANDPIPES	$244,500
VALVE HOUSE	$57,050
PENSTOCKS	$914,200
TRANSFORMER SUPPORTS	$67,500
SURGE CHAMBERS	$334,350
POWERHOUSE	$426,060
TAILRACE	$95,250
Project Subtotal	$12,009,000
Construction Contingencies (25%)	$3,002,000
TOTAL ESTIMATED PROJECT COST	**$15,011,000**

Appendix – A
Itemized Cost Estimate

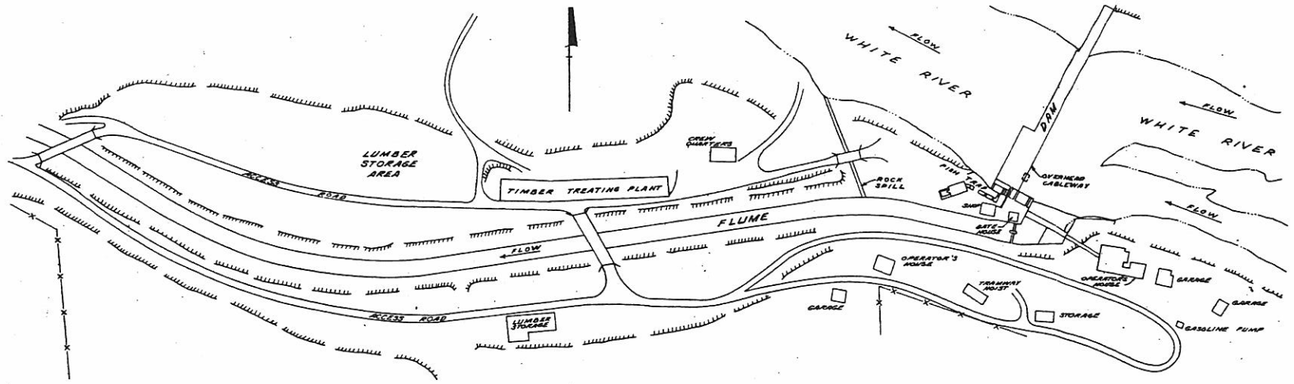
Appendix – B
Drawings

	QUANTITY	UNITS	UNIT PRICE	TOTAL COST	FACILITY
MOBILIZATION					$958,000
Mobilization and Demobilization (5%)				$598,000	
Insurance and Bonds (3%)				$360,000	
INTAKE RADIAL GATES AT DIVERSION DAM					$499,228
Fill From Gates to River	2,400	CY	$20.00	$48,000	
Demolish and Remove Building	2,600	CF	$4.00	$10,400	
Remove Concrete Pad/Foundation	8	CY	$145.00	$1,228	
Remove Guardrails	300	LF	$12.00	$3,600	
Remove Radial Gates	2	EA	$15,000.00	$30,000	
Demolish and Remove Radial Gate Structure	650	SF	$200.00	$130,000	
Remove Motor and Mechanical Equipment	1	LS	$10,000.00	$10,000	
Disconnect Electrical	1	LS	$2,000.00	$2,000	
Demolish and Remove Steel Bridge	640	SF	$350.00	$224,000	
Dewatering/Cofferdam	1	LS	$40,000.00	$40,000	
CONCRETE FLUME					$250,311
Demo Flume and Use as Fill	3,400	CY	$50.00	$170,000	
Fill Remaining Area/Depression	4,700	CY	$10.00	$47,000	
Regrade Surrounding Area for Drainage	7,846	SY	$1.00	$7,846	
Reseed/Revegetation	1.6	SY	$4,000.00	$6,484	
Remove Arch Bridge Flume	100	CY	$145.00	$14,500	
Excavation for Arch Bridge Flume	560	CY	$8.00	$4,480	
WOODEN FLUME					$1,355,681
Remove 6x12 Posts	16,500	LF	$3.00	$49,500	
Remove Plywood Walls	66,000	SF	$0.75	$49,500	
Remove Tongue and Groove Walls and Floor	158,400	SF	$2.00	$316,800	
Remove 4x6 Braces	2,300	LF	$1.50	$3,450	
Remove 6x8 Sills	51,150	LF	$6.00	$306,900	
Remove Steel I Tension Members	26,400	LF	$10.00	$264,000	
Remove Concrete Foundation	750	CY	$145.00	$108,750	
Hazardous Waste Disposal	3,210	Ton	$80.00	$256,781	
UNLINED CANAL					$40,000
Miscellaneous Demolition, Disposal and Clean-up	1	LS	$25,000.00	$40,000	
SEDIMENTATION BASINS					$272,215
Remove Concrete Discharge	40	CY	$145.00	$5,800	
Fill Excavation	30	CY	$10.00	$300	
Remove Concrete Flume	75	CY	$145.00	$10,875	
Remove Concrete Pipe Headwall	15	CY	$145.00	$2,175	
Remove Pipe	155	LF	$25.00	$3,875	
Remove Concrete Around Pipe	210	CY	$145.00	$30,450	
Excavation for Pipe Removal	1,150	CY	$7.60	$8,740	
Reseed/Revegetation	70	AC	$3,000.00	$210,000	
DIKES					$15,000
Miscellaneous Demolition, Disposal and Clean-up	1	LS	$15,000.00	$15,000	
FISH SCREENS					$1,902,919
Demolish and Remove Fish Screen Structure	322,560	CF	$2.20	$709,632	
Remove Fish Screen Concrete Pad/Foundation	853	CY	$145.00	$123,733	
Demolish and Remove O&M Building	22,600	CF	$2.50	$56,500	
Remove O&M Bldg Concrete Pad/Foundation	167	CY	$145.00	$24,274	
Remove Upstream Concrete Transition	2,290	CY	$145.00	$332,050	
Remove Upstream Transistion Foundation	250	CY	$145.00	$36,250	
Remove Downstream Concrete Transition	2,300	CY	$145.00	$333,500	
Remove Downstream Transition Foundation	250	CY	$145.00	$36,250	
Remove Fencing	900	LF	$2.50	$2,250	
Remove Guardrails	940	LF	$12.00	$11,280	
Remove Grating	580	LF	$15.00	$8,700	
Remove Misc Metals (Ladders, Stairs, Rope Rail, Etc)	1	LS	$3,500.00	$3,500	
Remove Crane	1	LS	$25,000.00	$25,000	
Remove Fish Screens	32	EA	$5,000.00	$160,000	
Remove Weir	1	EA	$10,000.00	$10,000	
Remove Trashrack	1	LS	$8,000.00	$8,000	
Remove Mechanical Equipment	1	LS	$5,000.00	$5,000	

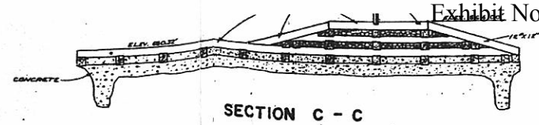
	QUANTITY	UNITS	UNIT PRICE	TOTAL COST	FACILITY
Reseed/Revegetation	3.0	AC	$4,000.00	$12,000	
Disconnect, Dispose Electrical	1	LS	$5,000.00	$5,000	
30 INCH HDPE FISH BYPASS PIPELINE					$109,075
Excavation	2,400	CY	$10.00	$24,000	
Pipe Removal	2,800	LF	$14.50	$40,600	
Remove Concrete End Halfpipe	75	CY	$145.00	$10,875	
Fill Using Excavated Material	2,200	CY	$8.00	$17,600	
Imported Fill	700	CY	$20.00	$14,000	
Reseed/Revegetation	0.5	AC	$4,000.00	$2,000	
LINED APPROACH CANAL					$106,100
Miscellaneous Demolition, Disposal and Clean-up	1	LS	$25,000.00	$25,000	
Fencing	2,200	LF	$13.00	$28,600	
Egress Ladders @500'	3	EA	$1,500.00	$4,500	
Revegetate	12.0	AC	$4,000.00	$48,000	
INTAKE TO PIPELINES AND VALVE HOUSE					$93,320
Demolish and Remove Building	16,000	CF	$2.50	$40,000	
Remove Concrete Pad/Foundation	85	CY	$145.00	$12,285	
Excavation	1,100	CY	$7.60	$8,360	
Fill Using Excavated Material	1,100	CY	$8.00	$8,800	
Remove Fencing	350	LF	$2.50	$875	
Remove Guardrails	150	LF	$12.00	$1,800	
Remove Misc Metals	1	LS	$1,000.00	$1,000	
Remove Grating	80	LF	$15.00	$1,200	
Remove Trash Rack	1	LS	$10,000.00	$10,000	
Remove Mechanical Equipment	1	LS	$5,000.00	$5,000	
Disconnect and Remove Electrical Equipment	1	LS	$4,000.00	$4,000	
10 FT DIAMETER PIPES					$3,565,157
Excavation	187,000	CY	$7.60	$1,421,200	
Pipe Removal	12,500	LF	$50.00	$625,000	
Fill Using Excavated Material	187,000	CY	$8.00	$1,496,000	
Reseed/Revegetation	5.7	AC	$4,000.00	$22,957	
DOWNSTREAM VALVE HOUSE					$154,150
Demolish and Remove Building	36,700	CF	$3.00	$110,100	
Remove Concrete Pad/Foundation	210	CY	$145.00	$30,450	
Remove Fencing	240	LF	$2.50	$600	
Remove Mechanical Equipment	1	LS	$6,000.00	$6,000	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
Disconnect and Remove Electrical Equipment	1	LS	$4,000.00	$4,000	
PRINTZ BASIN					$200,000
Miscellaneous Demolition, Disposal and Clean-up	1	LS	$40,000.00	$40,000	
Reseed/Revegetation	80	AC	$2,000.00	$160,000	
INTAKE TOWER					$131,636
Remove Floating Dock	1	LS	$1,000.00	$1,000	
Core Drill 2 Inch Diameter Holes Through 5 Foot Thick Slab	10	EA	$300.00	$3,000	
Remove Building (20'x20'x24')	9,600	CF	$1.50	$14,400	
Remove Fencing	200	LF	$1.55	$310	
Remove Trash Rack	1	LS	$10,000.00	$10,000	
Remove Upper Part of Shaft (10 Feet Below Surface)	14,240	CF	$0.36	$5,126	
Excavation to Remove Upper Part of Shaft	600	CY	$20.00	$12,000	
Plug Tunnel With Concrete	150	CY	$300.00	$45,000	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
Fill Intake Tower Shaft with Debris and Fill	2,700	CY	$14.00	$37,800	
TUNNEL					$48,000
Regrade Surrounding Area for Drainage	1	LS	$3,000.00	$3,000	
Plug Tunnel With Concrete	150	CY	$300.00	$45,000	
SHAFT					$22,280
Remove Upper Part of Shaft (10 Feet Below Surface)	2,250	CF	$4.00	$9,000	
Excavation to Remove Upper Part of Shaft	185	CY	$20.00	$3,700	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	

	QUANTITY	UNITS	UNIT PRICE	TOTAL COST	FACILITY
Fill Shaft with Debris and Fill	470	CY	$14.00	$6,580	
FOREBAY AND PENSTOCK GATE HOUSE					$137,145
Re-route Drainage from Forebay	1	LS	$3,000.00	$3,000	
Core Drill 2 Inch Diameter Holes Through Slab	10	EA	$300.00	$3,000	
Remove Building (17' x 39' x 20')	13,260	CF	$0.75	$9,945	
Remove Upper Section of Forebay	10,000	CF	$4.00	$40,000	
Remove Upper Section of Shaft (10 Feet Below Surface)	7,100	CF	$4.00	$28,400	
Excavation to Remove Upper Part of Shaft	250	CY	$20.00	$5,000	
Fill Shaft With Debris	1,700	CY	$14.00	$23,800	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
Plug Penstocks with Concrete	70	CY	$300.00	$21,000	
BYPASS PIPES					$10,000
Remove Pipes	1	LS	$7,000.00	$7,000	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
STANDPIPES					$244,500
Remove Steel Standpipes (6 Foot Diameter, 77' Height)	4	EA	$20,000.00	$80,000	
Plug Penstock Openings With Concrete	90	CY	$300.00	$27,000	
Remove Concrete Pedestals	700	CY	$135.00	$94,500	
Excavation to Remove Upper Part of Pedestals	1,500	CY	$20.00	$30,000	
Remove Portion of Penstocks (Minimum Cover of 10 Feet)	80	LF	$125.00	$10,000	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
VALVE HOUSE					$57,050
Demolish Building A (Minimum Cover of 10 Feet)	4,500	CF	$4.00	$18,000	
Demolish Building B (Minimum Cover of 10 Feet)	3,750	CF	$4.00	$15,000	
Remove Portion of Penstocks (Minimum Cover of 10 Feet)	80	LF	$100.00	$8,000	
Plug Remaining Penstock Openings With Concrete	90	CY	$145.00	$13,050	
Reseed/Revegetation	1.0	AC	$3,000.00	$3,000	
PENSTOCKS					$914,200
Excavation For Penstocks	57,000	CY	$7.60	$433,200	
Remove Penstocks	7,600	LF	$35.00	$266,000	
Fill and Regrade	20,000	CY	$10.00	$200,000	
Reseed/Revegetation	5.0	AC	$3,000.00	$15,000	
TRANSFORMER SUPPORTS					$67,500
Remove Transformer Supports	500	CY	$135.00	$67,500	
SURGE CHAMBERS					$334,350
Demolish Steel Portion of Chambers to Tops of Concrete Pedestals	8	EA	$15,000.00	$120,000	
Remove Concrete Pedestals	1,410	EA	$135.00	$190,350	
Excavation to Remove Pedestal	1,200	CY	$20.00	$24,000	
POWERHOUSE					$426,060
Drain and Disposal OCB, Remove Asbestos Insul. Equip	1	LS	$15,000.00	$15,000	
Secure Building	1	LS	$3,000.00	$3,000	
Disable Operating Mechanisms	1	LS	$1,500.00	$1,500	
Remove and Dispose Transformers (if present)	1	LS	$10,000.00	$10,000	
Demoslih Building and Dispose of Equipment	1,046,000	CF	$0.36	$376,560	
Dispose of Lead Paint Items	1	LS	$20,000.00	$20,000	
TAILRACE					$95,250
Remove Existing Timber Deck (20' x 252.5')	5,050	SF	$2.00	$10,100	
Fill Channel From Tailrace to Highway Bridge	3,650	CY	$11.00	$40,150	
Reseed/Revegetation	15.0	AC	$3,000.00	$45,000	
Project Subtotal				$12,009,127	$12,009,127
Construction Contingencies (25%)	25%			$3,002,282	
TOTAL ESTIMATED PROJECT COST				**$15,011,409**	

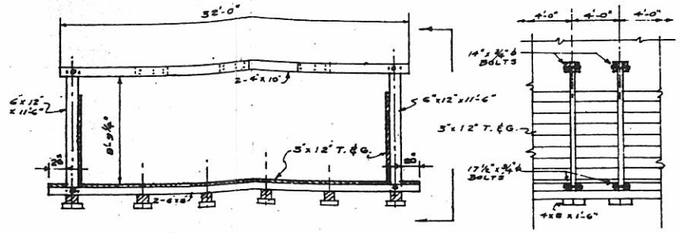
Appendix – B
Drawings



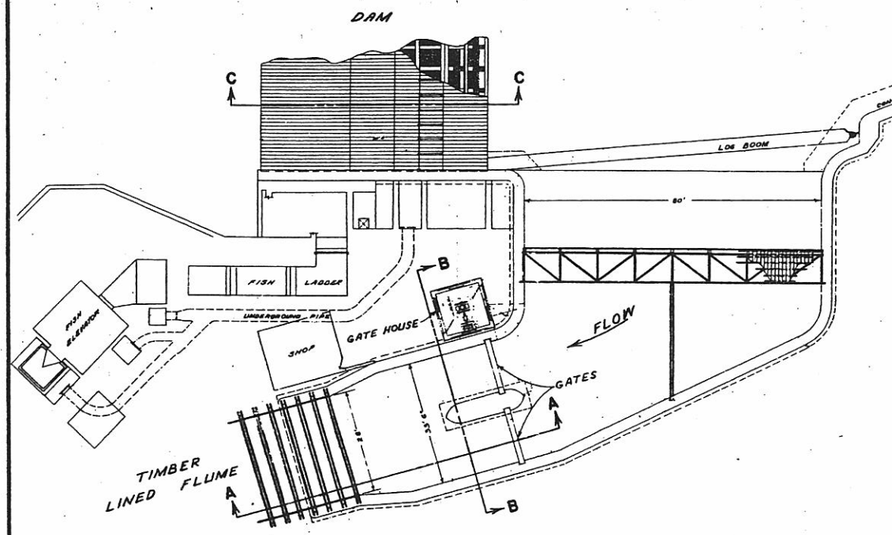
PLAN OF HEADWORKS AREA
SCALE 1" = 100'



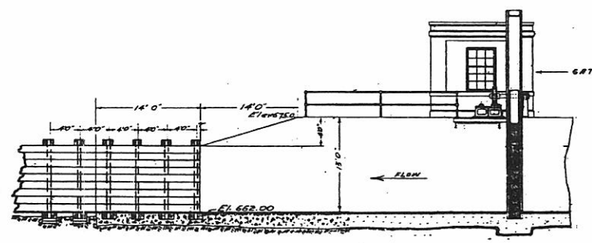
SECTION C - C
CROSS-SECTION OF DAM
SCALE $\frac{1}{8}$" = 1'-0"



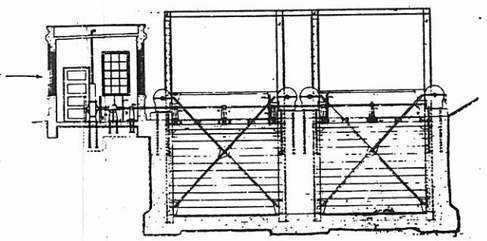
TYPICAL SECTION OF FLUME & LINED CANAL
SCALE $\frac{3}{16}$" = 1'-0"



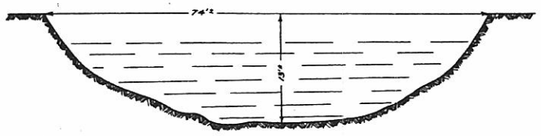
PLAN OF FLUME AND HEADWORKS
SCALE $\frac{1}{16}$" = 1'-0"



SECTION A - A
SCALE $\frac{1}{8}$" = 1'-0"



SECTION B - B
SCALE $\frac{1}{8}$" = 1'-0"



TYPICAL SECTION OF UNLINED CANAL
SCALE 1" = 10'

I CERTIFY THAT I SUPERVISED THE PREPARATION OF THE EXHIBIT DRAWINGS; AND THAT THEY ACCURATELY SHOW THE PROJECT LANDS AND APPURTENANCES AS OBTAINED FROM THE RECORDS OF THE ORIGINAL SURVEY NOTES AND PROJECT DRAWINGS IN THE PUGET SOUND POWER & LIGHT COMPANY FILES.

N. W. PETTIJOHN

PETTIJOHN ENGINEERING CO., INC.
WAS RETAINED BY THE LICENSEE TO MAKE THIS EXHIBIT DRAWING.

N. W. PETTIJOHN — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

EXHIBIT L SHEET 4

THIS MAP IS BEING SUBMITTED BY THE UNDERSIGNED THIS 13TH DAY OF MAY 1966 FOR INCLUSION IN THE APPLICATION FOR LICENSE FOR PROJECT NO. 2494 WHICH WAS SUBMITTED NOVEMBER 18, 1964

