



PORTLAND GENERAL ELECTRIC

TURBIDITY MANAGEMENT PLAN

Bull Run Hydropower Project Decommissioning

Sandy, Oregon



**November 2005
REPORT**

 **CORNFORTH**
CONSULTANTS
AND
CROCKETT
ENVIRONMENTAL

Report to:

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**TURBIDITY MANAGEMENT PLAN
BULL RUN HYDROPOWER PROJECT DECOMMISSIONING**

REPORT

November 2005

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TURBIDITY MANAGEMENT PLAN
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BULL RUN PROJECT TURBIDITY MANAGEMENT PLAN

1. Introduction

This Turbidity Management Plan is for the purpose of describing management practices to address turbidity impacts in the Sandy River that are likely to result from the removal of PGE's Bull Run Hydroelectric Project.

Turbidity in water results from inorganic and organic particulate matter being held in suspension. Turbidity may impact fish by impairing their ability to feed, and by causing them to avoid turbid reaches, leading to migration delays. Turbidity increases can also have a negative impact on benthic invertebrate densities, plant productivity, drinking water supplies, recreation, aesthetics, fishing and agricultural uses. For this reason, DEQ has established a water quality standard for turbidity that is designed to minimize the addition of soil particles or any other suspended substances that would cause significant increases in the river's normal, seasonal turbidity pattern.

The Sandy River is a glacially fed system, with headwaters located on the flanks of Mt. Hood. High turbidity events are common in glacially fed streams, due to the large volume of very fine material produced by glacial activity (DEQ, 2003). PGE will put in place management practices aimed at controlling increases in turbidity during removal of the Bull Run Hydroelectric facilities. These management practices are developed to comply with DEQ's regulatory goal to minimize turbidity during construction to achieve the long term benefit that Project removal will have on in-stream beneficial uses within the Sandy River Basin.

2. Background

Portland General Electric (PGE) plans to decommission their Bull Run Hydroelectric Project (FERC Project No. 477) in Clackamas County, Oregon. The FERC granted PGE's surrender application and accepted their Decommissioning Plan in an order dated May 12, 2004. The Decommissioning Plan will result in the removal and/or demolition of all existing project structures and facilities located within the Sandy River basin. Figure 1 shows the general vicinity of the project and Figure 2 shows the location of the project facilities within the basin.

Regulatory approvals to support the FERC decision to allow PGE to decommission the Bull Run Hydroelectric Project included a Clean Water Act 401 Certification from the Oregon Department of Environmental Quality (DEQ). The DEQ 401 Certification was issued on October 22, 2003 (Attachment A). It specifically found that the Project as outlined in the decommissioning plan will comply with applicable provisions of the federal Clean Water Act, Oregon water quality standards, and other appropriate requirements of state law provided conditions of approval are met. These conditions of approval address important water quality issues including sediment discharge, turbidity, protection of beneficial uses, temperature and general project issues that may affect water quality.

The DEQ 401 Clean Water Act Certification outlines specific conditions for turbidity. These conditions are:

- Turbidity Monitoring – PGE shall conduct turbidity monitoring before, during, and after Project removal.
- Turbidity Management During Removal – No less than 120 days prior to applying for a 404 Dredge and Fill Permit for Project removal activities, PGE shall submit a Turbidity Management Plan for review, public comment, and DEQ approval. This plan must describe the management activities that will be implemented during removal activities at all Project sites to control turbidity originating from project lands disturbed by construction activity. Data collected on background turbidity levels prior to Project removal may be used to develop construction management action levels.

The Decommissioning Plan (Sections 4.2.1 – 4.2.4) further defines requirements for turbidity monitoring before, during and after Project removal. These requirements include:

Pre-Removal Turbidity Monitoring.

- Quantitative information on background turbidity levels in the Sandy River will be collected to determine how project-related turbidity compares to background levels.
- PGE will monitor turbidity at two sites, one above and one below Marmot Dam using continuous monitoring equipment. Data will be collected for two years prior to dam removal, to include both summer and winter turbidity events.

Turbidity Monitoring During Structure Removal.

- The short-term level of impact on turbidity levels from removal activities will be controlled through best management practices.
- Turbidity will be monitored upstream of and at a site close to but downstream of the construction areas for Marmot Dam, Little Sandy Dam and Roslyn Lake.
- Sampling will be continuous with an averaging period no less frequent than every hour, encompassing the workday and occurring during times of peak activity.

Post Removal Turbidity Monitoring.