PUGET SOUND POWER & LIGHT COMPANY

BY _____
SR. VICE PRESIDENT

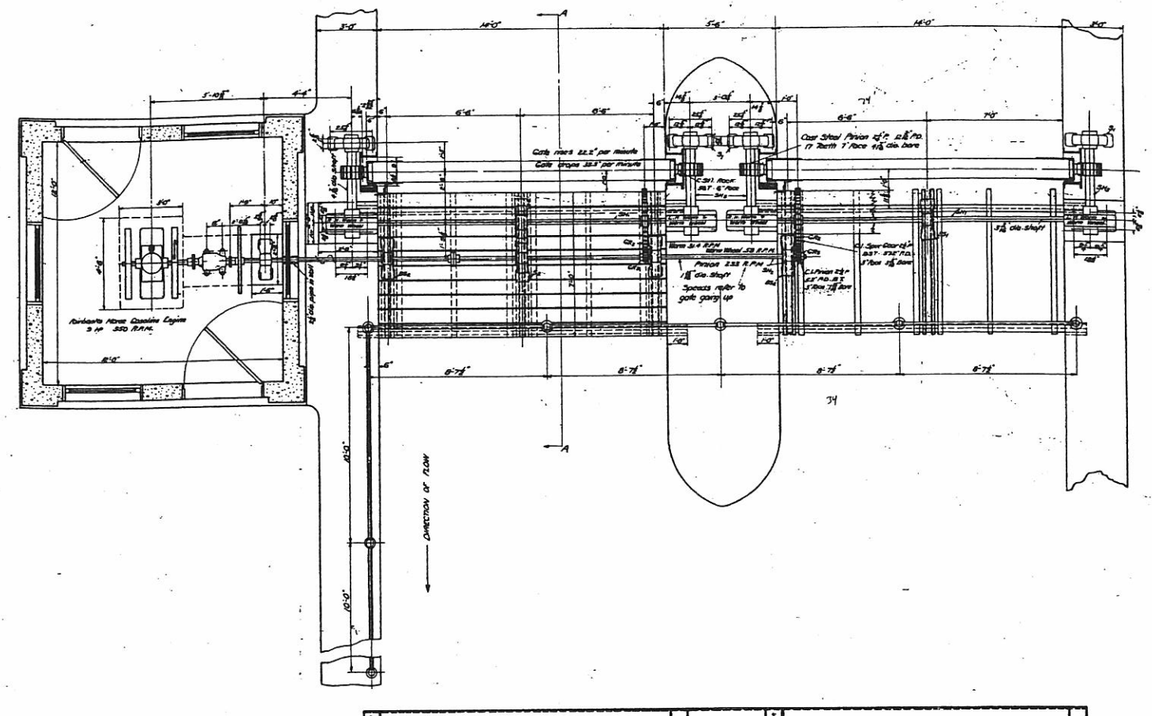
PROJECT NO. 2494 WASHINGTON

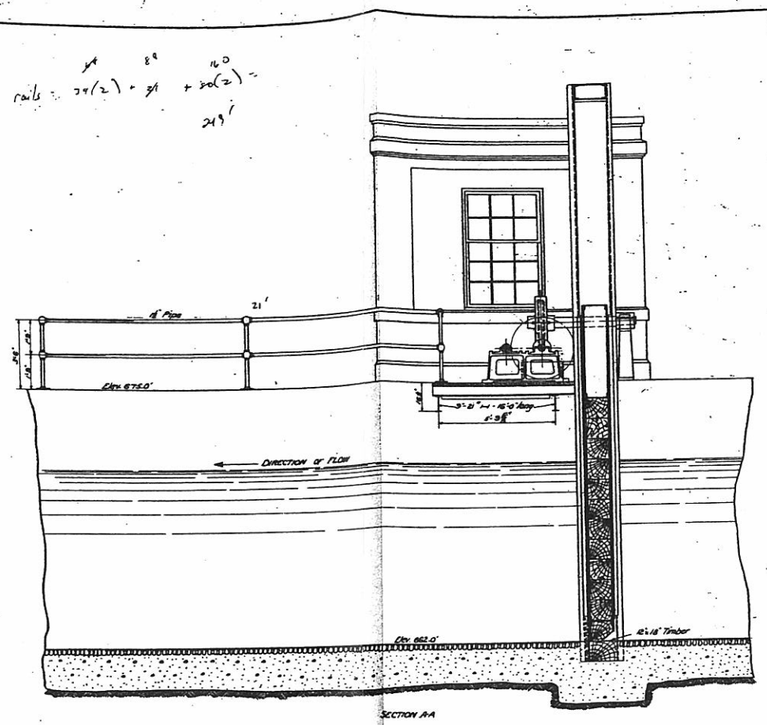
PUGET SOUND POWER & LIGHT COMPANY

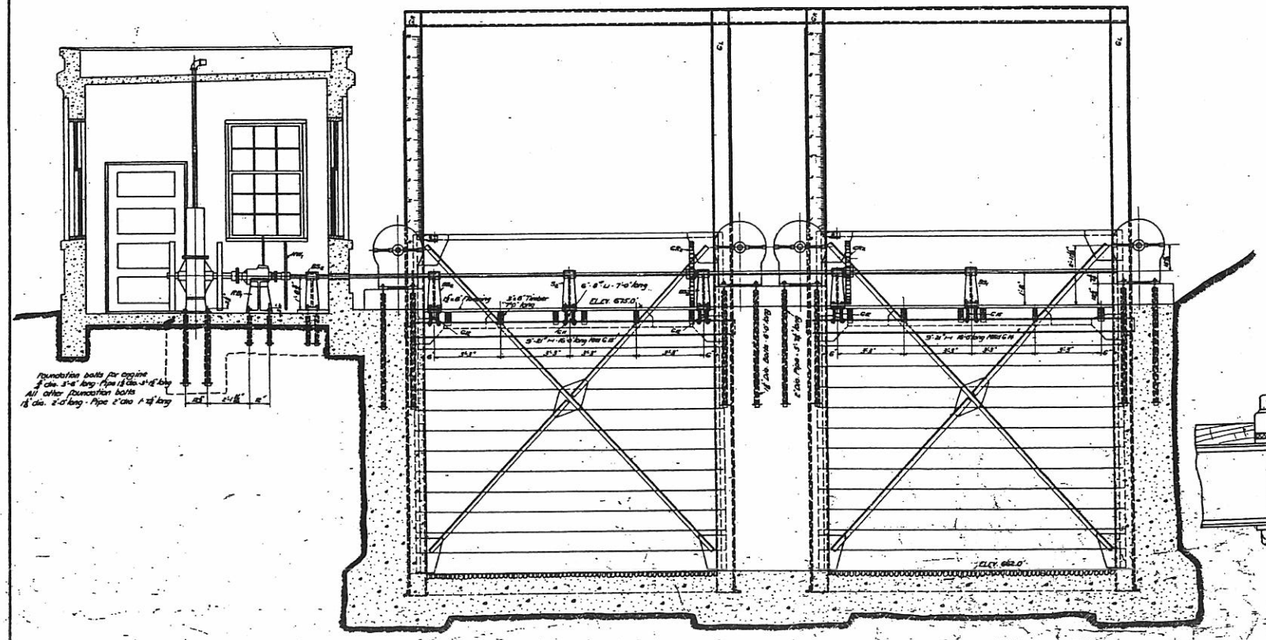
WHITE RIVER PROJECT

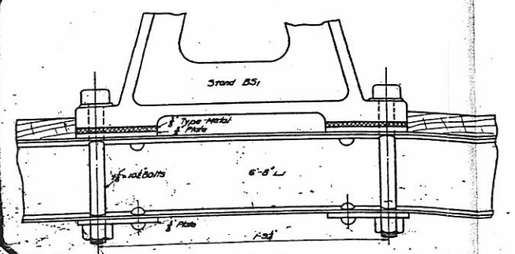
GENERAL PLAN

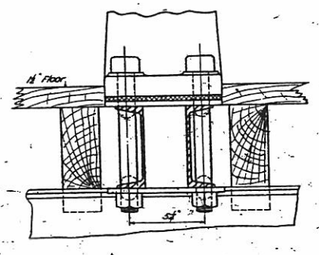
PUGET DWG F-5334 SH 04 REV 0







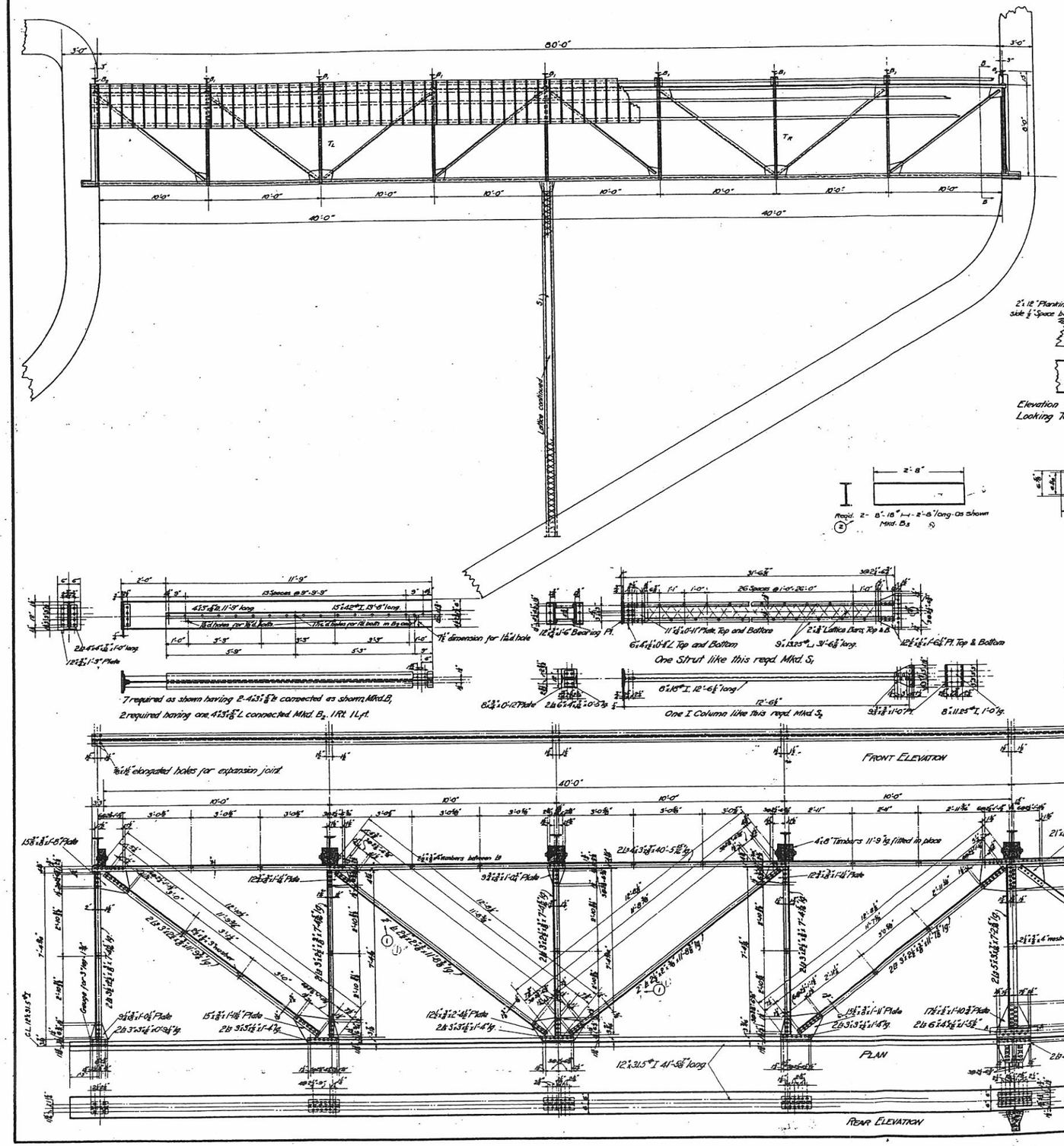


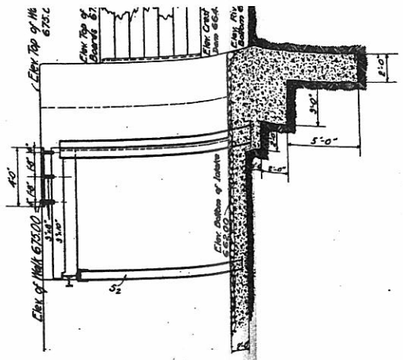


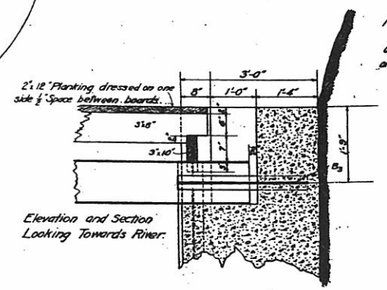
GENERAL ARRANGEMENT OF HEAD GATES AND OPERATING MACHINERY
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP. BOSTON

F16999

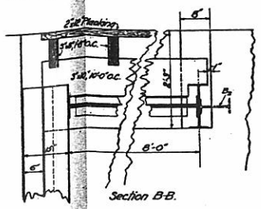
397-9 F-sw 365

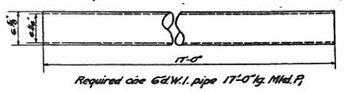


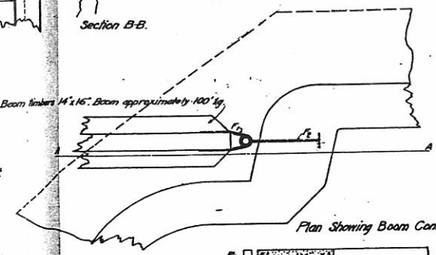


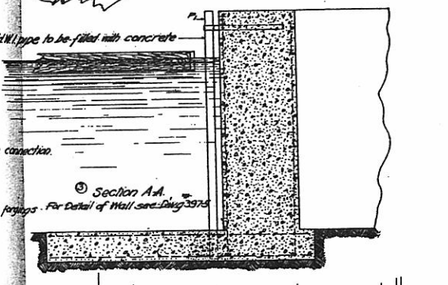


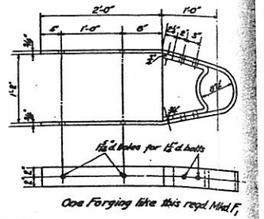
NOTE- Ends of truss left free and unobstructed to take care of expansion and contraction.

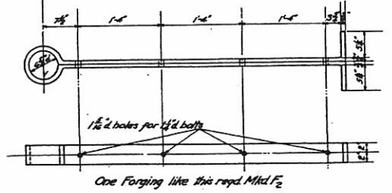




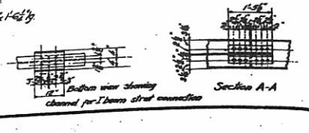








NOTES- Truss symmetrical about ℄.
One two span truss reqd. One span as shown, other opp. hand. Mkd. T1 & T2.
All rivets ¾" d. All rivet holes ⅞" d.



PLAN & DETAILS OF STEELWORK AT HEADWORKS
PACIFIC COAST POWER COMPANY
STONE & WEBSTER ENGINEERING CORP.
BOSTON
SCALE: ¼" = 1'-0"
July 30, 1910
Job Order No. 337

TABLE OF CHANGES

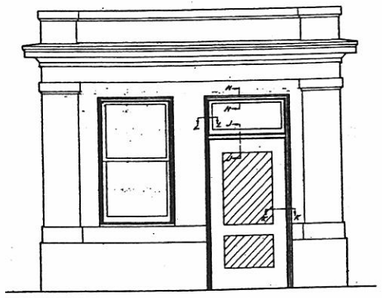
No.	Description	Date	By
1	Added Boom	10-7	W.V.A.
2	Added Boom Connection	10-7	W.V.A.
3	Added Boom Connection	10-7	W.V.A.
4	Added Boom Connection	10-7	W.V.A.
5	Added Boom Connection	10-7	W.V.A.

USE ONLY PRINTS SHOWING LATEST DATE

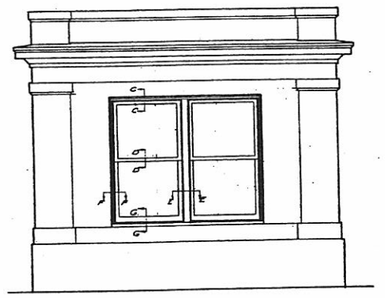
Checked	Traced	Approved
W.V.A.	W.V.A.	
J.D.C.	W.V.A.	

F20226

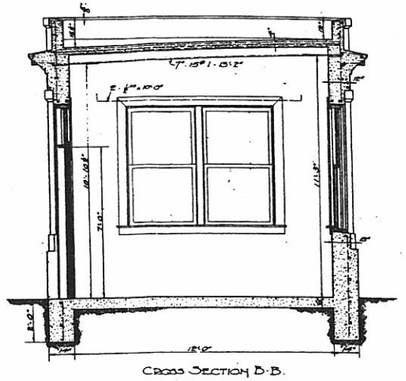
397/7 F:3W 361



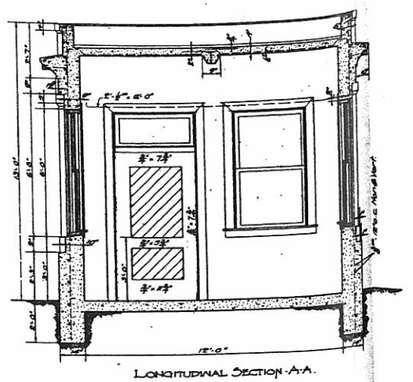
EAST ℄ WEST ELEVATION



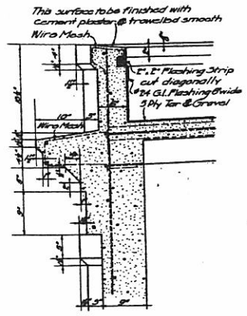
NORTH ℄ SOUTH ELEVATION



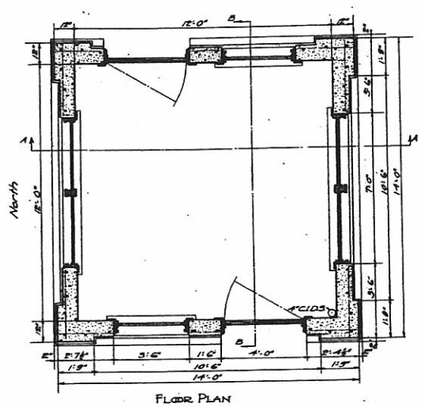
CROSS SECTION B-B.



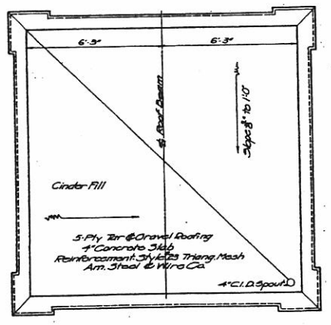
LONGITUDINAL SECTION A-A.



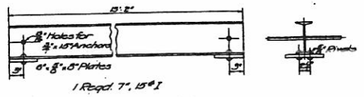
SECTION OF CORNICE ℄ PARAPET.



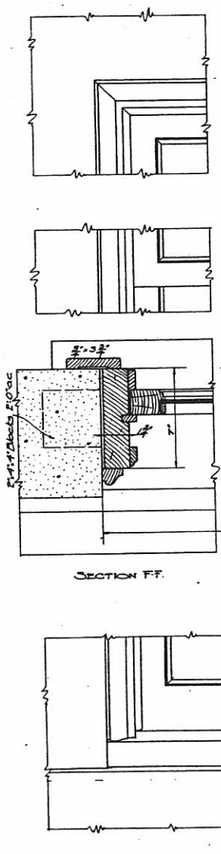
FLOOR PLAN



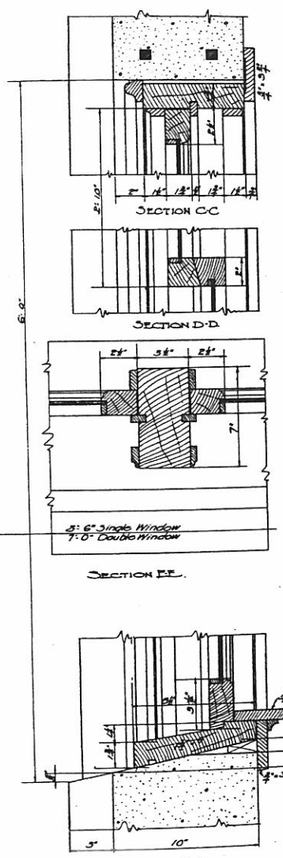
ROOF PLAN



DETAIL ℄ ROOF BEAM.



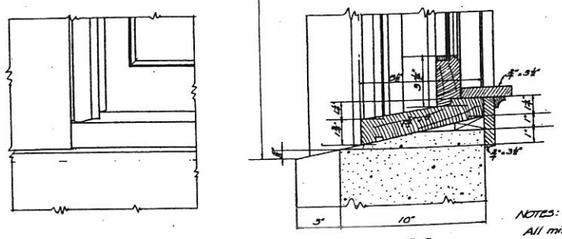
SECTION F-F.



SECTION E-E.

SECTION C-C

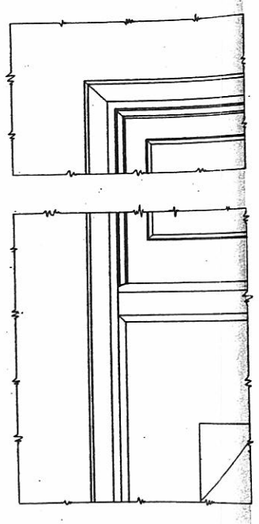
SECTION D-D.

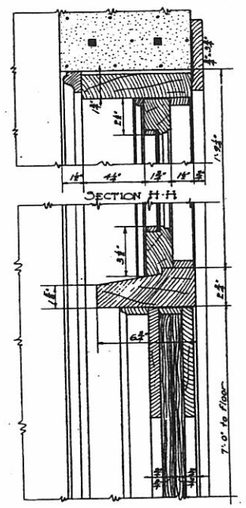


SECTION G-G.

DETAILS OF SINGLE ℄ DOUBLE WINDOWS

NOTES:
All millwork to be made from nearest stock sizes.
Dimensions may be changed slightly for this purpose.
All windows to be furnished with wired glass.

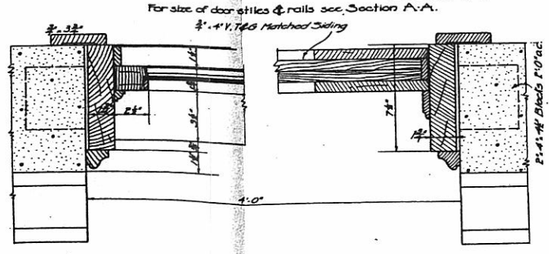




SECTION H-H

SECTION J-J

For size of door stiles ℄ rails see Section A-A.



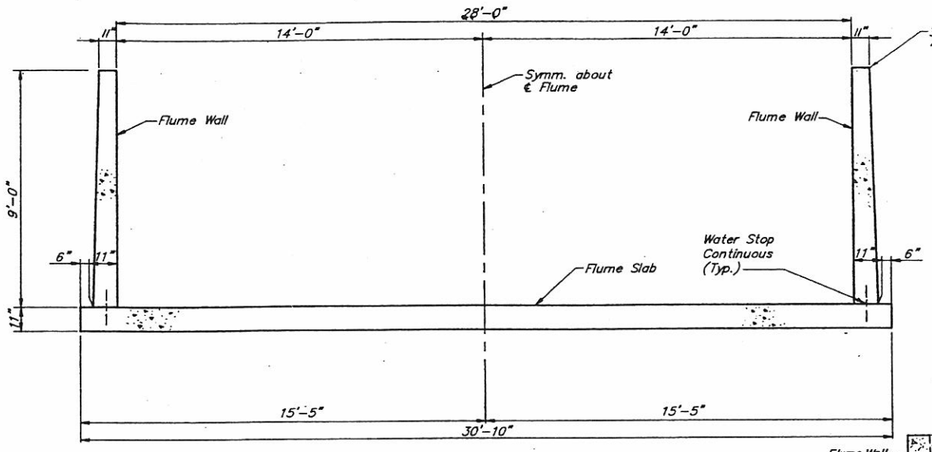
SECTION L-L

SECTION K-K

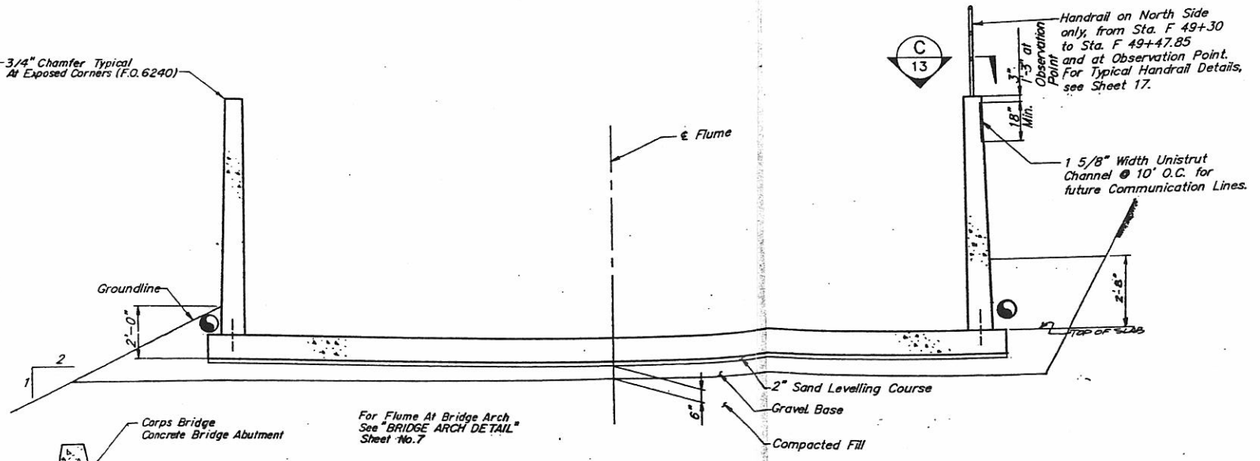
DETAILS OF DOOR ℄ TRANSOM.

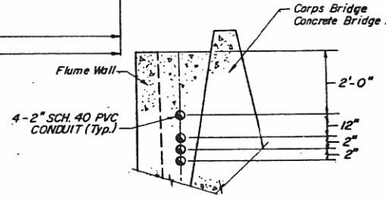
DETAILS OF GATEHOUSE AT HEADWORKS
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP
BOSTON

F20717



TYPICAL FLUME SECTION



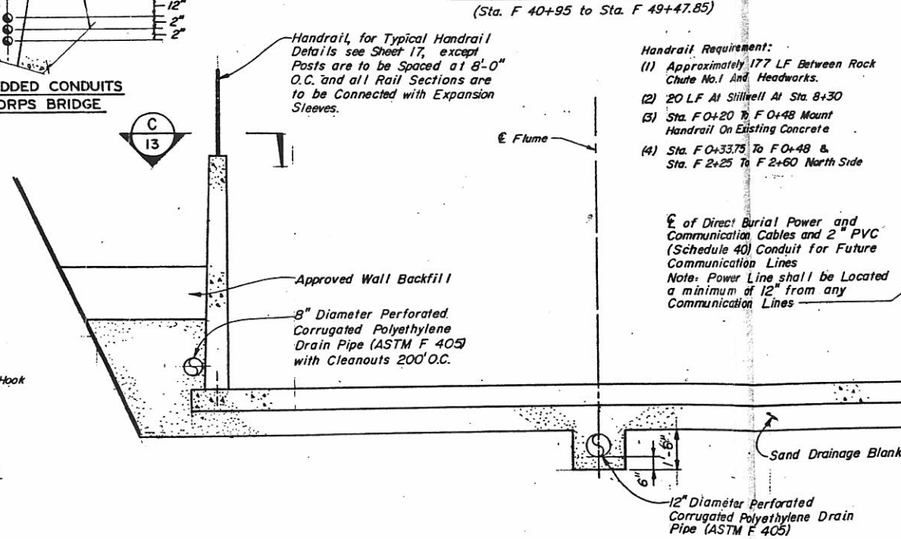


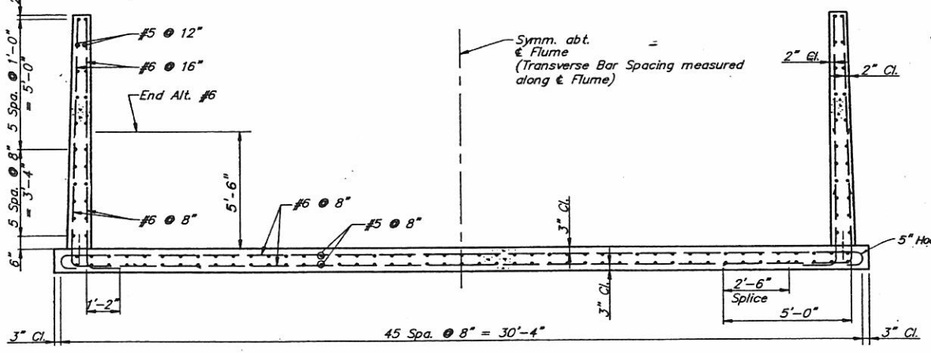
EMBEDDED CONDUITS AT CORPS BRIDGE

(ADDITIONAL DRAINAGE DETAILS LOCATED LOWER LEFT)

SECTION AT ELEVATED FLUME

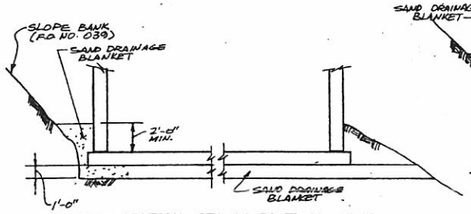
(Sta. F 40+95 to Sta. F 49+47.85)



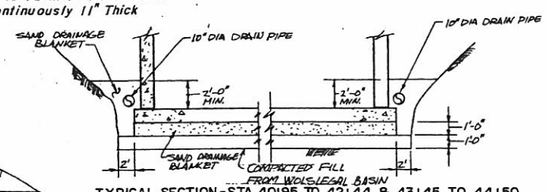


TYPICAL FLUME REINFORCEMENT

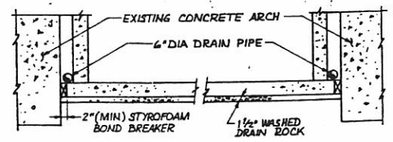
NOTE: It is Permissible to make all Flume Walls Continuously 11" Thick



TYPICAL SECTION - STA 44+50 TO 49+47.85



TYPICAL SECTION - STA 40+95 TO 42+44 & 43+45 TO 44+50



TYPICAL SECTION - STA 42+44 TO STA 43+45

TYPICAL SECTION AT IN-CUT FLUME

(Sta. F 0+48 to Sta. F 17+80)

NOTE Sand Drainage Blanket Replaced With Washed Rock Lying Between Filter Fabric (Approximately) Sta 4+75 To Sta 6+00 (P.O. No. 023)

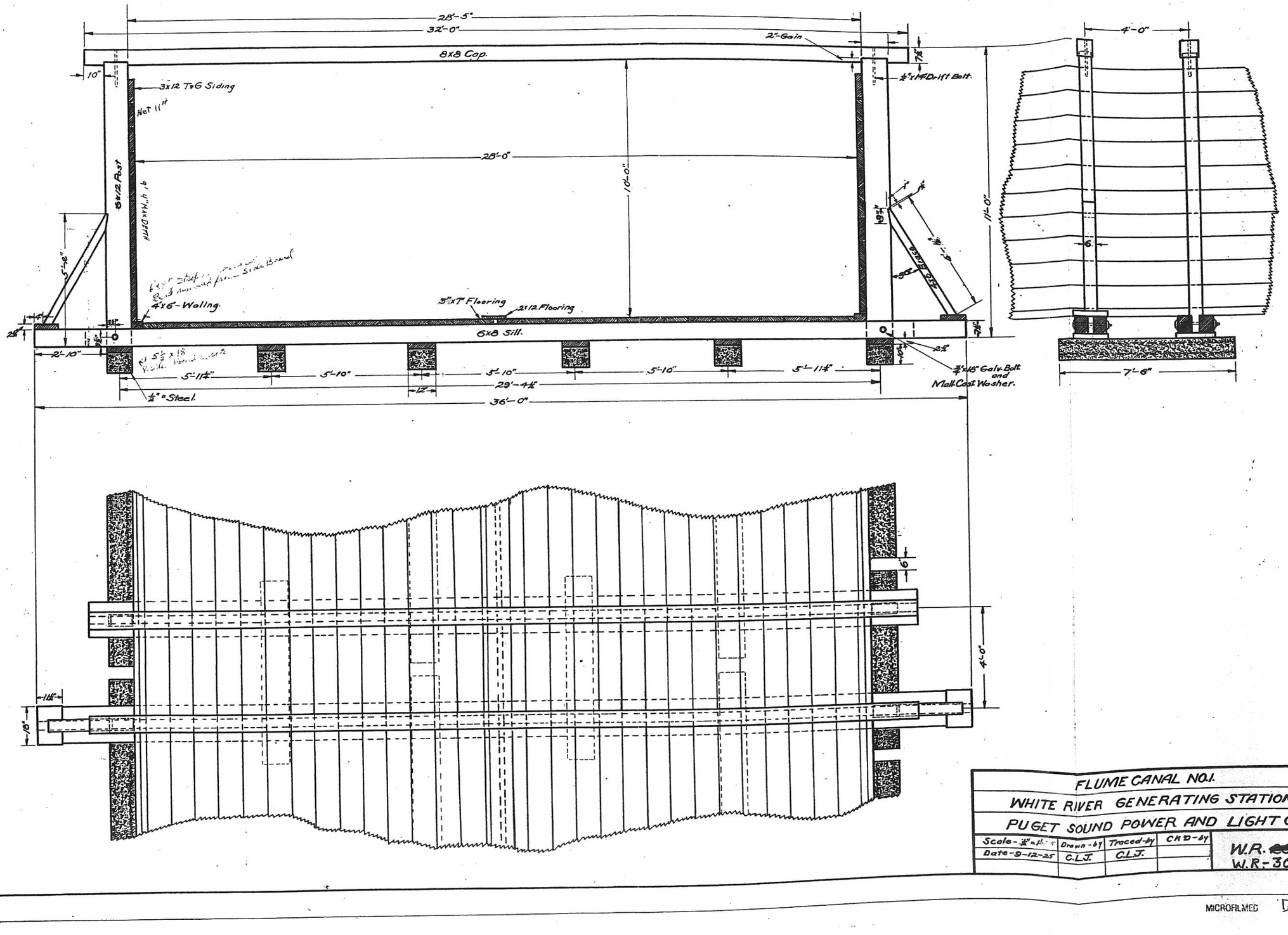
MARVIN E. PERALA STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

PUGET POWER	WHITE RIVER FLUME REBUILD		
	TYPICAL FLUME SECTIONS		
	Sverdrup CORPORATION		
2 12/29/88 Incorporate Red Line "As Built" Information From Inset Power — SLK	Dwn. GWM	Sheet 8 of 39	Date 4-29-1988
1 04/19/88 Issue For Construction — SLK	Ckd. DKS	Dwg. No. D7787	
No. Date Description By Revisions			

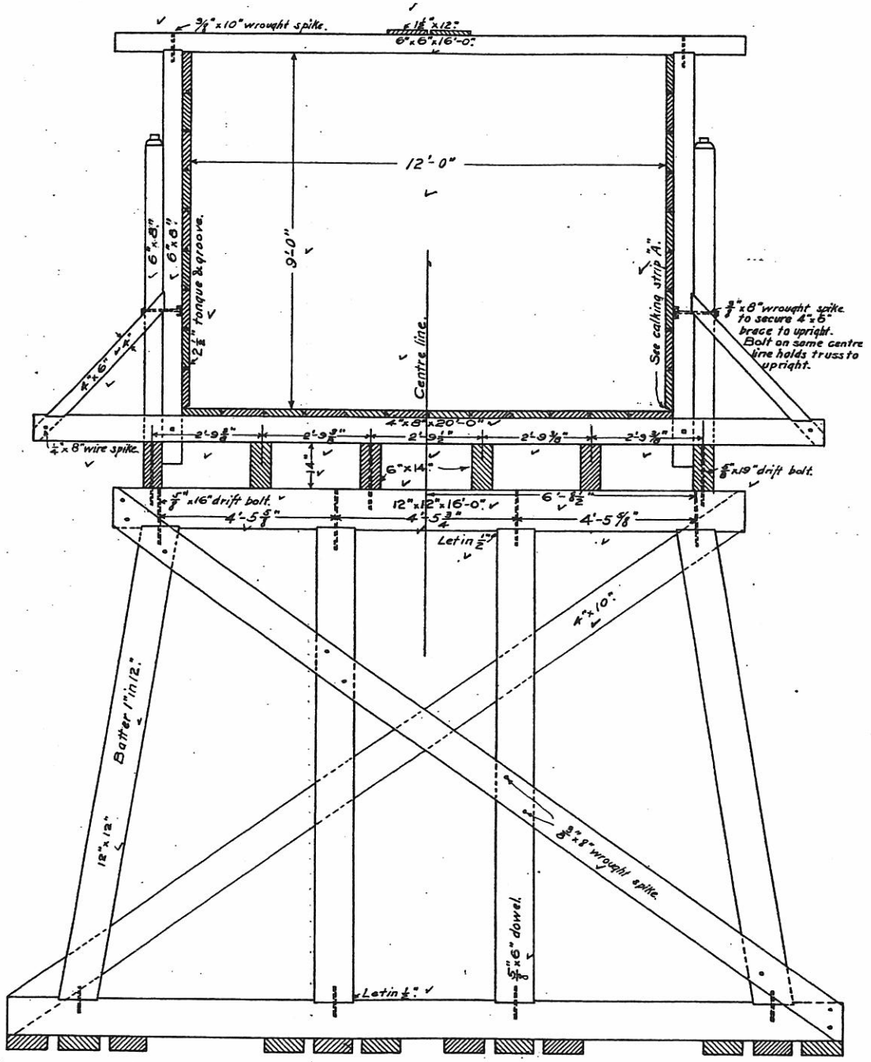
DO NOT SCALE THIS DRAWING. FOLLOW DIMENSIONS.

D. 140

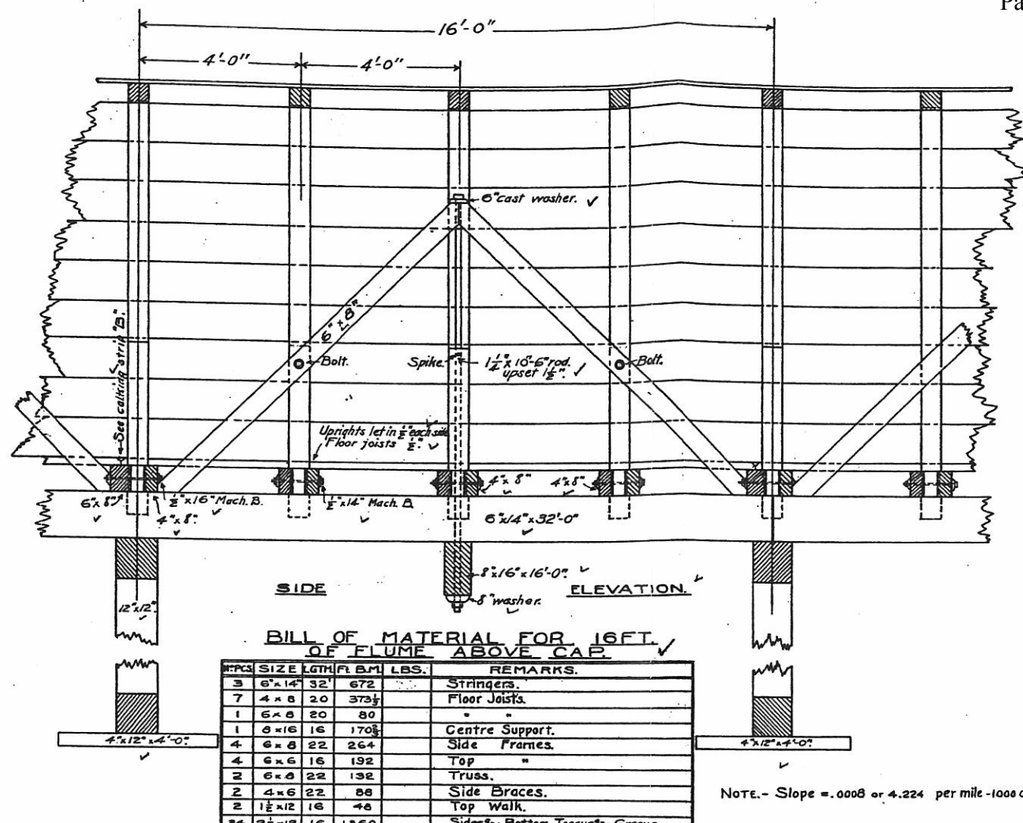
SCANNED



FLUME CANAL NO.1.				
WHITE RIVER GENERATING STATION.				
PUGET SOUND POWER AND LIGHT CO.				
Scale- ¾" = 1'-0"	Drawn-by	Traced-by	CK'D-by	W.R. ~~25.3~~.
Date-9-12-25	C.L.J.	C.L.J.		W.R.-305



√ End Elevation.



SIDE ELEVATION.

BILL OF MATERIAL FOR 16FT. OF FLUME ABOVE CAP.

No. PCS.	SIZE	LGTH.	Ft. B.M.	LBS.	REMARKS.
3	6"x14"	32'	672		Stringers.
7	4"x8"	20	373⅓		Floor Joists.
1	6"x8"	20	80		" "
1	8"x16"	16	170⅔		Centre Support.
4	6"x8"	22	264		Side Frames.
4	6"x6"	16	192		Top "
2	6"x8"	22	132		Truss.
2	4"x6"	22	88		Side Braces.
2	1½"x12"	16	48		Top Walk.
34	2½"x12"	16	1360		Sides ¼" & Bottom Tongue ¼" Groove.
2	⅝"x1½"	16	8		Calking Strip "A".
2	⅝"x1½"	12	6		" " "B".
			3369		
2	1¼" upset 1½"	10'-6"		120.	Truss Rods.
2	8"				Cast Washers - 1⅝" hole.
2	6"				" " " "
6	¾"	14"		5.9	Machine Bolts.
2	¾"	16"		2.2	" "
6	⅜"x⅜"	10"			Wrought Spikes.
8	⅜"x⅜"	8"			" "
16	½"	6"		6	Wire Spikes.
9	⅞"	19"		15	Drift Bolts.
70	20d			2.5	Wire Nails.
450	16d			90	" "
40	10d			0.6	" "
FOR BENT 16 Ft. IN HEIGHT.					
1	12"x12"	16'	192		Cap
1	12"x12"	32	384		Posts.
1	12"x12"	34	408		"
1	12"x12"	22	264		Sill.
2	4"x10"	26	173⅓		Sway Braces.
12	4"x12"	4	192		Mud Sills.
4	⅞"	16"			Drift Bolts.
4	⅞"	6"			Dowels.
20	⅜"x⅜"	8"			Wrought Spikes.
			1613⅓		

NOTE.- Slope = .0008 or 4.224 per mile - 1000 C.F.S.

Copied from H.L. Hawkin's plan dated Jan. 1903.
White River

DATE.	DESCRIPTION.	CHECKED & PROPERTY MANAGER
	TABLE OF CHANGES. USE ONLY PRINTS SHOWING LATEST CHANGE.	

FLUME

WHITE RIVER DEVELOPMENT.
THE TACOMA INDUSTRIAL CO.
STONE & WEBSTER ENGINEERING CORP.
BOSTON.

Scale ½" = 1 ft.
Aug. 29. 1906.
Eng. Job Order

CHECKED	INSPECTED	APPROVED
E.S.H.		V.-C.-A.
<4-4->		W.S.S.

H8101

H-sw 109
H.G.F-2.

DWR. NO. 1-V-(1)

PROJECT BOUNDARY

DINGLE BASIN

FILL AREAS

PROJECT BOUNDARY
ALONG EASTERLY BOUNDARY LINE OF COUNTY RD. --

WICKERSHAM BASIN

PROJECT BOUNDARY
ALONG EASTERLY BOUNDARY LINE OF COUNTY RD. - 1925'

BUCKLEY CITY LIMITS

WHITE RIVER

BUCKLEY CITY LIMITS

LIMITS OF SLUICING CHANNEL SEE RECORD SURVEY

SLUICING CHANNEL

T.20N.R.6E.W.M.
T.19N.R.6E.W.M.

T.20N.R6E.W.M.
T.19N.R6E.W.M.

WOL SLAGEL BASIN

EDGE OF CLEARING SEE RECORD SURVEY

ACCESS ROAD

BRIDGE

CONCRETE ARCH CULVERT

FLUME

PROJECT BOUNDARY
ALONG ACCESS ROAD R/W

PROJECT BOUNDARY
LOT 3

LOT 2

LOT 1

LOT 4

CEDARWILD ADDITION

BUCKLEY

P.S.H. No. 5 TO TACOMA

TO ENUMCLAW

NORTHERN PACIFIC RAILWAY

LEGEND
- EXISTING CONTOURS
- MONUMENT
- WATER COURSE
- PROPOSED SEDIMENT STORAGE AREAS

SCALE IN FEET

F-5265 SH 1/3

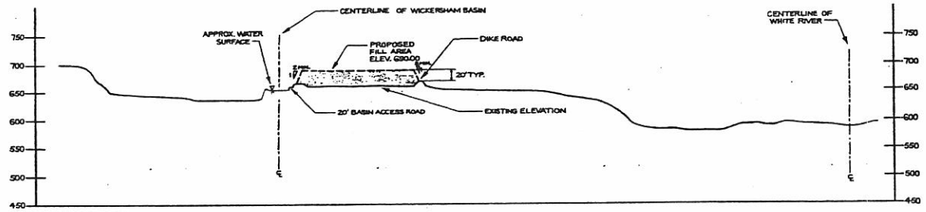
PUGET SOUND POWER & LIGHT COMPANY
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

BASIN SEDIMENT STORAGE PLAN

8/84

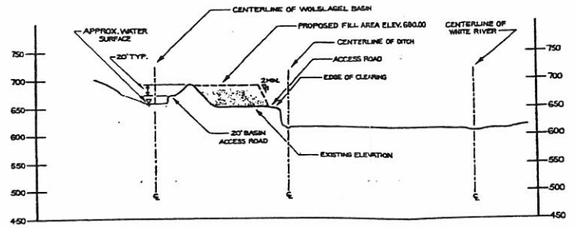
FILE No. 30

SCANNED



WICKERSHAM BASIN CROSS SECTION C

VERTICAL SCALE : 1" = 100'
HORIZONTAL SCALE : 1" = 300'



WOLSLAGEL BASIN CROSS SECTION D

VERTICAL SCALE : 1" = 100'
HORIZONTAL SCALE : 1" = 300'

SEDIMENT STORAGE VOLUMES
(APPROX.)

WICKERSHAM BASIN	684,000 C.Y.
WOLSLAGEL BASIN	598,000 C.Y.
TOTAL STORAGE VOLUME	1,282,000 C.Y.

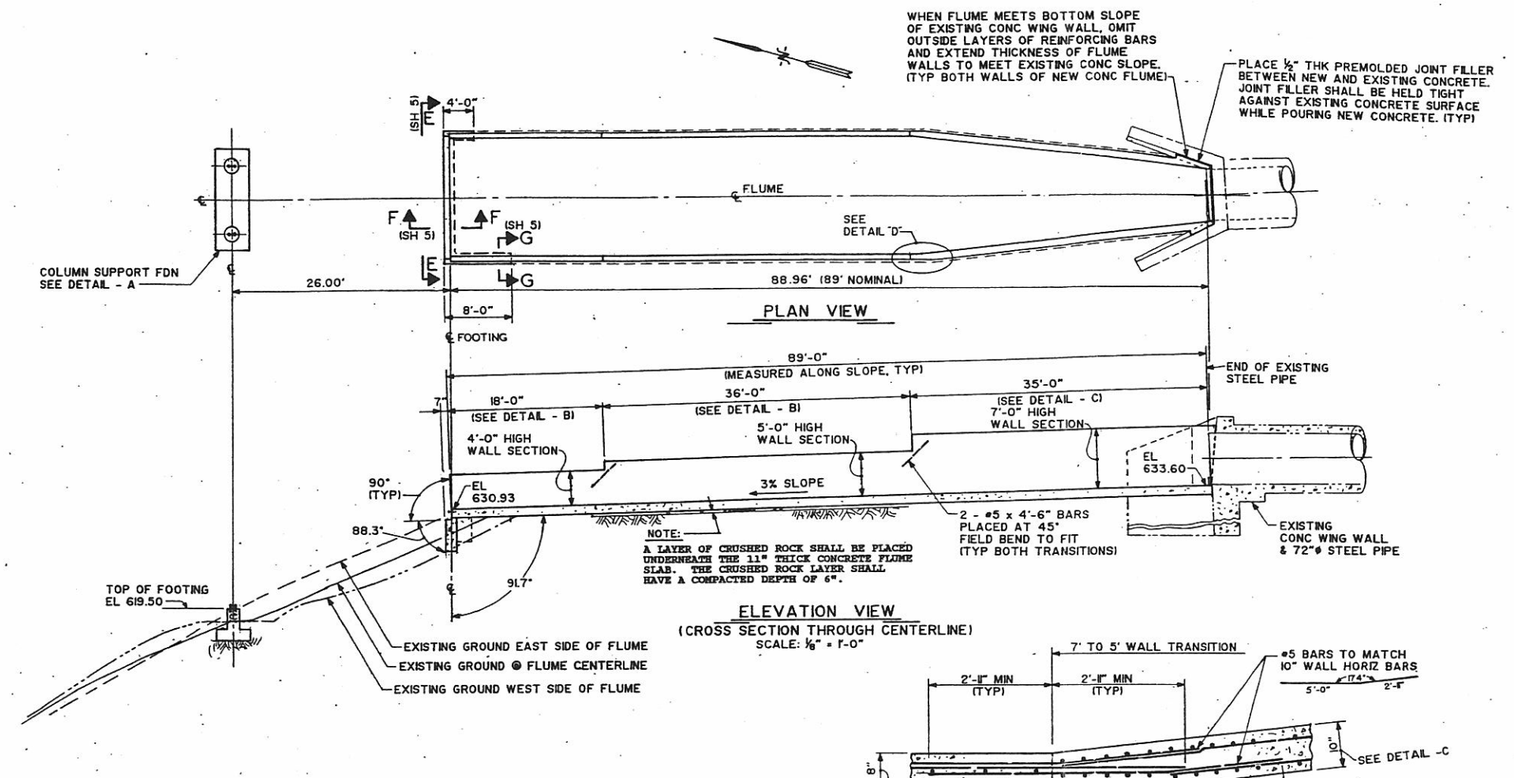
F-5265 SH. 3/3

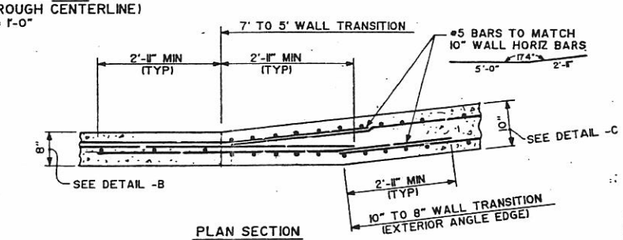
PUGET SOUND POWER & LIGHT COMPANY
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