- Continuous turbidity data will be collected at five sites: one each above the Marmot and Little Sandy Dams, one each below the dams, and one downstream of all Project influence (below the Bull Run confluence).
- Turbidity monitoring will continue until the “endpoint” defined in Reach 3 of the Sandy River which one year plus two consecutive years with no barriers to fish passage and with improved channel complexity or channel complexity within the range of values prior to dam removal; plus two more consecutive years with no barriers to fish passage and either improved channel complexity or channel complexity within the range of values prior to dam removal as determined

by the Monitoring Implementation Team (MIT). (Reach 3, 6 to 8 miles downstream of the dam, requires two additional consecutive years beyond Reach 1, 0 to 1.5 miles downstream of dam, which could result in monitoring for at least 5 years.)

- A shorter time period may be agreed to by PGE and DEQ once turbidity impacts are understood. However, monitoring will occur for a minimum of two years after dam removal.

3. Regulatory Context

The Department of Environmental Quality adopted a water quality standard to address turbidity in Oregon streams in the 1970s and revised the standard in 1990. The turbidity standard is designed to minimize the addition of soil particles or any other suspended substances that would cause significant increases in the river's normal, seasonal turbidity pattern. Currently, the adopted standard is:

OAR 340-041-0485(2): No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause violation of the following standards in the waters of the Sandy River Basin:

Turbidity (Nephelometric Turbidity Units, NTU): No more than a 10% cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction or other legitimate activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied and one of the following has been granted.

Emergency Activities: Approval coordinated by DEQ with the Department of Fish and Wildlife under conditions they may prescribe to accommodate response to emergencies or to protect public health and welfare.

Dredging, Construction or other Legitimate Activities: Permit or certification authorized under terms of Sections 401 or 404 with limitations and conditions governing the activity set forth in the permit or certificate.

PGE has obtained a Water Quality Certification under Section 401 of the Clean Water Act. Therefore the standard of OAR 340-041-0485(2)(c)(B) applies whereby limited duration activities are allowed to exceed the 10% cumulative natural stream turbidity including decommissioning the Bull Run Hydroelectric facilities provided all practicable turbidity control techniques are applied.

However, DEQ has developed a draft revision to the above adopted turbidity standard that will likely be considered for adoption by the Environmental Quality Commission (EQC) in early 2006. If adopted, this revised turbidity standard will be in place during Project removal (beginning in June, 2007). For this reason, this Turbidity Management Plan includes management practices which comply with the proposed revised standard. The proposed standard, which is similar to the current turbidity rule, would set regulatory criteria requiring individual activities to not exceed a specified NTU above background at a specified compliance point. Specified short-term exceedances of the

criteria would be allowed, and monitored (*Draft Technical Basis for Revising Turbidity Criteria*, DEQ, 2005). The standards proposed in the revised rule include:

- **A monthly average criteria** of 3 NTUs above background is proposed for activities that introduce or re-suspend turbidity causing materials into waters of the state during at least 20 days out of any consecutive 30 days; and
- **A maximum criteria** of 5 NTUs above background is proposed for activities that introduce or re-suspend turbidity causing materials into waters of the state during fewer than 20 days out of any consecutive 30 days.
- **Limited duration exceedances:** Turbidity may exceed an increase of 5 NTUs above background during a single period of not greater than eight hours for each calendar day allowed. During that period, turbidity increases above background may exceed 30 NTUs for no more than two hours and must not exceed 50 NTUs above background turbidity; and limited duration exceedances of the criteria are allowed for no more than 6 calendar days out of any consecutive 30-day period, unless turbidity monitoring or existing relevant data demonstrate compliance with the monthly average turbidity criteria. Limited duration exceedances of the instantaneous maximum criteria (5 NTUs proposed) can be allowed in accordance with table 4.2 of DEQ's report on *Technical Basis for Revising Turbidity Criteria* as follows:

Table 4.2 – DEQ Technical Basis for Revising Turbidity Criteria

Limited Duration Exceedances (single exceedance period per 24-hour period); & may enlist only one category from the list below per day		
Hrs per 24 hrs	Maximum NTUs	Exceedance Period Limit per 30-days (month)
2	50	6
4	40	5
8	30	4
12	25	3
24	20	2 (non-consecutive)

4. Pre-Construction Turbidity Monitoring (Baseline Conditions)

PGE conducted turbidity monitoring from August 2003 – July 31, 2005. The “before removal” turbidity monitoring included collecting data using continuous monitors at two sites in the Sandy River. One site was located above Marmot Dam at approximately River Mile (RM) 31 and the other site was located at RM 18, just below the junction of the Bull Run River with the Sandy River (BRC

Site, or Bull Run Confluence). The first year of results for the “before removal” turbidity monitoring are contained in a report titled *Sandy River Baseline Turbidity Monitoring, Report to Portland General Electric for August 2003 to July 2004 Pre-Removal Turbidity Monitoring at the Bull Run Hydroelectric Project, Oregon, written by Romey & Associates, 2004*. The second year turbidity monitoring results are similar to those of the first year and will be presented in a report by January 2006 (Bernard Romey, Personal Communication, Sept., 2005). This information provides the required pre-project-removal turbidity data.