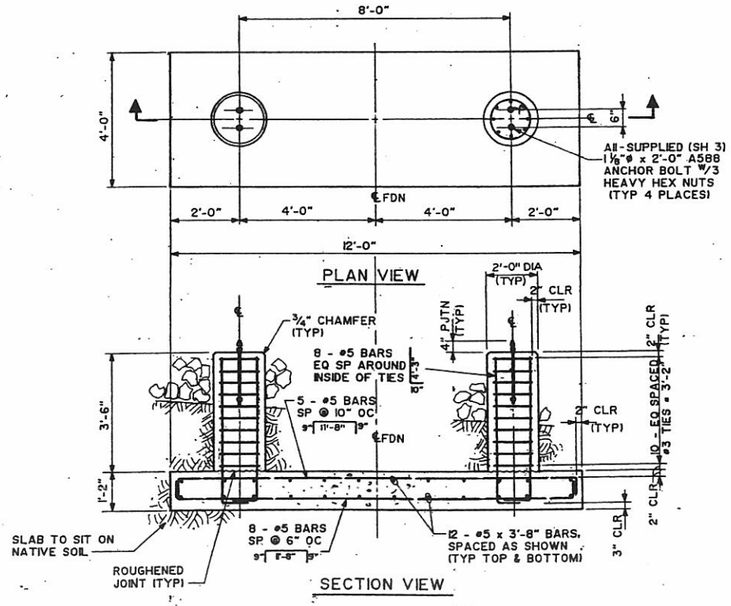
BASIN SEDIMENT STORAGE SECTIONS WITHIN BUCKLEY CITY LIMITS

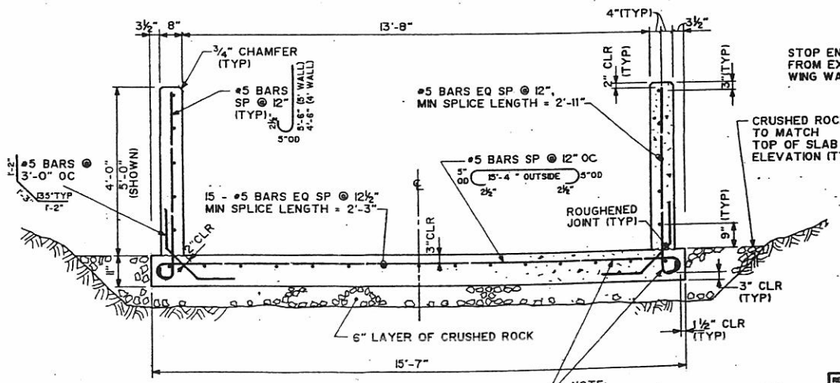
8/84

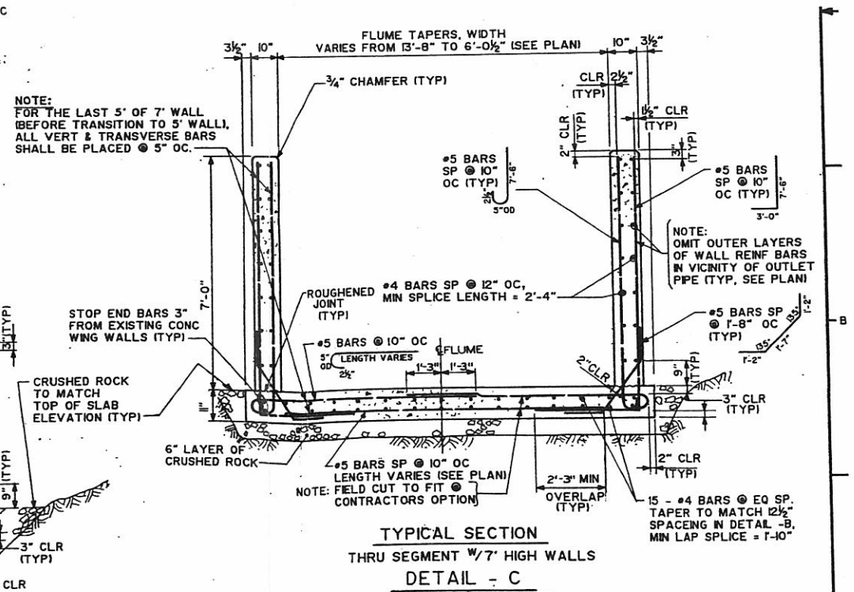
FILE NO: 30











CONCRETE AND REINFORCING NOTES

1. ALL CONCRETE SHALL HAVE A MINIMUM 7 DAY COMPRESSIVE STRENGTH OF 3000 PSI.
2. ALL REINFORCING BARS SHALL CONFORM TO ASTM-A615, GRADE 60.
3. ALL REINFORCING BARS SHALL BE FABRICATED IN ACCORDANCE WITH THE "ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315-80 AND SHALL BE CLEAN AND FREE OF GREASE AND SCALING RUST.
4. ALL CONCRETE WORK SHALL COMPLY WITH THE REQUIREMENTS OF ACI 301-72 (LATEST REVISION).
5. WHERE SHEAR KEYS ARE NOT REQUIRED AS SHOWN IN THE DRAWINGS AND WHEN CONCRETE IS PLACED AGAINST HARDENED CONCRETE, THE INTERFACE SHALL BE CLEAN, FREE OF LAITANCE AND INTENTIONALLY ROUGHENED TO AN AMPLITUDE OF 1/4 INCH.
6. ALL EXPOSED SALIENT CORNERS AND EDGES SHALL BE CHAMFERED 3/4" AND ALL RE-ENTRANT CORNERS, EXCEPT WALL TO FLOOR CONSTRUCTION JOINTS, SHALL HAVE A 3/4" FILLET.
7. AN AIR ENTRAINING AGENT, CONFORMING TO UBC STANDARD NO. 26-9 SHALL BE ADDED TO ALL CONCRETE. THE AMOUNT OF ENTRAINED AIR SHALL BE 5% ± 1% BY VOLUME.
8. CALCIUM CHLORIDE (CaCl2) OR OTHER WATER-SOLUABLE CHLORIDE ION ADMIXTURES SHALL NOT BE USED.
9. REINFORCING BARS IN BEAMS AND SLABS SHALL BE SUPPORTED ON WELL-CURED CONCRETE BLOCKS OR APPROVED METAL CHAIRS AS SPECIFIED BY THE CRSI MANUAL OF STANDARD PRACTICE.
10. LAP SPLICES FOR REINFORCING SHALL BE AS SHOWN ON THE DRAWINGS. MECHANICAL OR WELDED BUTT SPLICES SHALL NOT BE USED. AT NO TIME WILL WELDING OF THE REINFORCING BE ALLOWED. ALL VERTICAL REINFORCING BARS SHALL BE CONTINUOUS WITH NO LAP SPLICES.
11. THE BOTTOM LAYER OF REINFORCING IN CONCRETE CAST AGAINST EARTH SHALL HAVE 3" OF CONCRETE COVER. ALL OTHER REINFORCING SHALL HAVE A CONCRETE COVER SHOWN ON THE CONSTRUCTION DRAWINGS.
12. ALL GROUT SHALL BE NON-SHRINK TYPE.
13. ALL CONCRETE REINFORCING AND ANCHOR BOLTS SHALL BE INSPECTED FOR CONFORMANCE WITH THE APPROVED CONSTRUCTION DRAWINGS BY THE DESIGN ENGINEER OR A SPECIAL INSPECTOR APPROVED BY THE DESIGN ENGINEER PRIOR TO PLACING CONCRETE. THE ENGINEER OR SPECIAL INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 2 DAYS PRIOR TO PLACING CONCRETE. APPROVAL BY THE ENGINEER OR SPECIAL INSPECTOR WILL NOT RELIEVE THE CONTRACTOR'S RESPONSIBILITY TO COMPLY WITH THE APPROVED CONSTRUCTION DRAWINGS.
14. THE CONTRACTOR SHALL ALLOW ACCESS FOR A SPECIAL INSPECTOR TO TAKE SAMPLES OF AND PERFORM TESTS ON ANY CONCRETE DELIVERED TO THE SITE.
15. EMBEDDED HEX NUT ON ALL ANCHOR BOLTS SHALL BE TIGHTENED AGAINST THREAD RUN OUT PRIOR TO PLACING BOLTS. PROJECTING ANCHOR BOLT THREADED ENDS SHALL BE COVERED TO PREVENT CONCRETE FROM ADHERING TO THE BOLT THREADS DURING CONCRETE PLACEMENT.

Concrete Flume

REVISION DESCRIPTION		WO NO: 9402596	CONCRETE PLAN AND DETAILS WOLSLAGEL DISCHARGE FLUME
ORIGINAL ISSUE			
	APPROVAL	DATE (M, D, Y)	
DRAWN BY	mt	5/26/94	
CADD/DRAFT	DAD	7/5/94	
DESIGNER	DAL	7/6/94	
	FMC	7/12/94	
LOG OUT		7/13/94	

PUGET POWER — ENGINEERING DEPARTMENT — DRAWING NO D-10704 — REV NO 0 — SHEET 4 OF 6 — SCALE: NOTED — CLASS: — MICROFILMED: — FILE NO D-190 — CADD NO:

SCANNED

Section A-A

Section Thru 6'-0" Culvert

Bent No. 1

Detail of Bent

Bent #2

Bent #3

Bent #4

Plan

Section Thru Culvert

Rear Elevation

Detail of Angles

Cross-Section of Culvert
Showing Reinforcement.
1.07 cu. yds. Concrete per lin. ft.

Guide - 1 Req'd.
Cast Iron.

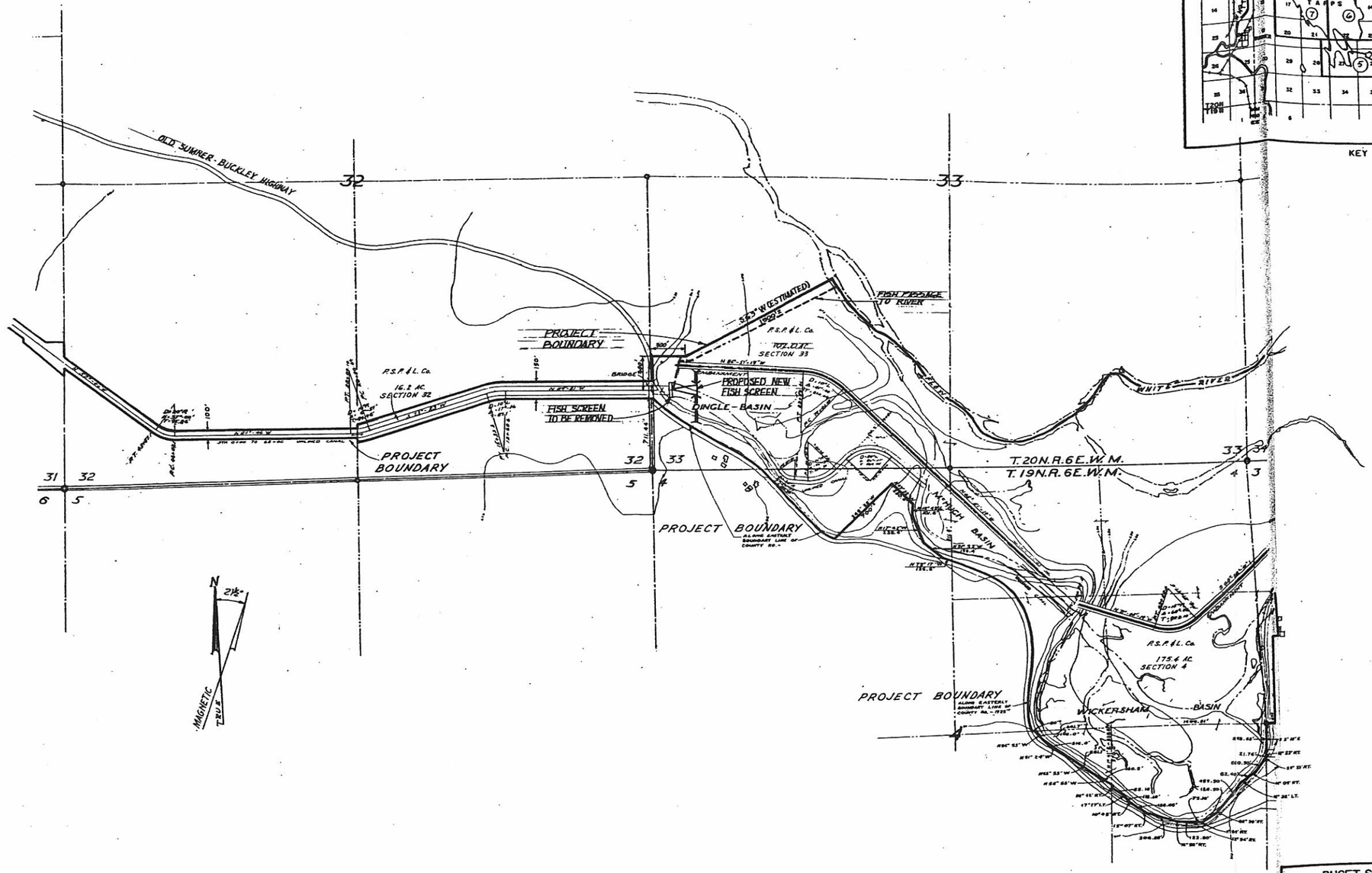
Wolslegal Basin.
Plan and Sections of
6'-0" Dia. Culvert.
Pacific Coast Power Co.
Stone & Webster Engineering Corp
Boston

Scale
Jan. 4 - 1911
Const. Job Order 397

F 20231

64 - K(1)
= 3512

397-E-sw 359
46



F-5264 SH 4/11

PUGET SOUND POWER & LIGHT COMPANY
APPLICATION FOR LICENSE
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

PROJECT BOUNDARY MAP

EXHIBIT G-3

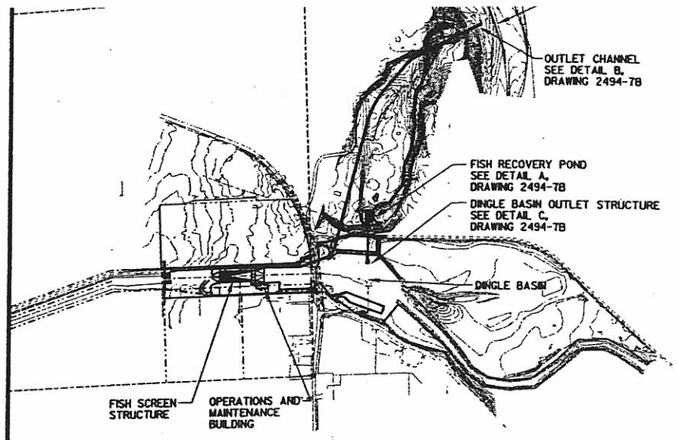
FERC DRAWING NO.

2494-15

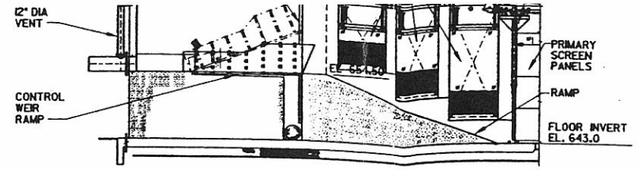
12/83

FILE NO.: 30

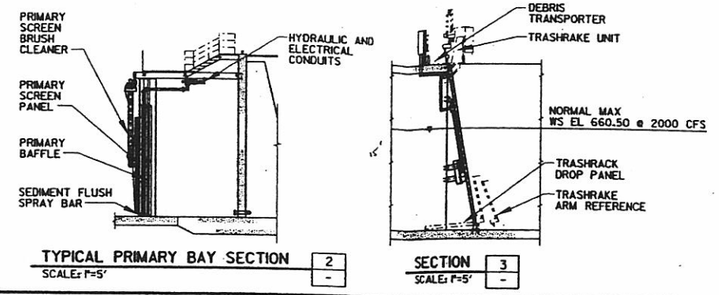
SCANNED



VICINITY MAP

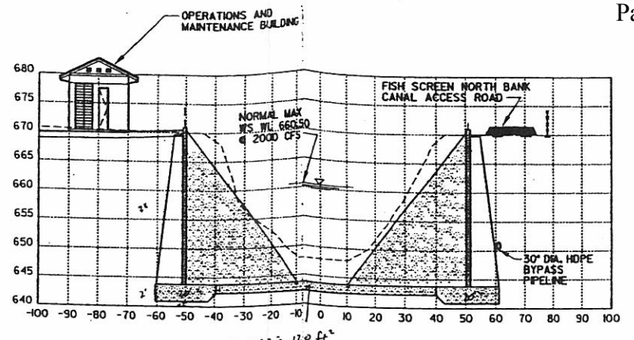


SECONDARY SCREEN - FRONT ELEVATION 1 –
SCALE: 1"=5'

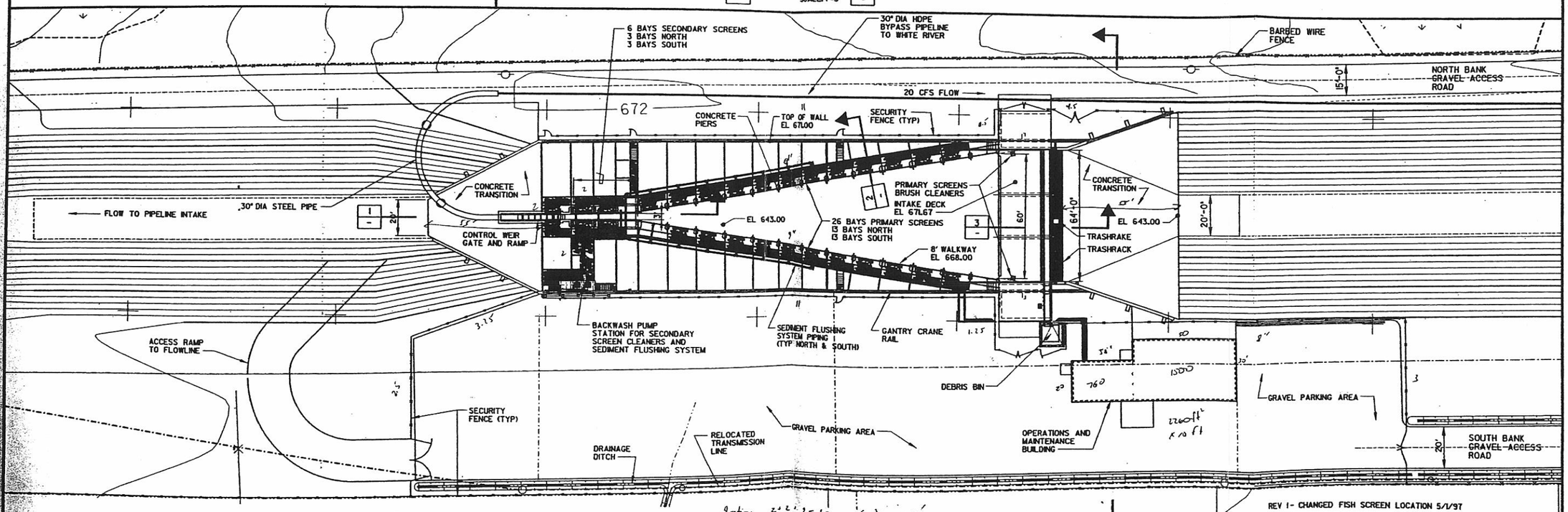


TYPICAL PRIMARY BAY SECTION 2 –
SCALE: 1"=5'

SECTION 3 –
SCALE: 1"=5'



SECTION 4 –
HORZ: 1" = 10'
VERT: 1" = 5'



PLAN-FISH SCREEN AND BYPASS

REV 1- CHANGED FISH SCREEN LOCATION 5/1/97

PUGET SOUND POWER & LIGHT COMPANY
APPLICATION FOR LICENSE
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

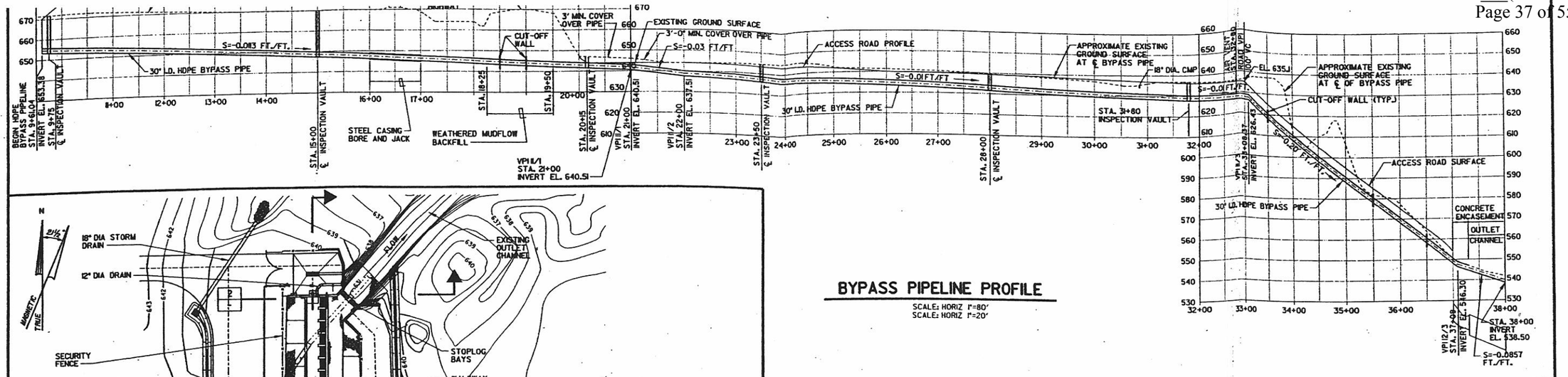
FISH SCREEN

EXHIBIT F-7

FERC DRAWING NO.

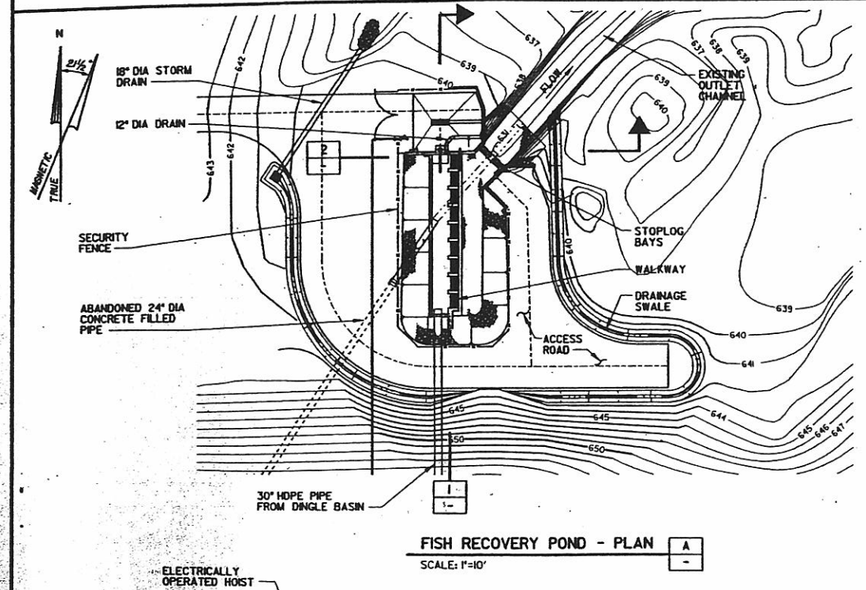
2494-7(A)

4/4/97 | PUGET DWG F-5272 SH 01 REV 1



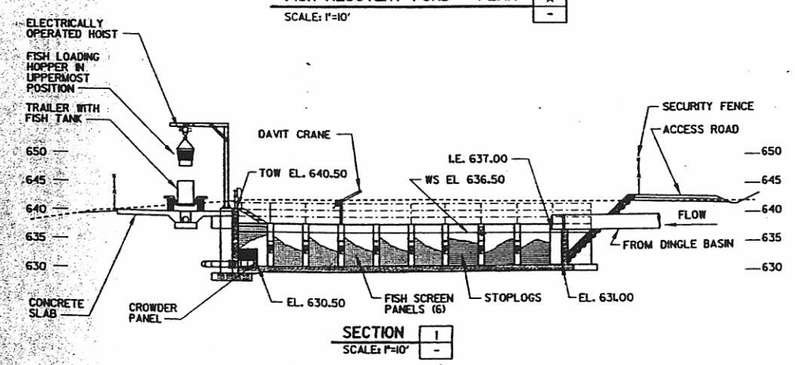
BYPASS PIPELINE PROFILE

SCALE: HORIZ 1"=80'
SCALE: HORIZ 1"=20'



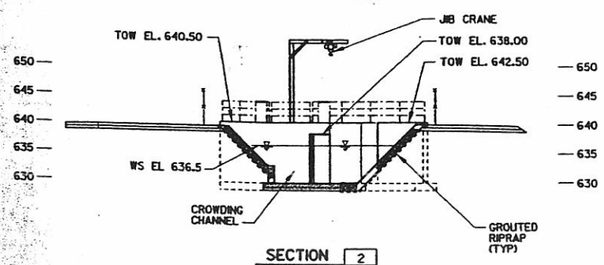
FISH RECOVERY POND - PLAN [A -]

SCALE: 1"=10'



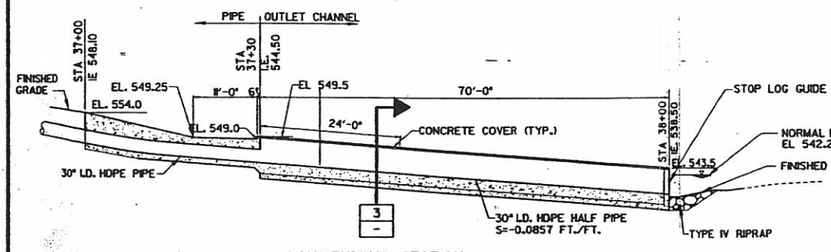
SECTION [1 -]

SCALE: 1"=10'



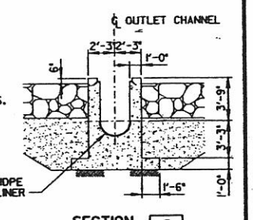
SECTION [2 -]

SCALE: 1"=10'



LONGITUDINAL SECTION [3 -]

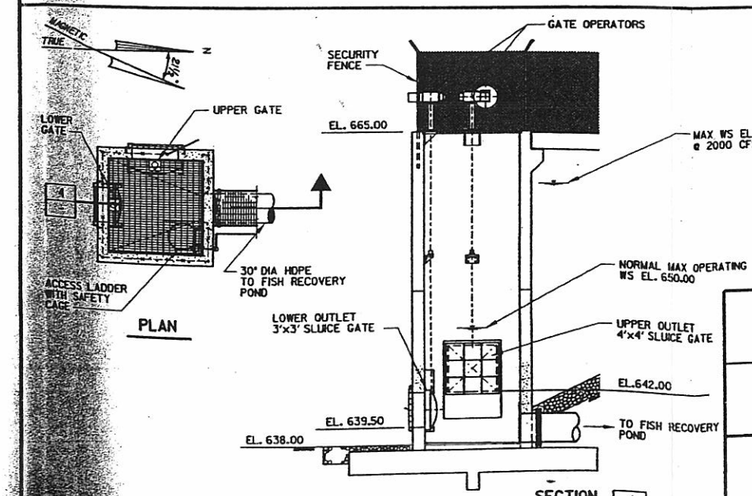
SCALE: 1"=10'



SECTION [3 -]

SCALE: 1"=5'

BYPASS PIPELINE OUTLET CHANNEL [B -]



PLAN [4 -]

SECTION [4 -]

DINGLE BASIN OUTLET STRUCTURE [C -]

SCALE: 1"=5'

PUGET SOUND POWER & LIGHT COMPANY
APPLICATION FOR LICENSE
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

FISH SCREEN

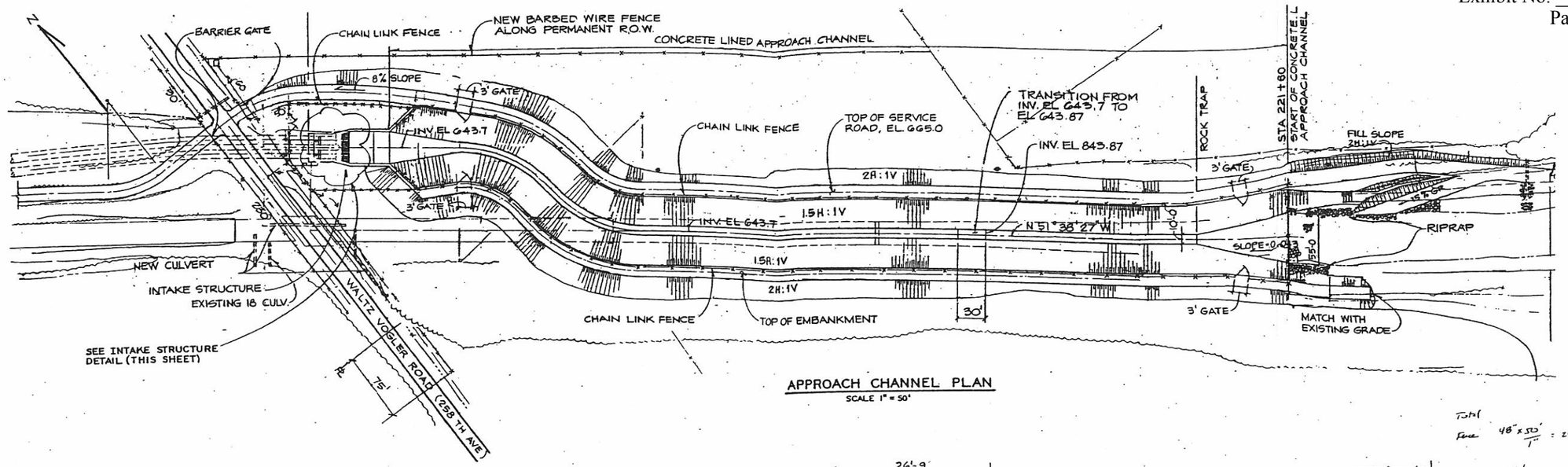
EXHIBIT F-7

FERC DRAWING NO.

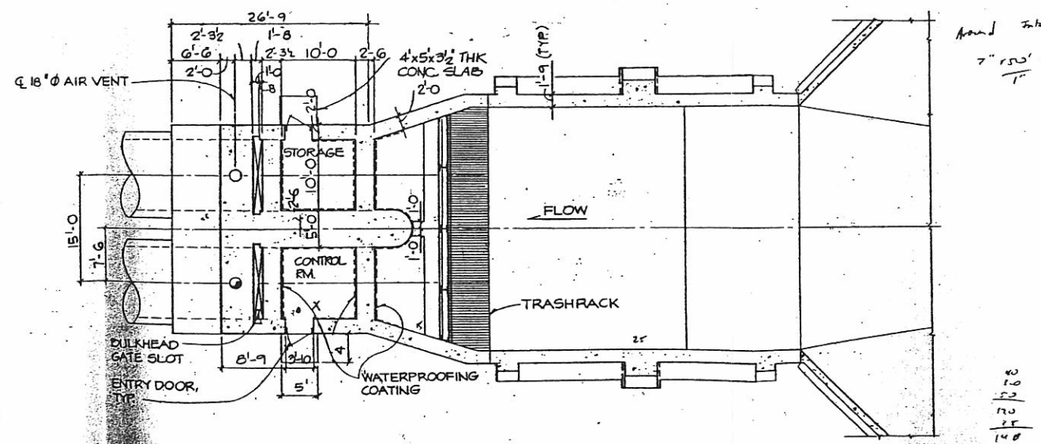
2494-7(B)

SCANNED

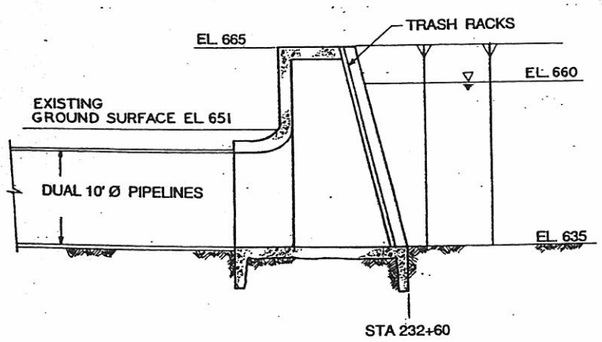
PUGET DWG F-5272 SH 02 REV 0



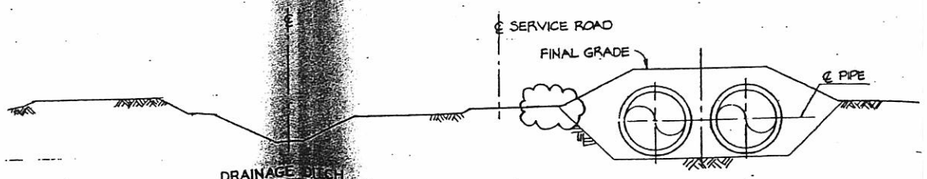
APPROACH CHANNEL PLAN
SCALE 1" = 50'



INTAKE STRUCTURE DETAIL
SCALE ⅛" = 1'-0"



INTAKE STRUCTURE PROFILE



PIPELINE CROSS SECTION
SCALE 1" = 10'

NOTE: ALL ELEVATIONS ARE GIVEN IN FEET MEAN SEA-LEVEL (FMSL), UNITED STATES COAST AND GEODETIC SURVEY DATUM.

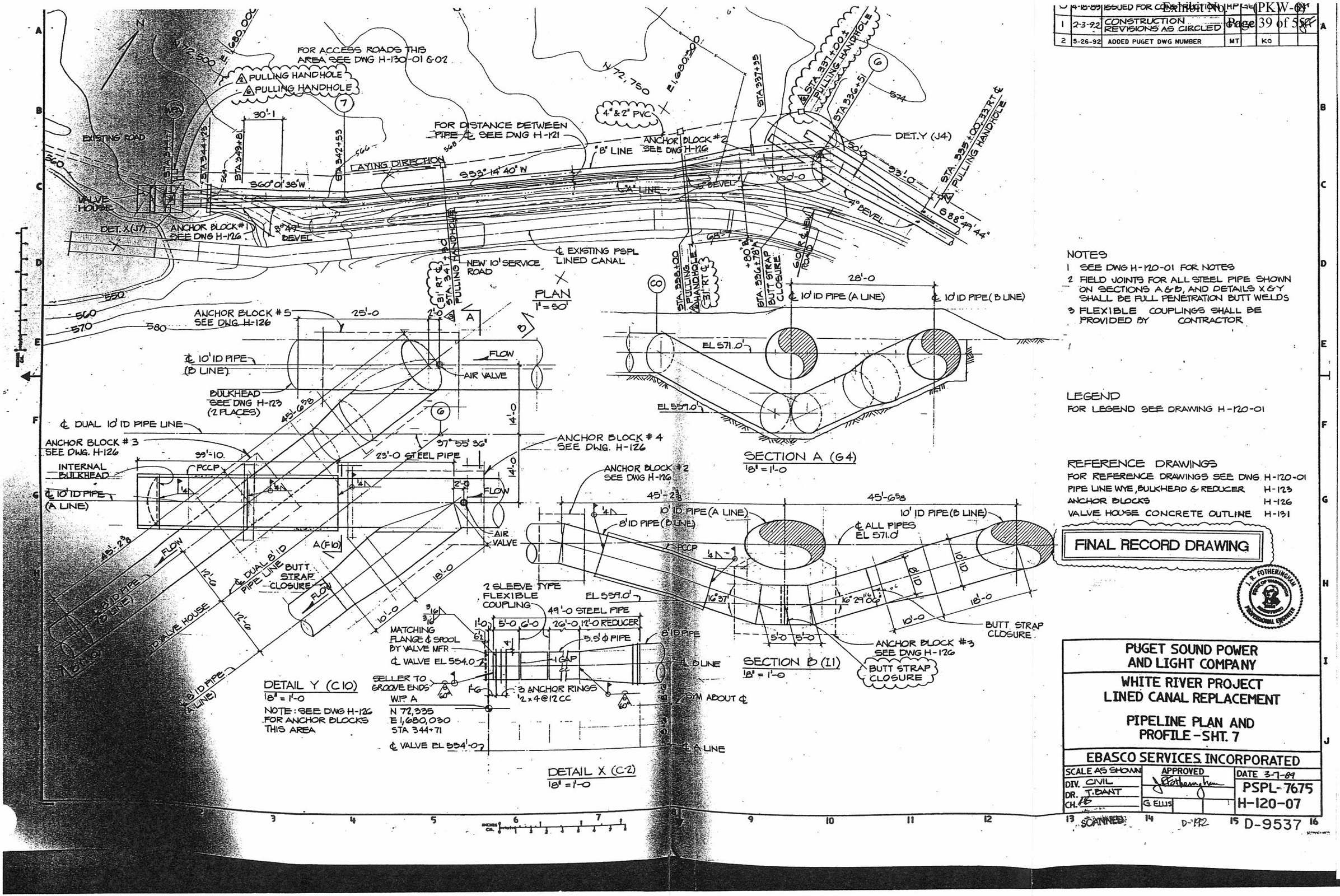
REV 1 7-16-92 SH 3 OF 5 F-5273

PUGET SOUND POWER & LIGHT COMPANY
APPLICATION FOR LICENSE
WHITE RIVER PROJECT
FERC PROJECT NO. 2494

PROPOSED IN-LINE POWER GENERATION
PROJECT DETAILS & SECTIONS
EXHIBIT F-10

FERC DRAWING NO.
2494-10(R)

3	4-18-89	ISSUED FOR CONSTRUCTION	MP		KO	
1	2-3-92	CONSTRUCTION REVISIONS AS CIRCLED	MT		KO	
2	5-26-92	ADDED PUGET DWG NUMBER	MT		KO	



NOTES

1 SEE DWG H-120-01 FOR NOTES
2 FIELD JOINTS FOR ALL STEEL PIPE SHOWN ON SECTIONS A & B, AND DETAILS X & Y SHALL BE FULL PENETRATION BUTT WELDS
3 FLEXIBLE COUPLINGS SHALL BE PROVIDED BY CONTRACTOR

LEGEND

FOR LEGEND SEE DRAWING H-120-01

REFERENCE DRAWINGS

FOR REFERENCE DRAWINGS SEE DWG	H-120-01
PIPE LINE WYE, BULKHEAD & REDUCER	H-123
ANCHOR BLOCKS	H-126
VALVE HOUSE CONCRETE OUTLINE	H-131

FINAL RECORD DRAWING

J. R. FOTHERINGHAM STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

PUGET SOUND POWER AND LIGHT COMPANY

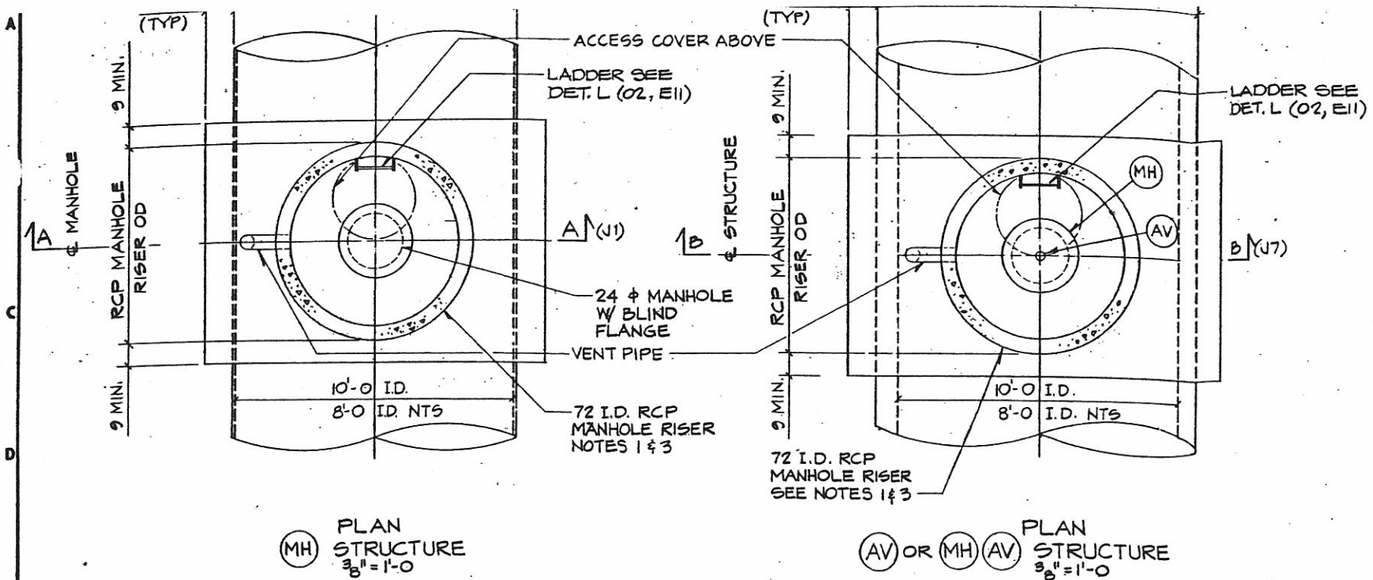
WHITE RIVER PROJECT
LINED CANAL REPLACEMENT

PIPELINE PLAN AND PROFILE - SHT. 7

EBASCO SERVICES INCORPORATED

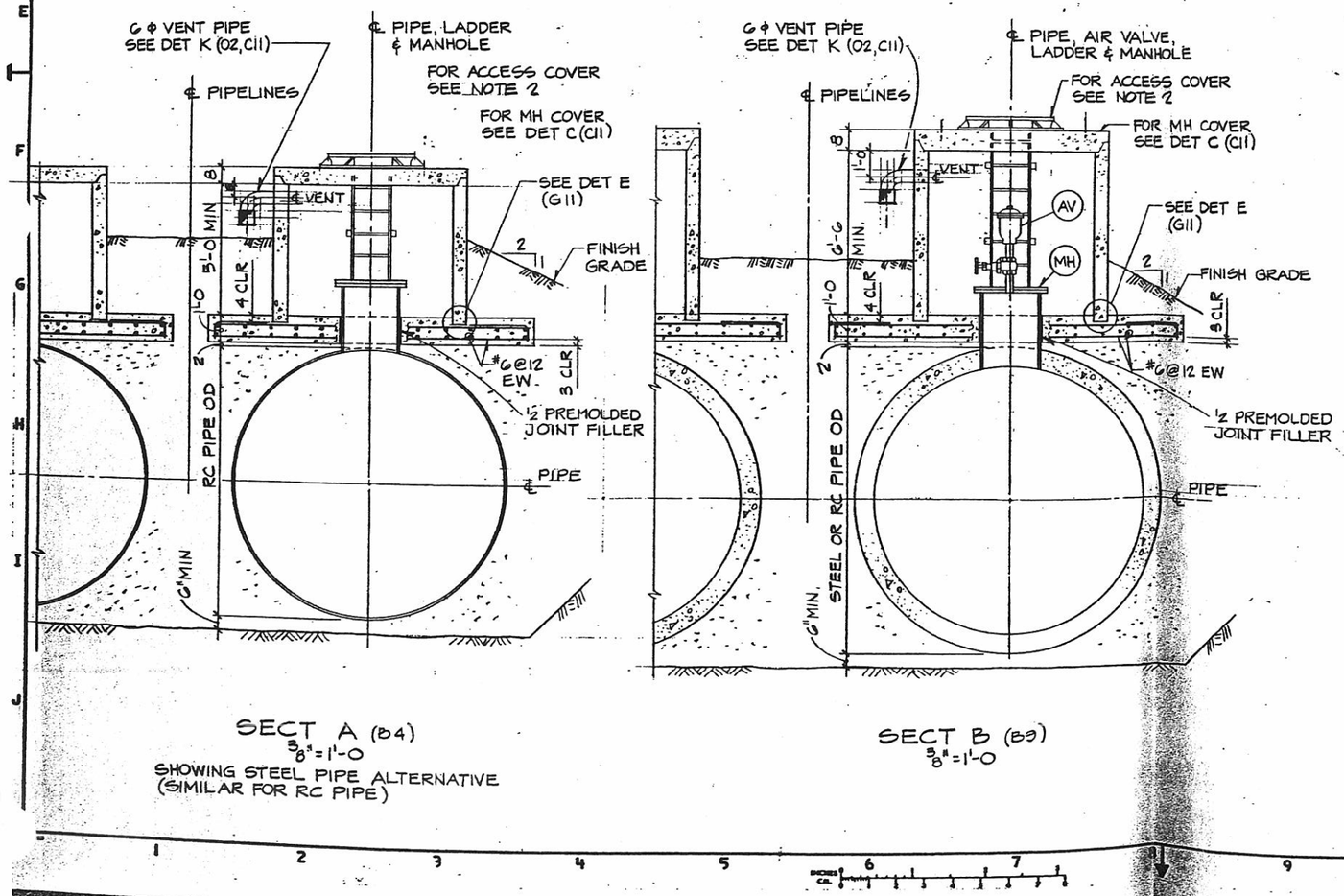
SCALE AS SHOWN	APPROVED	DATE 3-7-89
DIV. CIVIL		PSPL-7675
DR. T. DANT		H-120-07
CH. [illegible]	G. ELLIS	

1	2-3-92	CONSTRUCTION REVISIONS AS CIRCLED				
2	5-28-92	ADDED PUGET DWG NUMBER	MT		KO	



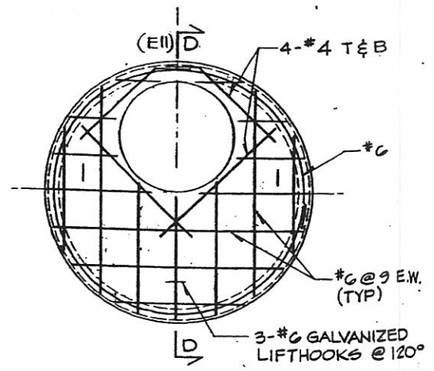
MH PLAN STRUCTURE
3/8" = 1'-0

AV OR MH AV PLAN STRUCTURE
3/8" = 1'-0

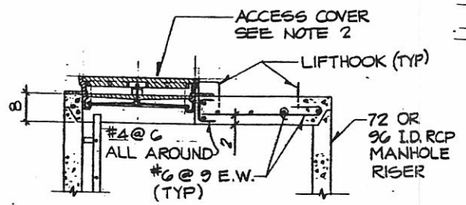


SECT A (B4)
3/8" = 1'-0
SHOWING STEEL PIPE ALTERNATIVE
(SIMILAR FOR RC PIPE)

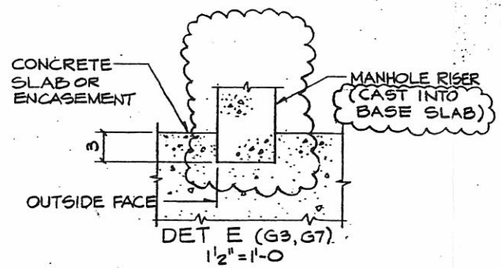
SECT B (B9)
3/8" = 1'-0



DET C (F3, F7)(02, E1)(02, F6)
MANHOLE COVER
1/2" = 1'-0



SECT D (C11)
1/2" = 1'-0



DET E (G3, G7)
1 1/2" = 1'-0

NOTES

1. ALL MANHOLE RISER JOINTS SHALL BE KEYED AND CAULKED WATERTIGHT.
2. ACCESS RING AND COVER SHALL BE NEENAH FOUNDRY NO. R-1751-D WITH LOCKING INNER COVER OR APPROVED ALTERNATE.
3. MANHOLE RISERS SHALL BE ASTM C76, CLASS I, WALL THICKNESS B.
4. OWNER FURNISHED PIPE WILL BE PRESTRESSED CONCRETE MANUFACTURED BY AMERON, EXCEPT WYES, BULKHEADS, REDUCERS AND 66-INCH DIAMETER PIPE WHICH WILL BE STEEL AND SUPPLIED BY AMERON.

LEGEND
MH - MANHOLE
AV - AIR RELEASE VALVE

REFERENCE DRAWINGS

H-100	SITE PLAN
H-120	PIPELINE PLAN AND PROFILE SHEETS 01-07
H-121	TYPICAL PIPELINE CROSS SECTION

FINAL RECORD DRAWING

J. R. FOTHERINGHAM — STATE OF WASHINGTON — REGISTERED ENGINEER

PUGET SOUND POWER AND LIGHT COMPANY

WHITE RIVER PROJECT
LINED CANAL REPLACEMENT

PIPELINE DETAILS - SHT. 1

EBASCO SERVICES INCORPORATED

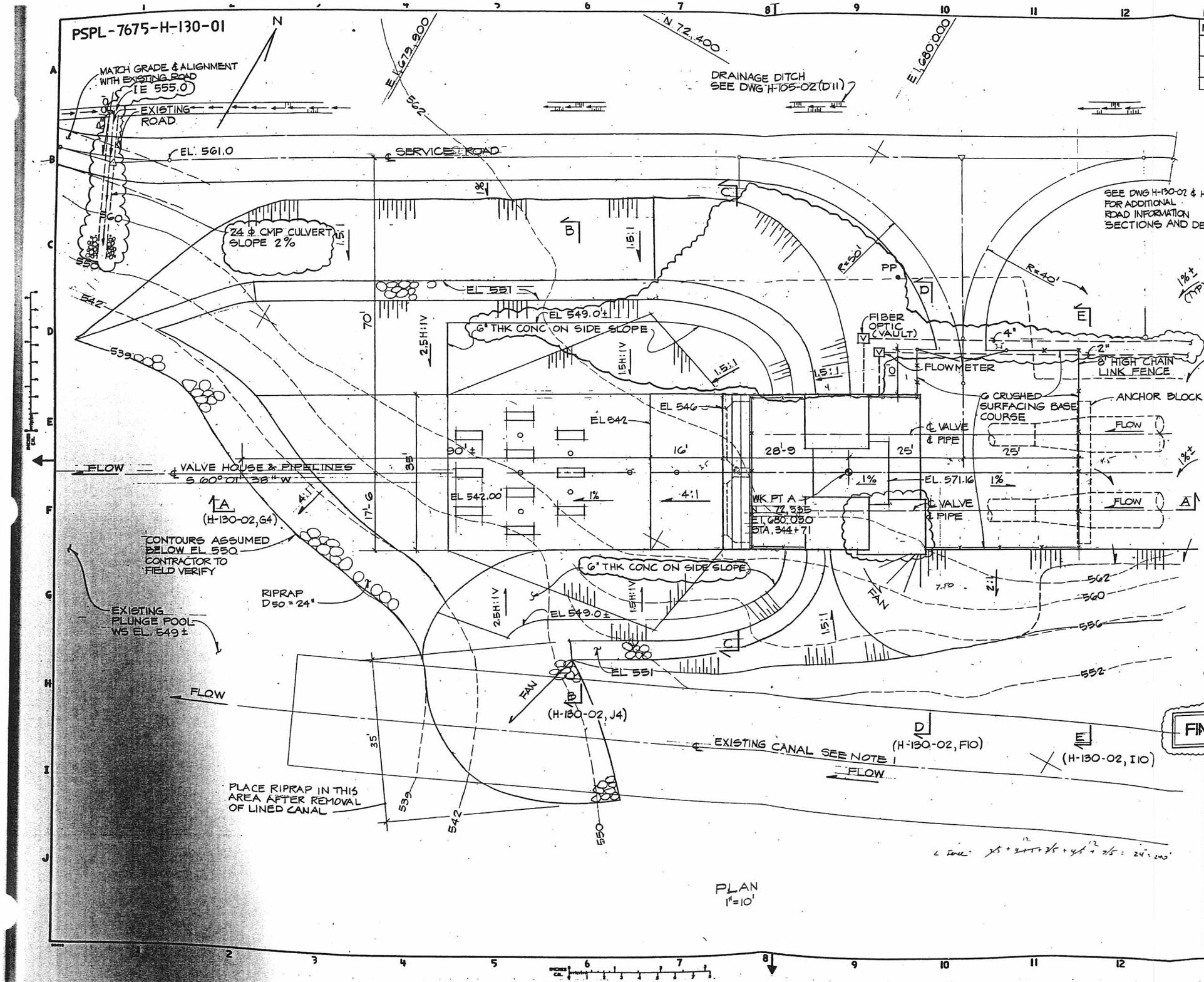
SCALE AS NOTED	APPROVED	DATE 3-7-89
DIV. CIVIL		PSPL-7675
DR. H. PIATOTE		H-122-01
CH. G ELLIS		

D-192

D-9539

PSPL-7675-H-130-01

NO	DATE	REVISION	BY	CH	APPROVED	
0	4-18-89	ISSUED FOR CONSTRUCTION	HP	MJF		MJF
1	2-3-92	CONSTRUCTION REVISIONS AS CIRCLED	GY	GE		MJF
2	5-26-92	ADDED PUGET DWG NUMBER	MT		KO	



NOTE

1. EXISTING LINED CANAL SHALL REMAIN IN FULL OPERATING SERVICE DURING CONSTRUCTION OF VALVE HOUSE AND CHANNEL. AFTER COMPLETION OF VALVE HOUSE AND FINAL OPERATIONAL ACCEPTANCE OF THE PIPELINE AND VALVE FACILITY, THE EXISTING CANAL WILL BE DEMOLISHED IN ACCORDANCE WITH THE SPECIFICATION S-95 "DEMOLITION" AND DWG H-103.

REFERENCE DRAWINGS

H-100	SITE PLAN
H-102	ROAD DETAILS
H-103	DEMOLITION
H-105	SITE DRAINAGE
H-120	PIPELINE PLAN & PROFILE
H-126	PIPELINE ANCHOR BLOCKS
H-130-02	GENERAL ARRANGEMENT
H-131	VALVE HOUSE CONC. OUTLINE
H-132	VALVE HOUSE CONC. REINFORCING
H-133	MISC. METAL
H-141	VALVE HOUSE ELECTRICAL
H-130-03	STILLING BASIN; PLAN & SECTION
H-134	VALVE HOUSE 1991 MODIFICATIONS
H-135	" " " "
H-136	" " " "
H-137	" " " "

J. R. FOTHERINGHAM STATE OF WASHINGTON 9889 REGISTERED PROFESSIONAL ENGINEER

FINAL RECORD DRAWING

PUGET SOUND POWER AND LIGHT COMPANY

WHITE RIVER PROJECT
LINED CANAL REPLACEMENT

VALVE HOUSE
GENERAL ARRANGEMENT SHT. 1

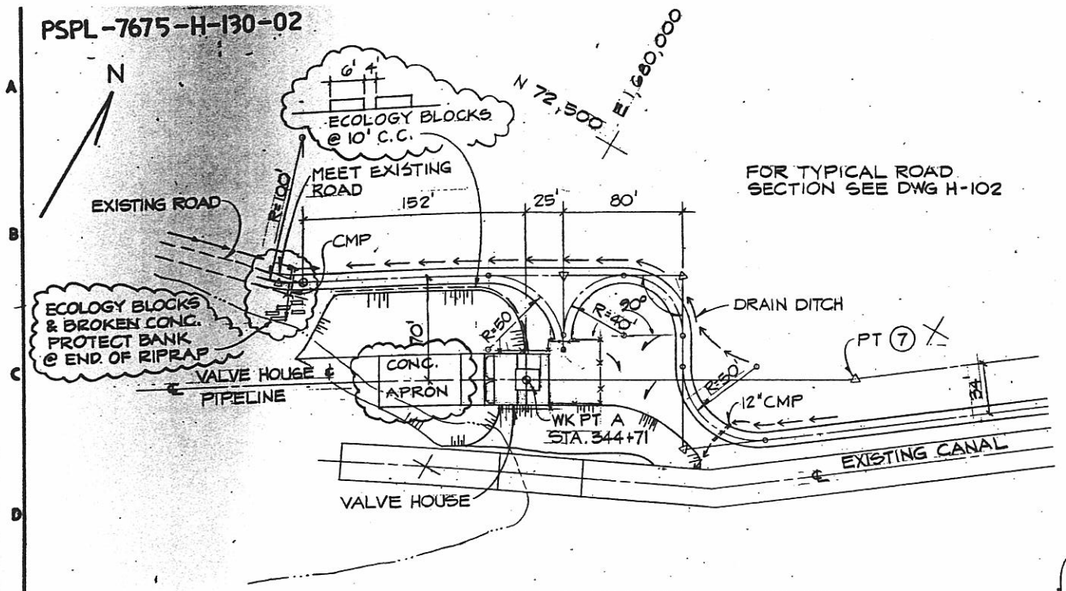
EBASCO SERVICES INCORPORATED

SCALE 1"=10'	APPROVED J. Fotheringham	DATE 3-7-89
DIV. CIVIL		PSPL-7675
DR. H. PIATOTE		H-130-01
CH. M.J. Fan		

PSPL-7675-H-130-02

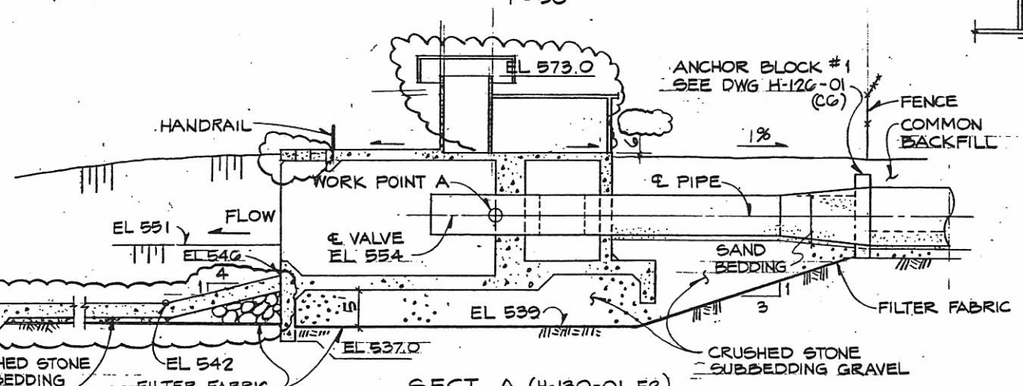
NO	DATE	REVISION	DR	CK	EW	APPROVED
0	4-18-89	ISSUED FOR CONSTRUCTION	HP			JFF
1	2-3-92	CONSTRUCTION REVISIONS AS CIRCLED	GY	GE		JFF
2	5-26-92	ADDED PUGET DWG NUMBER	MT		KD	

Exhibit No. (PKW-6)
Page 42 of 55

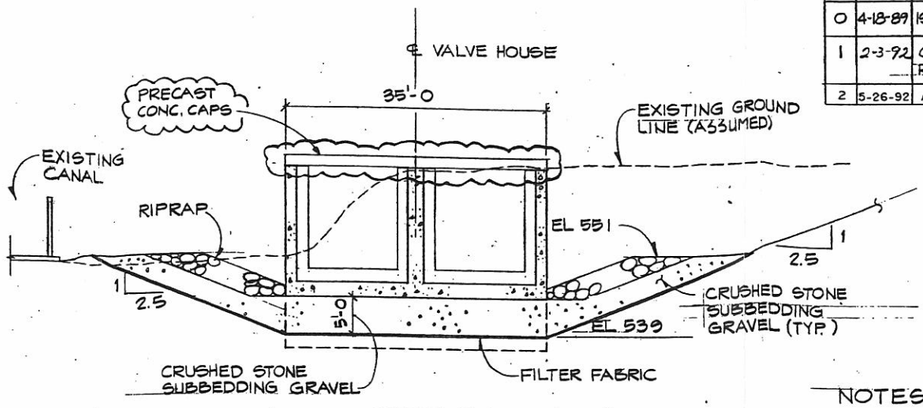


FOR TYPICAL ROAD SECTION SEE DWG H-102

NEW ROAD LOCATION PLAN
1" = 50'

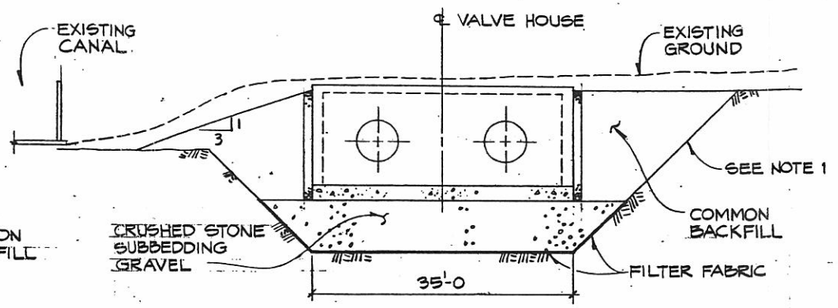


SECT A (H-130-01, F2)
1"=10'-0



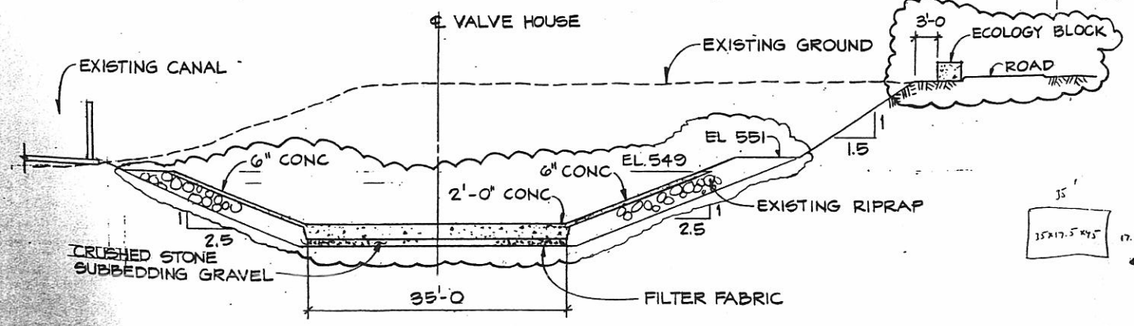
SECT C (H-130-01, H8)
1" = 10'-0

NOTES
1. TEMPORARY CUT SLOPES TO BE DETERMINED BY CONTRACTOR.

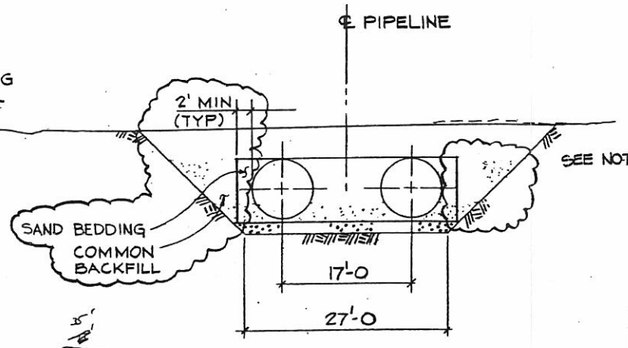


SECT D (H-130-01, I10)
1"=10'-0

REFERENCE DRAWINGS
H-130-01 GENERAL ARRANGEMENT SHT 1



SECT B (H-130-01, H6)
1"=10'-0



SECT E (H-130-01, I12)
1"=10'-0

FINAL RECORD DRAWING

PUGET SOUND POWER AND LIGHT COMPANY

WHITE RIVER PROJECT
LINED CANAL REPLACEMENT

VALVE HOUSE
GENERAL ARRANGEMENT SHT. 2

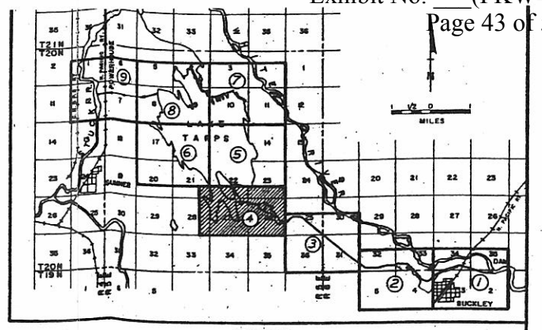
EBASCO SERVICES INCORPORATED

SCALE AS NOTED	APPROVED	DATE 3-7-89
DIV. CIVIL		PSPL-7675
DR. H. PIATOTE		H-130-02
CH. M.J. Fine		

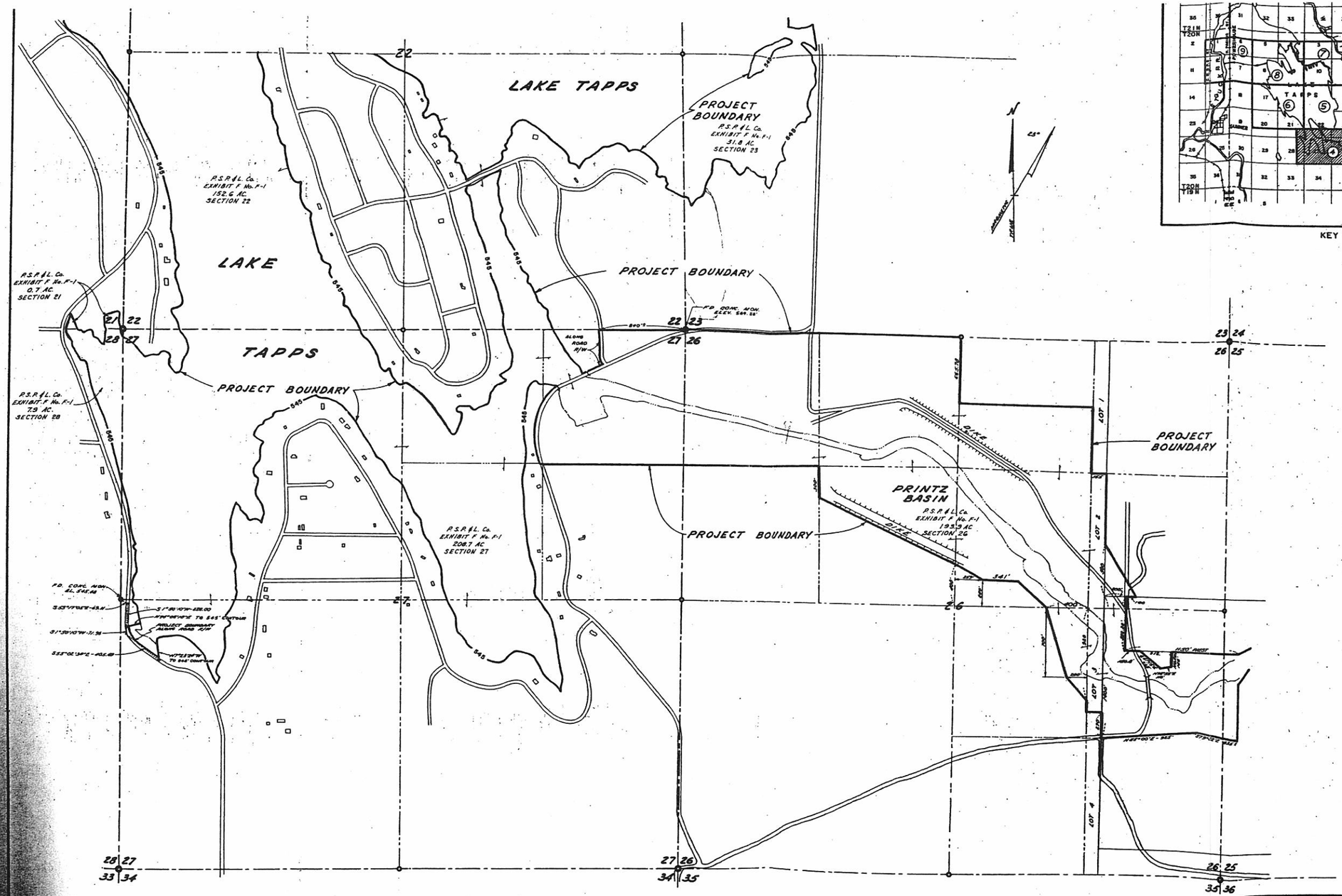
Dam
Stre
Lak
Ha

SCANNED

D-192 D-9544



KEY MAP



I CERTIFY THAT I SUPERVISED THE PREPARATION OF THE EXHIBIT DRAWINGS; AND THAT THEY ACCURATELY SHOW THE PROJECT LANDS AND APPURTENANCES AS OBTAINED FROM THE RECORDS OF THE ORIGINAL SURVEY NOTES AND PROJECT DRAWINGS IN THE PUGET SOUND POWER & LIGHT COMPANY FILES.

N. W. PETTIJOHN

PETTIJOHN ENGINEERING CO., INC. WAS RETAINED BY THE LICENSEE TO MAKE THIS EXHIBIT DRAWING.

N. W. PETTIJOHN STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

T. 20N., R. 5 E., W.M.
PIERCE CO., WASHINGTON

400 200 0 400 800 1200 1600 2000
SCALE IN FEET
1" = 400'

LEGEND

TOWNSHIP LINES
SECTION LINES
1/4 SECTION LINES
1/16 SECTION LINES
PROJECT BOUNDARY

VERTICAL DATUM - U.S.G.S.

EXHIBIT K SHEET 4

THIS MAP IS BEING SUBMITTED BY THE UNDERSIGNED THIS 13TH DAY OF MAY 1966 FOR INCLUSION IN THE APPLICATION FOR LICENSE FOR PROJECT NO. 2494 WHICH WAS SUBMITTED NOVEMBER 18, 1964

PUGET SOUND POWER & LIGHT COMPANY

BY _____
SR. VICE PRESIDENT

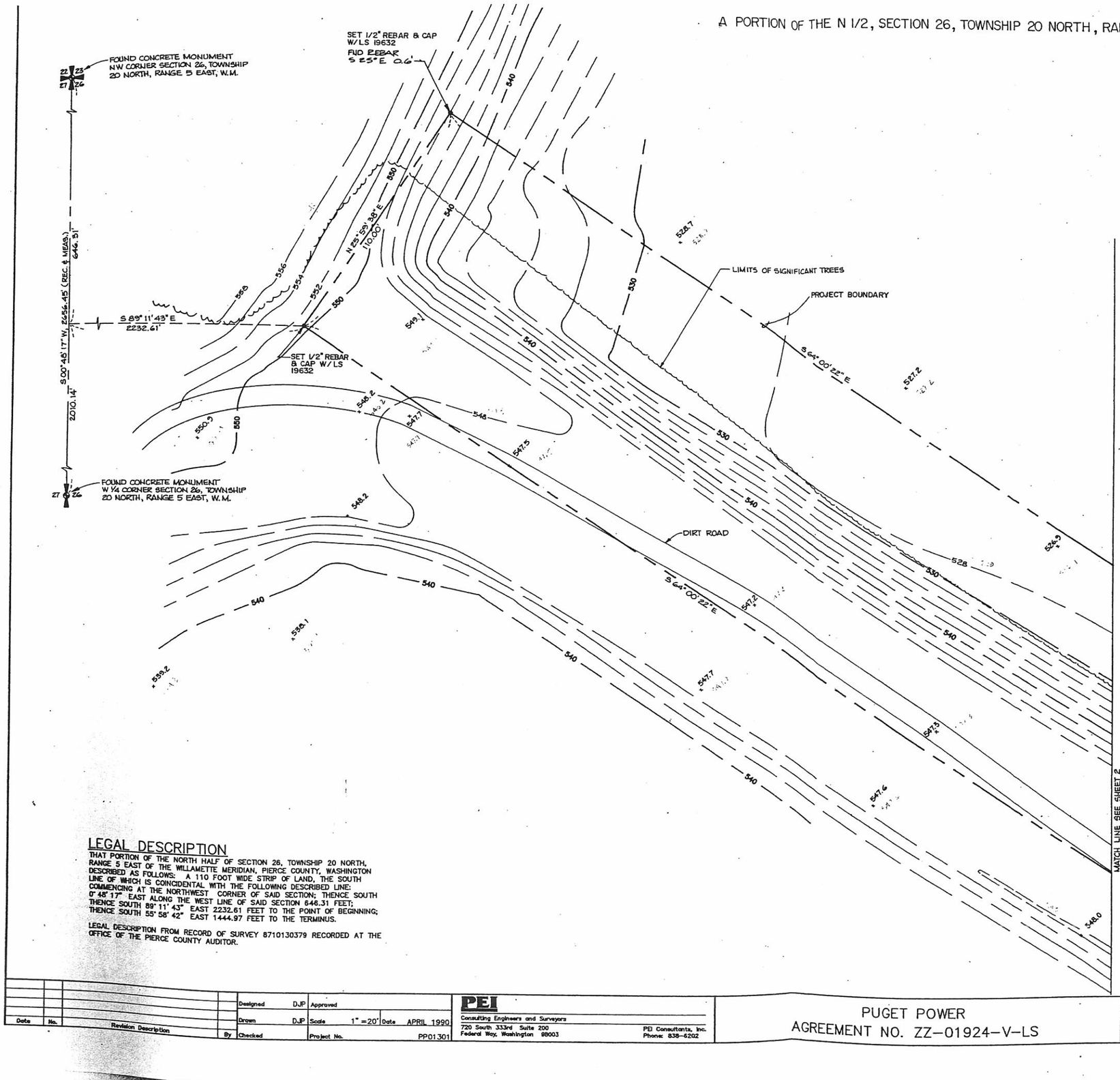
PROJECT NO. 2494 WASHINGTON

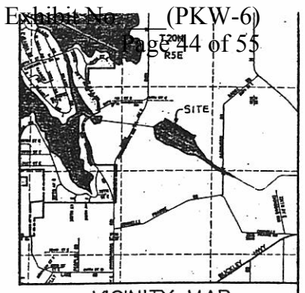
PUGET SOUND POWER & LIGHT COMPANY
WHITE RIVER PROJECT

PROJECT AREA & BOUNDARY

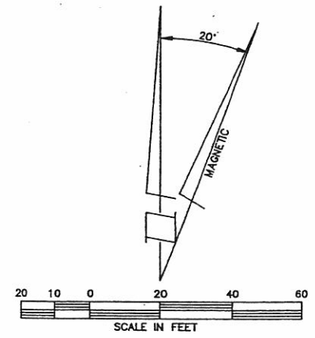
PUGET DWG F-5331 SH 04 REV 0

A PORTION OF THE N 1/2, SECTION 26, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M.





VICINITY MAP



BASIS OF BEARING
RECORD OF SURVEY 8710130379
BY LEROY, INC.

LEGAL DESCRIPTION

THAT PORTION OF THE NORTH HALF OF SECTION 26, TOWNSHIP 20 NORTH, RANGE 5 EAST OF THE WILLAMETTE MERIDIAN, PIERCE COUNTY, WASHINGTON DESCRIBED AS FOLLOWS: A 110 FOOT WIDE STRIP OF LAND, THE SOUTH LINE OF WHICH IS COINCIDENTAL WITH THE FOLLOWING DESCRIBED LINE: COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION; THENCE SOUTH 0° 48' 17" EAST ALONG THE WEST LINE OF SAID SECTION 646.31 FEET; THENCE SOUTH 89° 11' 43" EAST 2232.61 FEET TO THE POINT OF BEGINNING; THENCE SOUTH 55° 58' 42" EAST 1444.97 FEET TO THE TERMINUS.

LEGAL DESCRIPTION FROM RECORD OF SURVEY 8710130379 RECORDED AT THE OFFICE OF THE PIERCE COUNTY AUDITOR.

DATUM
U.S.G.S.

BENCH MARK: BRONZE PLAQUE EMBEDDED IN THE CONCRETE FLOOR OF THE GATE HOUSE AT THE ENTRANCE TO THE TUNNEL LEADING FROM THE WESTERLY SHORE OF THE INTAKE POND LOCATED IN THE NORTHWEST QUARTER OF SECTION 8, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M., TO THE WHITE RIVER GENERATING PLANT, WHICH BRONZE PLAQUE HAS ENGRAVED UPON IT THE FIGURES "544.75".

ELEVATION = 544.46 U.S.G.S. FROM MERIWEATHER, LEACHMAN LETTER DATED DECEMBER 9, 1987.

DAVID J. MAROON
REGISTERED
PROFESSIONAL
LAND SURVEYOR
5-10-90

Date	No.	Revision Description	By

Designed DJP | Approved
Drawn DJP | Scale 1" = 20' | Date APRIL 1990
Checked | Project No. PP01301

PEI
Consulting Engineers and Surveyors
720 South 333rd Suite 200
Federal Way, Washington 98003
PEI Consultants, Inc.
Phone 838-6202

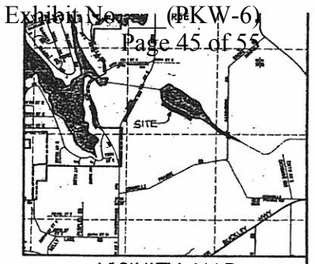
PUGET POWER
AGREEMENT NO. ZZ-01924-V-LS

WHITE RIVER PROJECT
LAKE TAPPS DIKE 14

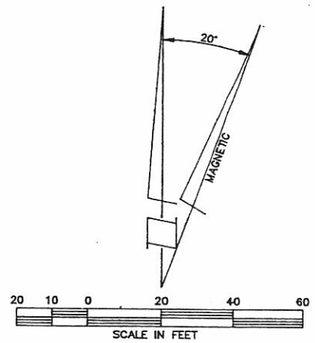
ACAD No. PP013M1
Sheet 1
of 4

D-8802

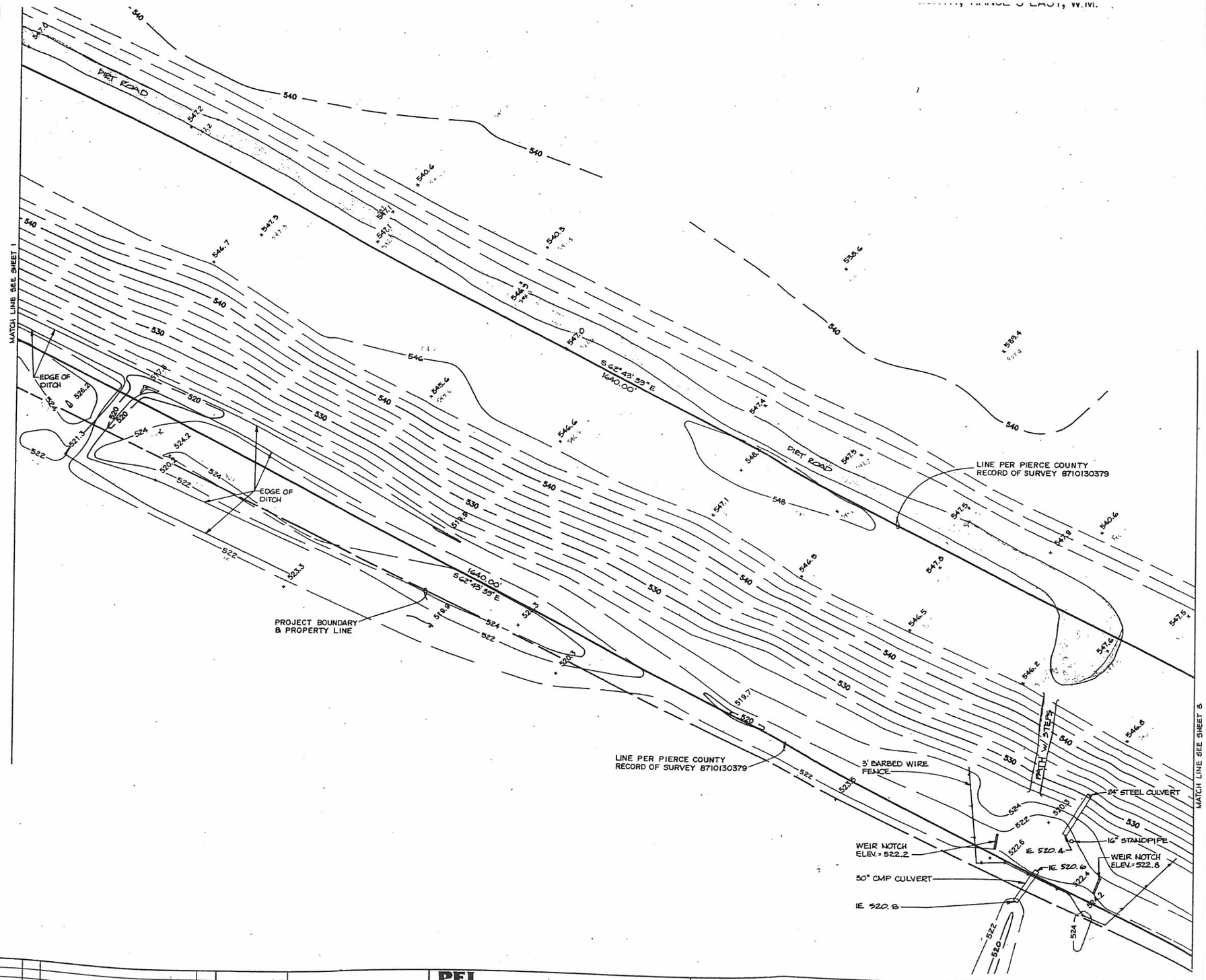
F/N: D-184



VICINITY MAP



BASIS OF BEARING
RECORD OF SURVEY 8710130379
BY LEROY, INC.



Date	No.	Revision Description	By

Designed DJP Approved
Drawn DJP Scale 1" = 20' Date APRIL 1990
Checked Project No. PP01301

PEI
Consulting Engineers and Surveyors
720 South 333rd Suite 200
Federal Way, Washington 98003
PEI Consultants, Inc.
Phone: 838-8202

PUGET POWER
AGREEMENT NO. ZZ-01924-V-LS

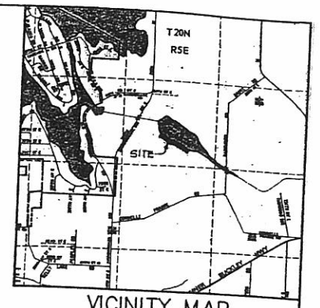
WHITE RIVER PROJECT
LAKE TAPPS DIKE 15

D-8803

ACAD No. PP013N2
Sheet 2 of 4

F/N: D-184

A PORTION OF THE N 1/2, SECTION 26,
TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M.



VICINITY MAP

NW CORNER SECTION 26, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M.

N00°48'17"W, 2636.45' (REC. & MEAS.)
1119.01'
1557.55'

S89°11'43"E
1449.71'

SET CONC MON W/ BRASS CAP STAMPED "ELEV. 548.75"
FND REBAR & CAP LS# 12944
S 70° W 0.3'

LINE PER PIERCE COUNTY RECORD OF SURVEY 8710130379

N 27°16'21" E
105.00'

S 62°43'39" E

DIET ROAD

FOUND CONCRETE MONUMENT W 1/4 CORNER SECTION 26, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M.

SET 1/2" REBAR & CAP W/ LS 19632
FND REBAR & CAP LS# 12944
S 52° W 0.2'

LIMITS OF SIGNIFICANT TREES

LINE PER. PIERCE COUNTY RECORD OF SURVEY 8710130379

PROJECT BOUNDARY & PROPERTY LINE

16" ALDER

MATCH LINE SEE SHEET 2

20° MAGNETIC

20 10 0 20 40 60
SCALE IN FEET

BASIS OF BEARING
RECORD OF SURVEY 8710130379
BY LEROY, INC.

DATUM
U.S.G.S.

BENCH MARK: BRONZE PLAQUE EMBEDDED IN THE CONCRETE FLOOR OF THE GATE HOUSE AT THE ENTRANCE TO THE TUNNEL LEADING FROM THE WESTERLY SHORE OF THE INTAKE POND LOCATED IN THE NORTHWEST QUARTER OF SECTION 8, TOWNSHIP 20 NORTH, RANGE 5 EAST, W.M., TO THE WHITE RIVER GENERATING PLANT, WHICH BRONZE PLAQUE HAS ENGRAVED UPON IT THE FIGURES "544.75".

ELEVATION = 544.46 U.S.G.S. FROM MERIWEATHER, LEACHMAN LETTER DATED DECEMBER 9, 1987.

Date	No.	Revision Description	By

Designed DJP | Approved
Drawn DJP | Scale 1" = 20' | Date APRIL 1990
Checked | Project No. PP01301

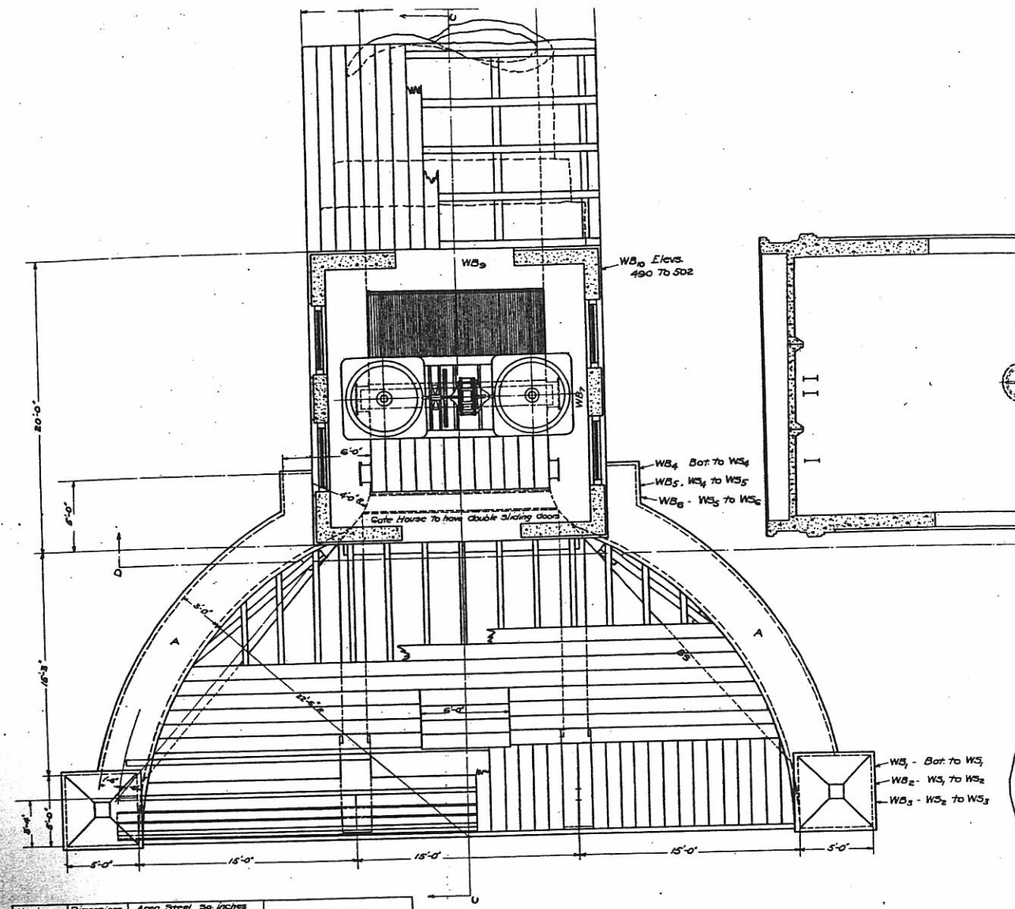
PEI
Consulting Engineers and Surveyors
720 South 333rd Suite 200
Federal Way, Washington 98003
PEI Consultants, Inc.
Phone: 838-6202

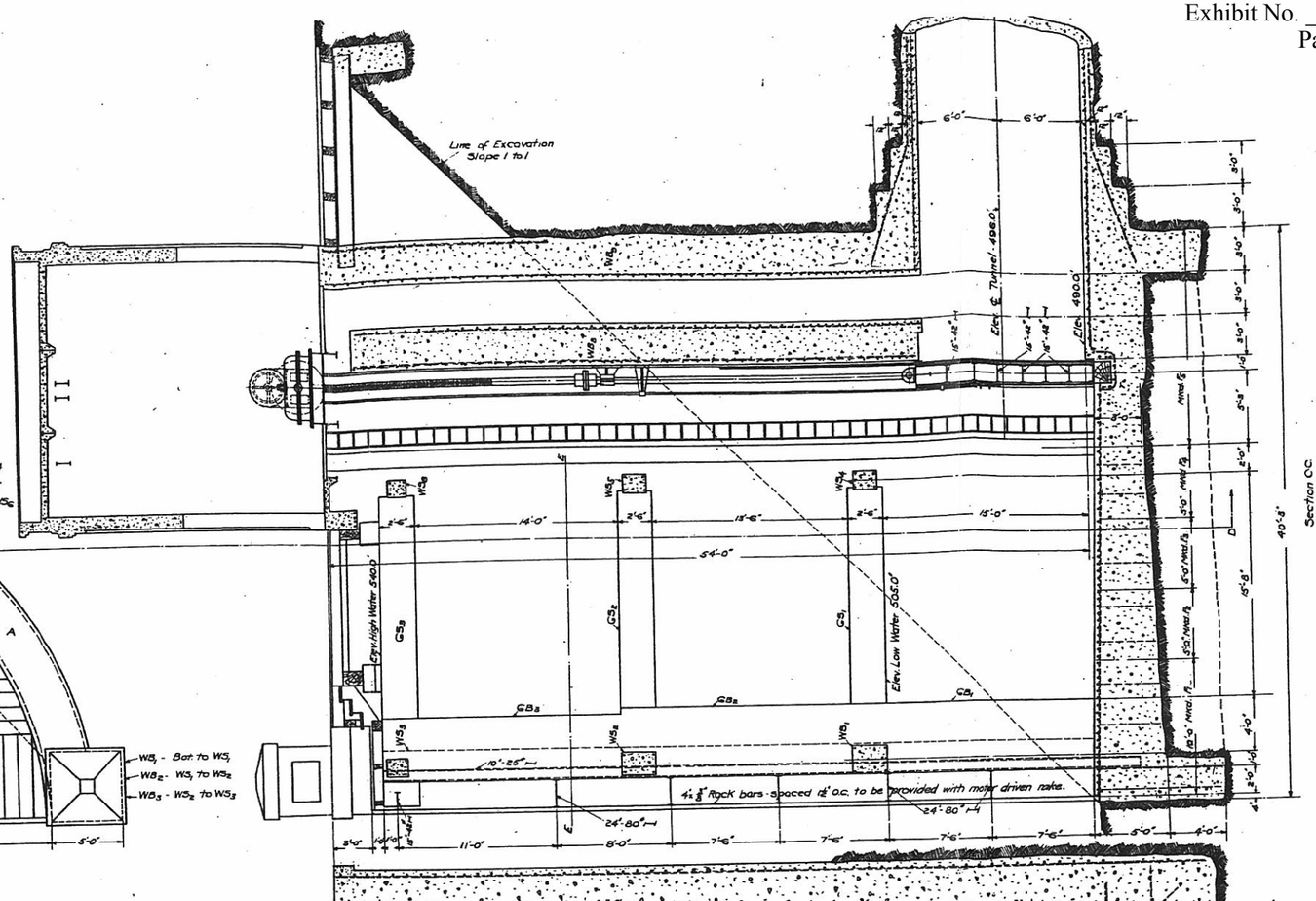
PUGET POWER
AGREEMENT NO. ZZ-01924-V-LS

DAVID J. MAROON 9106
REGISTERED PROFESSIONAL LAND SURVEYOR
4-10-90

ACAD No. PP013N1
Sheet 1

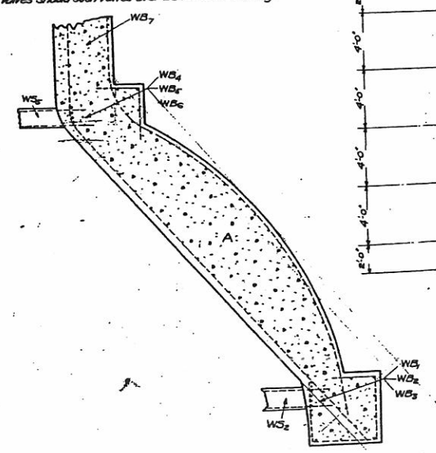
WHITE RIVER PROJECT
LAKE TAPPS





Number	Dimensions	Area Steel Sq. inches	
CB_1	24'x60"	8.92 in.	
CB_2	24'x60"	8.3 in.	
CB_3	24'x.58"	7.4 in.	
WS_1	36'x60"	11.1 in.	
WS_2	36'x60"	9.2 in.	
WS_3	36'x60	5.2 in.	
WS_4	36'x.54"	5.35 in.	
WS_5	36'x.54"	2.78 in.	
WS_6	36'x.54"	2.0 in.	
WS_7 (Above Gate House)	18'x.36"	0.2286 per ft. height	$\frac{5}{8}$" d. rods 12" o.c.
WS_7 (Below Gate House)	18'x.36"	0.78 per. ft. height	1" d. rods 12" o.c.
WS_8 (Above Gate House)	18'x.36"	1.4 per ft. height	1" d. rods 6" o.c.
WS_8 (Below Gate House)	18'x.36"	1.1 per ft. height	1" d. rods - 9" o.c.
WS_9 (Above Gate House)	18'x.36"	0.74 per ft. height.	1" d. rods - 12" o.c.
WS_9 (Below Gate House)	18'x.36"	0.57 per ft. height	$\frac{3}{4}$" d. rods 12" o.c.
WS_{10} (Above Gate House)	18'x.36"	Reinforce Same as WS_9 But on opposite Side	
WS_{10} (Below Gate House)	18'x.36"	Reinforce Same as WS_9 But on opposite Side	
WS_{11}	36'x.36"	4.95 in.	
F_1	18'x.60"	4.05 per ft. Width	1$\frac{5}{8}$" d. rods 6" o.c.
F_2	See Sec. CC	3.56 per ft. Width	$\frac{7}{8}$" d. rods 6" o.c.
F_3	See Sec. CC	2.82 per ft. Width	1$\frac{5}{8}$" d. rods 6" o.c.
F_4	See Sec. CC	1.19 per ft. Width	$\frac{7}{8}$" d. rods 12" o.c.
F_5	See Sec. CC	0.415 per ft. Width	$\frac{3}{4}$" d. rods 12" o.c.
GB_1	18'x.18"	2.28 per ft. height	$\frac{7}{8}$" d. rods 6" o.c.
GB_2	18'x.18"	1.14 per ft. height	$\frac{7}{8}$" d. rods 12" o.c.
A_1	18'x.36"	0.78 per ft. height (Inside Surface)	1" d. rods 12" o.c. (Inside Surface)
A_2	12'x.30"	4-1" d. rods	
A_3	12'x.30"	4-1" d. rods	
A_4	18'x.30"	3-1" d. rods in bottom 2-1" d. rods in Top	
A_5	12'x.30"	4-1" d. rods	
A_6	12'x.30"	4-1" d. rods	
A_7	12'x.18"	4-1" d. rods	
A_8	12'x.30"	4-1" d. rods	
A_9	12'x.18"	4-1" d. rods	
A_{10}	12'x.18"	4-1" d. rods.	

Note:- Surface between floor and excavation to be provided with tile drain; tile to be connected to capped pipes passing upward thru floor, such pipes to be provided with special check valves should such valves ever be found necessary.



Section EE Thru Bow String Arch Wall.

PLAN AND SECTIONS OF FOREBAY AT UPPER PORTAL OF TUNNEL.
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP. BOSTON

Scale 1/4 in. (1/8)
Eng. Job Order 397

F20430

397-3 F-sw 3/12

SECTION THRU ℄ 12'-0" DIA. TUNNEL FORE-BAY & TUNNEL ENTRANCE

PACIFIC COAST POWER CO.

STONE & WEBSTER ENGINEERING CORP. BOSTON

TABLE OF CHANGES

F20709

397-101

F-sw 306

UP STREAM ELEVATION

DOWN STREAM ELEVATION

SECTION A-A

SIDE VIEW OF 15'-33"↵ AT ENDS OF GATE

DETAIL OF CORNER OF GATE
SCALE 6"=1'0"

SECTION F-F

PLAN

DEVELOPMENT OF BOTTOM OF GATE

SECTION D-D (Showing drilling in bottom ↵)

TOP VIEW OF GATE

SECTION C-C

ELEVATION

SECTION G-G

TOP VIEW

PLAN

CAST BRONZE BEARING STRIP (AT TOP OF GATE)
2 Required, 1 Right, 1 Left - Mkd. BT.R & BT.L
Finish all over

CAST BRONZE BEARING STRIP (AT SIDE OF GATE)
2 Required, 1 Rt., 1 Left - Mkd. BS.R & BS.L
Finish all over

CAST BRONZE BEARING STRIP (AT SIDE OF GATE)
2 Required 1 Right, 1 Left - Mkd. BS.R & BS.L
Finish all over

FULL SIZE DETAIL BRONZE BEARING STRIP

CAST STEEL GUIDES FOR GATE.
4 REQUIRED.

CAST STEEL SHOE FOR GATE
3 REQUIRED

CAST BRONZE GATE GUIDE
2 REQD. Mkd. B4.
Finish all over

CAST STEEL SHOE FOR GATE
2 Required - 1 Right - 1 Left.

CAST BRONZE GATE GUIDE
4 REQD - 2 RIGHT - 2 LEFT
Mkd. B1.R, B1.L; B2.R, B2.L
Finish all over

CAST BRONZE GATE GUIDE
4 REQD - 2 RIGHT - 2 LEFT
Mkd. B3.R, B3.L
Finish all over

CHANNEL FRAME FOR GATE GUIDE.
2 REQUIRED, 1 RIGHT, 1 LEFT. MKD. GR AND GL
Note:- Rd. rivets ⅞" D. - Holes 1" D. unless otherwise noted.

NOTE:- ONE GATE REQUIRED COMPLETE AS SHOWN

ELEVATION ON Q-Q.

SECTION C-C

SECTION A-A.
SCALE 3"=1'0"

SECTION D-D

SECTION B-B

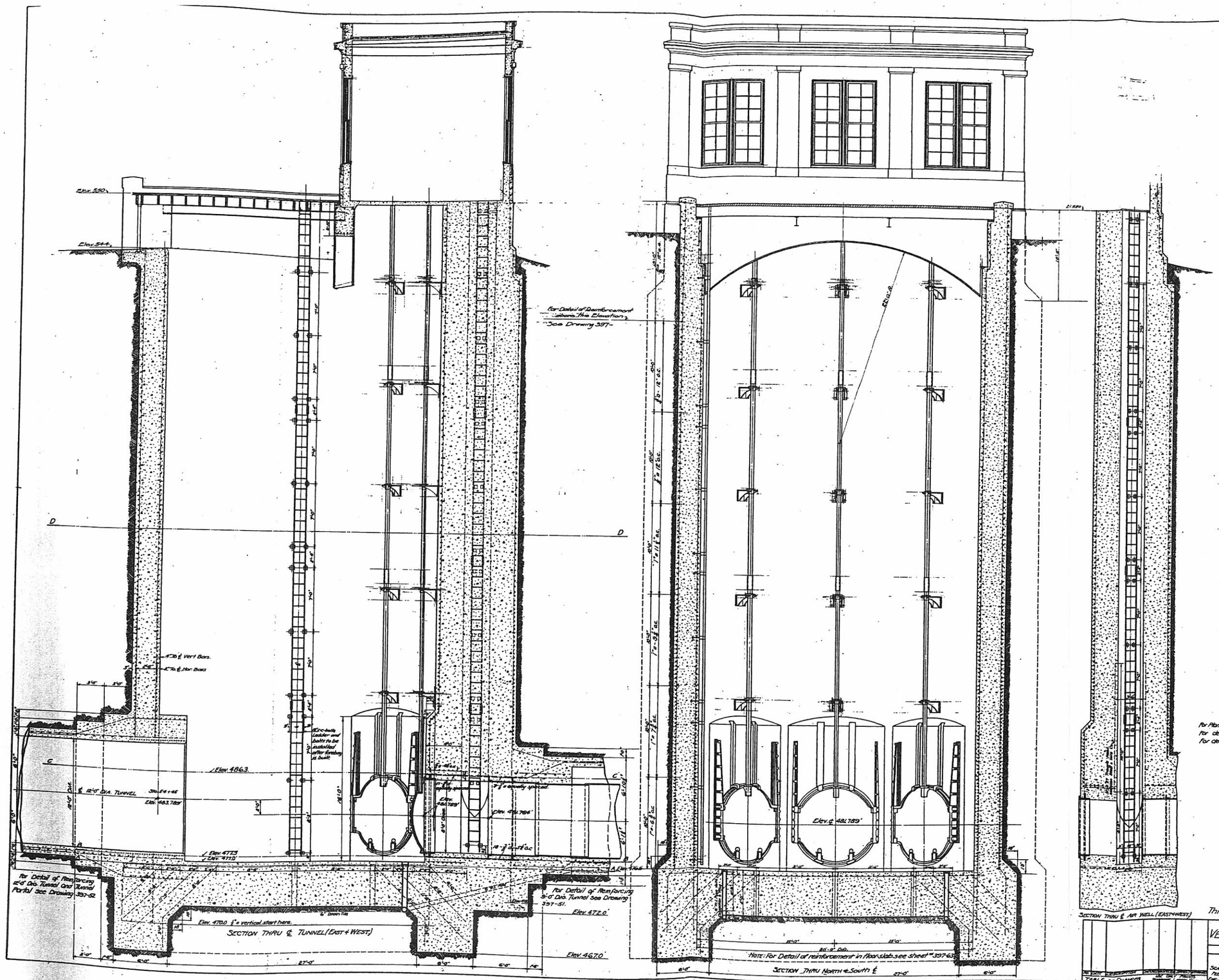
SECTION THRU CHANNELS.

NOTES:- All rivets ⅞" dia. holes 1/16" dia. unless otherwise noted. All joints to be countersunk with round nosed tools and made watertight. After gate has been assembled all structural steel to receive two coats of paint, each coat composed of equal parts of red lead and graphite. All parts which will be inaccessible when assembled to receive 2 coats of red lead.
All finished surfaces on gate for attaching bronze bearing strips to be planed full size. Section of gate guide. After gate is finished All bronze bearing to be finished to thickness shown.

DETAILS of 12'0" GATE AND GATE GUIDES.
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP.
BOSTON
SCALE:-1"=1'0"
APP. & CHK.
DWG. 103 ORDER 330
F20724

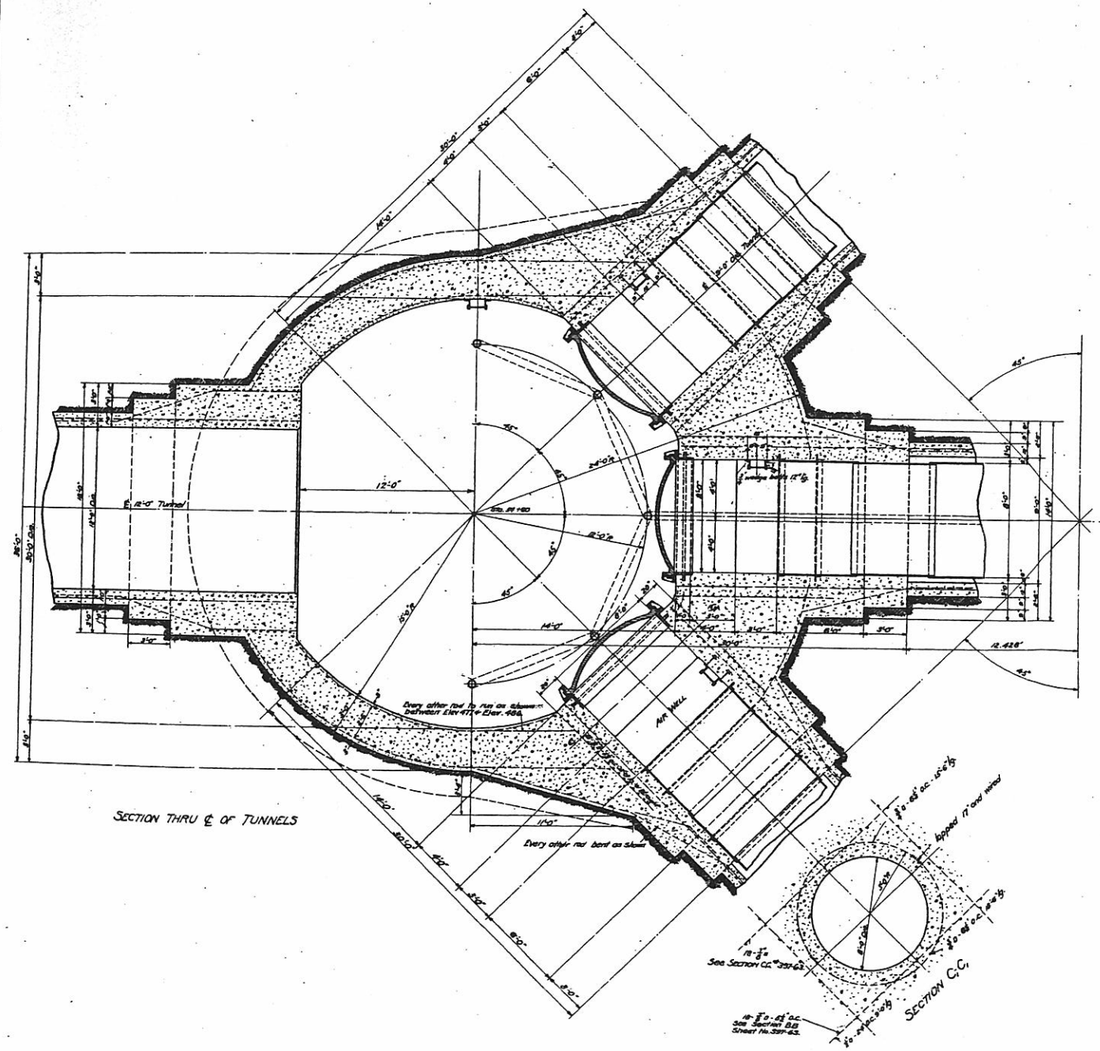
D 397 F-sw 373
28
SCANNED

DWR-064

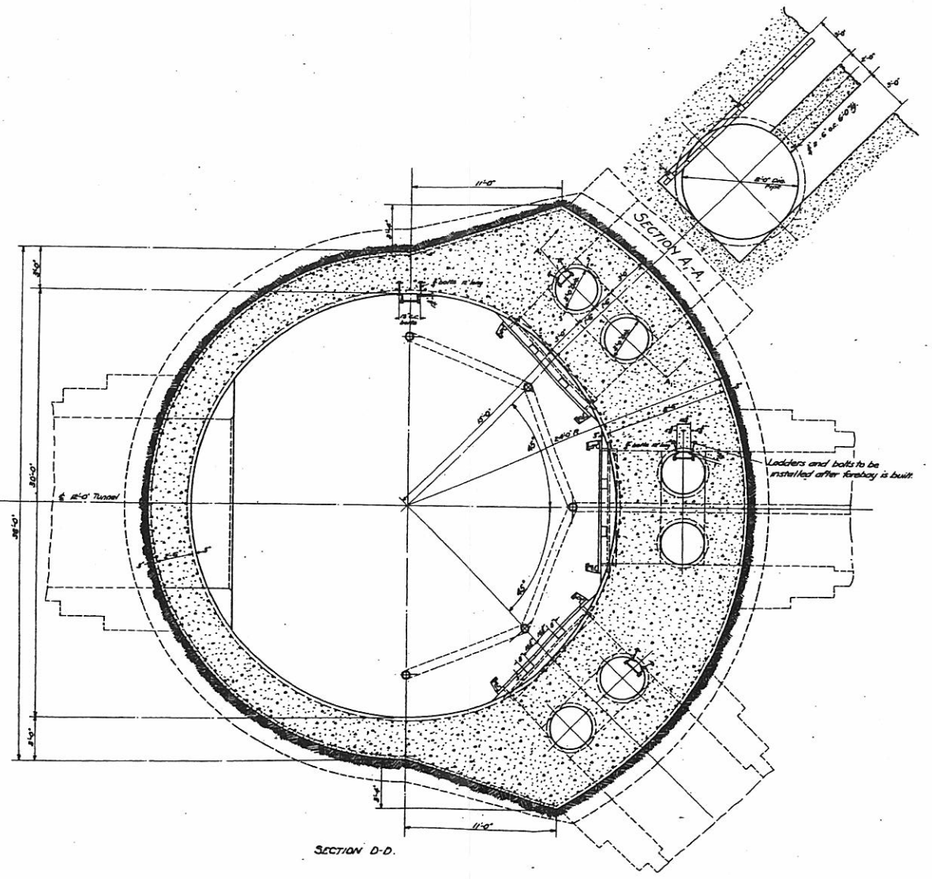


397-F-sw 316
3/3

SCANNED DWR-064



SECTION THRU ℄ OF TUNNELS



SECTION D-D.

Notes.
For vertical sections of forebay see sheet No. 397-53.
For cross sections of forebay see sheet No. 397-63.

CROSS-SECTIONS 30FT DIA. FOREBAY
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP.
BOSTON.
SCALE 1/8" = 1'-0"
FEB. 11 1911.
DRG. NO. ORDER 397

DESIGNED	DRAWN	TRACED	CHECKED
W.L.A.	A.A.F.	F.D.R.	F.W.S.

F20235

397-54 F-sw 315

SCANNED DWR-064

SECTIONAL PLAN "B-B"

ELEVATION

SECTIONAL ELEVATION "A-A"

To be attached to Contract between
The Willamette Steel Pipe Co.
and
The Puget Sound Power and Light Co.
Dated Dec. 29, 1923.
For Pipe Line No. 4.

To be attached to Contract between
WILLAMETTE IRON & STEEL WORKS
AND
PUGET SOUND TRACTION LIGHT & POWER COMPANY
DATED FEB. 12, 1917.
For Pipe Line No. 3.

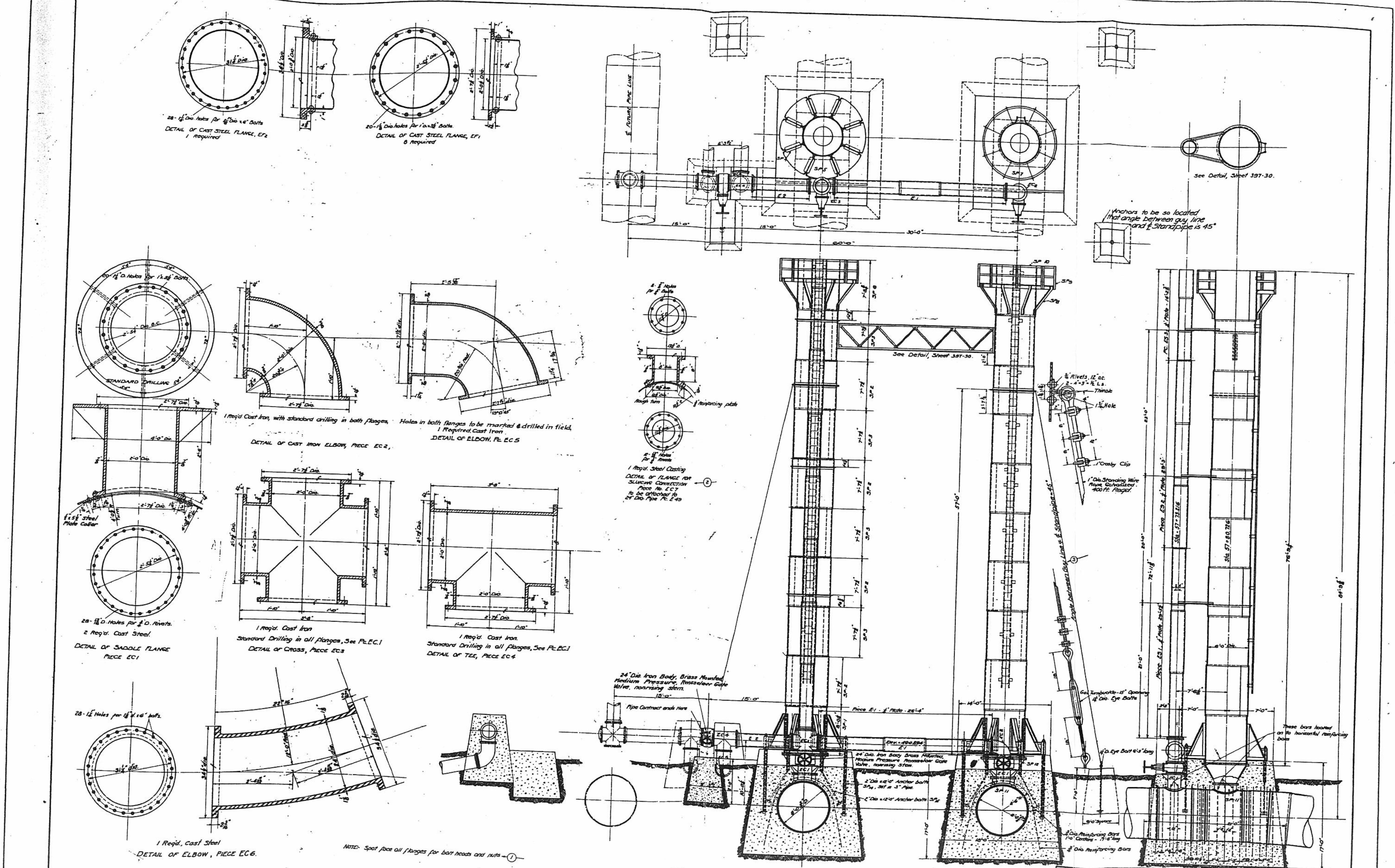
ARRANGEMENT - STAND PIPE - SOUTH PIPE LINE
HYDRAULIC EQUIPMENT - 1917 ADD.-WHITE RIVER DEVEL.
PUGET SOUND TRACTION LIGHT & POWER CO.
STONE & WEBSTER ENGINEERING CORP.
BOSTON

F62640

R.C. 6054
F-sw 324.

DWR-064

Drawn by C.A.K. Checked by A.E.S.
Traced by T.A.H. & H.A.C.



To be attached to contract between [redacted]
and PACIFIC COAST POWER COMPANY Dated. [redacted]

ARRANGEMENT OF STAND PIPES AND DETAILS OF 24" PIPE CASTINGS
PACIFIC COAST POWER CO.
STONE & WEBSTER ENGINEERING CORP.
BOSTON
SCALE - ⅜" = 1'-0"
DEC. 5 - 1910
ENG. JOB ORDER - 397

No.	DATE	DESCRIPTION
③	12-10-14	Angle of Guy Changed
②	5-31-11	EC7 added
①	2-18-11	Note added

TABLE OF CHANGES — USE ONLY PRINTS SHOWING LATEST CHANGE.

F20168

F-SW 347

24" Iron body bronze mounted Rensselaer double gate valve, without by pass, rising stem, working pressure 225 lbs per sq. in.

Plan of Lower Course

Section A-A

Plan Showing Riveted Flange

Plan Showing Bolted Flange

Section A-A

Section B-B

2 Cast Steel Saddles Like This Reqd. Mkd. AT3.

Section A-A

Section B-B

Two Cast Steel Saddles as shown Marked AT5

Elevation A-A

Section B-B

2 Cast Steel Saddles Like This Reqd. Marked AT7

Two Cast Steel Saddles Like This Reqd. Mkd. AT6

2 Cast Steel Saddles Like This Reqd. Marked AT14

Down Stream Elevation of Air Tanks

Section E-E

Section B-D

Section A-A

Section C-C

Two Cast Steel Saddles Like This Required. Marked AT1

Plan Showing Bolted Flange

Plan Showing Riveted Flange

Section A-A

Section B-B

Note: Material noted on this Sheet is for two Air Tanks
Four Air Tanks required
All bolts to have hexagon head & nut

Note: Inside diameter Air Tank 7'-0" Plate 1" thick, Circular Butt Straps 1/2" thick.
Longitudinal Butt Straps Tattock Circular joints double riveted. Longitudinal joints triple riveted
Rivets 1" Dia. Holes 1 1/16" Dia.
All Circular and Longitudinal joints on Air Tanks to be made as shown on this Detail
Actual length of plate, butt joint courses, is course length shown on this sheet minus clearance shown on joint detail

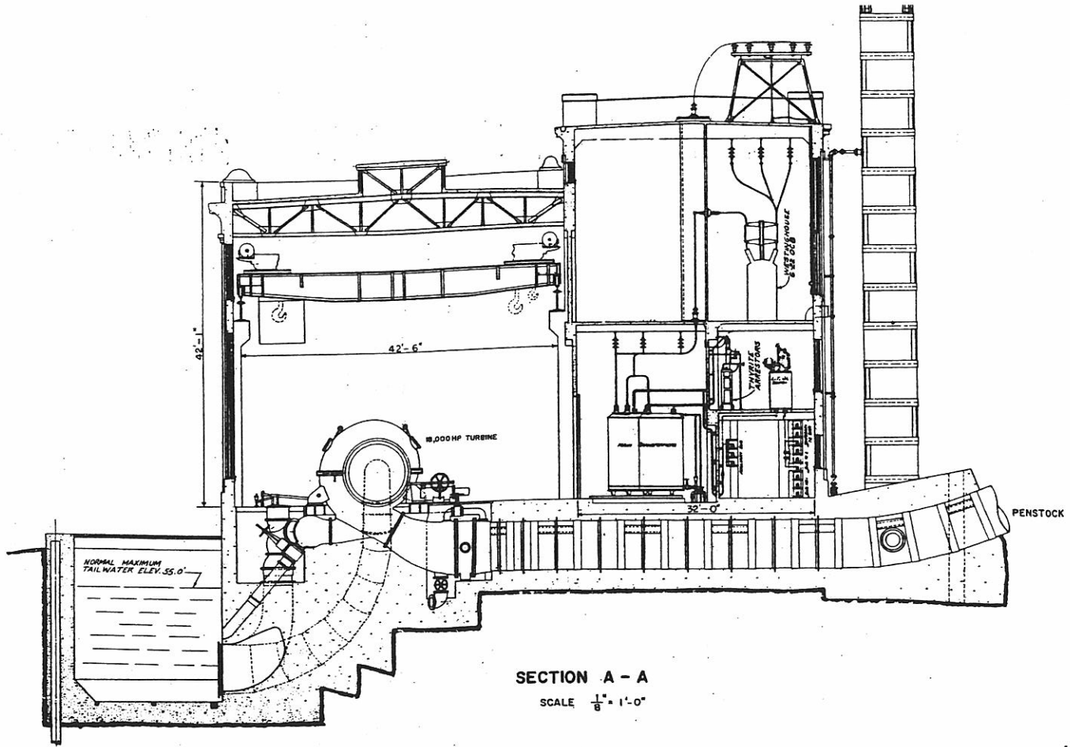
To be attached to contract between [redacted] and PACIFIC COAST POWER COMPANY Dated [redacted]

TABLE OF CHANGES	NO.	DESCRIPTION	DATE	APPROVED
	A	Revised Details	8/11	
	B	Revised Details	9/11	

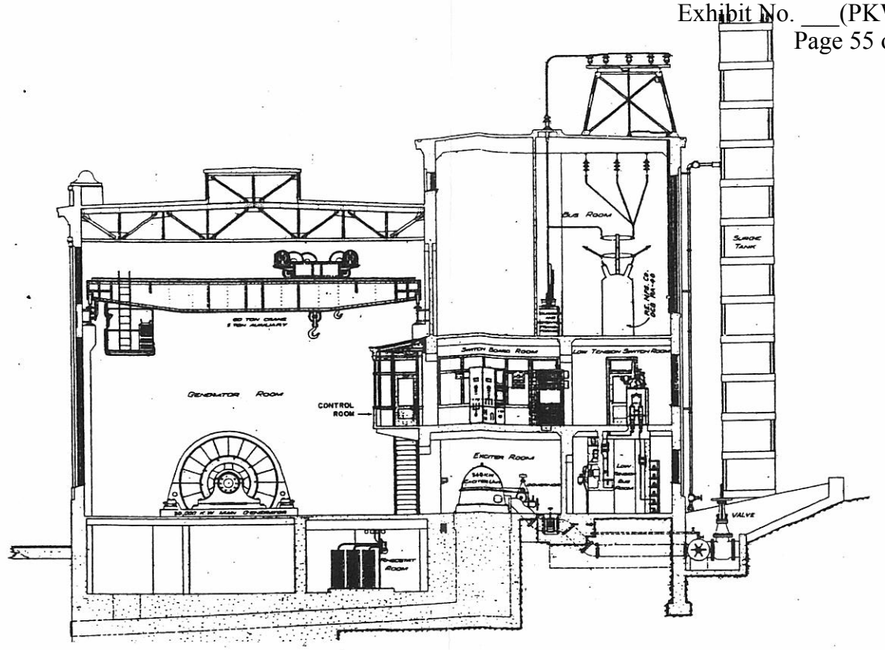
GENERAL ARRANGEMENT & DETAILS OF AIR CHAMBERS
PACIFIC COAST POWER CO
STONE & WEBSTER ENGINEERING CORP
BOSTON
SCALE 1/4" = 1'-0" Dec. 3, 1910
DWG. NO. 20 ORDER NO. F20170

397-33
F-sw 340

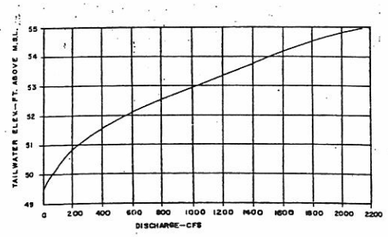
SCANNED DWR-064



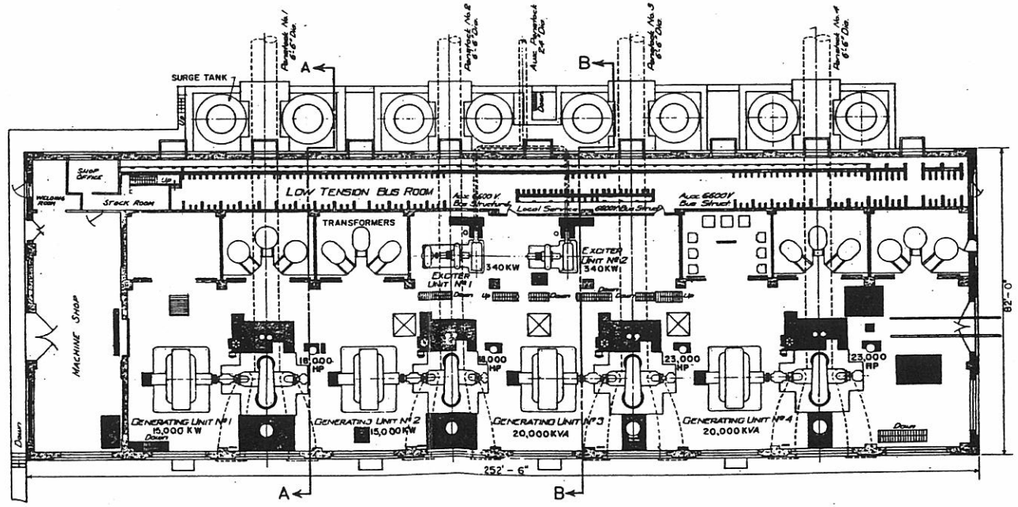
SECTION A - A
SCALE $\frac{1}{8}$" = 1'-0"



SECTION B - B
SCALE $\frac{1}{8}$" = 1'-0"



TAILWATER RATING CURVE



PLAN OF POWER HOUSE
SCALE $\frac{1}{16}$" = 1'-0"

I CERTIFY THAT I SUPERVISED THE PREPARATION OF THE EXHIBIT DRAWINGS; AND THAT THEY ACCURATELY SHOW THE PROJECT LANDS AND APPURTENANCES AS OBTAINED FROM THE RECORDS OF THE ORIGINAL SURVEY NOTES AND PROJECT DRAWINGS IN THE PUGET SOUND POWER & LIGHT COMPANY FILES.

N. W. PETTIJOHN

PETTIJOHN ENGINEERING CO., INC.
WAS RETAINED BY THE LICENSEE TO MAKE THIS EXHIBIT DRAWING.

N. W. PETTIJOHN — REGISTERED PROFESSIONAL ENGINEER

EXHIBIT L SHEET 2

THIS MAP IS BEING SUBMITTED BY THE UNDERSIGNED THIS 13TH DAY OF MAY 1966 FOR INCLUSION IN THE APPLICATION FOR LICENSE FOR PROJECT NO. 2494 WHICH WAS SUBMITTED NOVEMBER 18, 1964

PUGET SOUND POWER & LIGHT COMPANY

BY _____
SR. VICE PRESIDENT

ONE LINE WIRING DIAGRAM :
REFER TO FPC ANNUAL REPORT
FORM 12, SCHEDULE 18. .

PROJECT NO. 2494 WASHINGTON
PUGET SOUND POWER & LIGHT COMPANY
WHITE RIVER PROJECT
GENERAL PLAN

PUGET DWG F-5334 SH 02 REV 0