Turbidity was monitored with an Analite model 395 turbidity meter with integral wiper assembly attached. The instruments measure turbidity in nephelometric turbidity units (NTUs) and take readings that are averaged over a 15-minute interval. Turbidity data was collected from the meter and stored on site via a Campbell Scientific CR10X data logger. The turbidity meter was placed inside a perforated steel pipe, anchored to the stream bank, and submerged at a summer depth of approximately 1.5 meters below the surface of the water. Stream flow data were derived from the USGS database (Romey & Associates, 2004).

The results of the first year of turbidity monitoring are summarized in Figure 3. For the majority of readings where there is data for both the Marmot and Bull Run Confluence sites, the Marmot readings are consistently higher than the Bull Run Confluence average monthly readings. The data indicate a direct increase in turbidity at both monitoring sites as a result of storm events and subsequent increases in flow. It should be noted that the suspended sediment is expected to settle out as it moves downstream. Also, readings at the Bull Run Confluence site are diluted from water input from the Bull Run River and other smaller tributaries downstream of Marmot Dam. This may confound the ability to detect differences in turbidity at the Bull Run Confluence site when comparing readings after project decommissioning to baseline readings (Romey & Associates, 2004).

The second year turbidity monitoring data will not be available until January 2006.

5. Decommissioning Practices for Turbidity Management

Effective turbidity management requires close adherence to several important measures. These measures include turbidity monitoring, erosion and sediment control, construction methods aimed at turbidity reduction, and revegetation and restoration of the construction impact areas. These measures are identified for each Project facility below. It should be noted that erosion and sediment control measures and post construction revegetation and restoration measures are described in detail within Project reports focused exclusively on those issues (see *PGE Erosion and Sediment Control Plan*, Cornforth Consultants, 2005 and *PGE Revegetation, Noxious Weed Control and Site Restoration Plan*, 2005).

5.1 Marmot Dam

Project Construction Description – Removal of Marmot Dam and its appurtenant facilities will be accomplished during a July 1 to November 30, 2007 construction period. The in-water construction work will be completed during the in-water work period as established by Oregon Department of

Fish & Wildlife (ODFW) between July 1 and October 31. Approximately 13,000 cubic yards of concrete in the dam and appurtenant facilities plus 1,900 cubic yards of the original timber crib material are to be removed by controlled blasting and excavators. Approximately 30,000 cubic yards of sediment (sand, gravel and cobbles) will require removal to allow access to the upstream dam base and remaining timber crib material. Upstream and downstream cofferdams will be constructed and steamflows diverted through the canal overflow gate and the existing canal, tunnel, and flume system to allow excavation and removal in the dry. The excavated material will be placed on Bureau of Land Management (BLM) lands near the dam site. Following the removal of the RCC dam, timber crib dam elements, and the fish ladder, the cofferdams will be breached under high flow conditions to return river flows to the stream channel. The approximate 960,000 cubic yards of sediment in the reservoir area will be allowed to move downstream under the high flow conditions (see Marmot Dam Figures 4-7).

Erosion and Sediment Control Measures – Erosion and sediment control measures to be implemented at the site during the dam removal may include the use of erosion blankets, sediment fences, sediment traps, straw mulch and plastic sheeting. Typical locations for these erosion and sediment control measures in proximity to the Marmot Dam deconstruction areas are shown on Figure 5.

Construction Methods to Reduce Turbidity – The primary construction methods to be used to reduce turbidity during Marmot Dam deconstruction are to contain and hold turbid water in lined sediment holding ponds or Baker tanks until the sediments settle out, and to stop work as necessary until turbid water can be controlled or clarified. These methods will require placement of lined ponds, sediment traps or storage tanks below the construction impact area that are capable of holding turbid water until it can be settled out and slowly released back into the Sandy River. The stop work method will be used if the collection areas become too overwhelmed and additional methods such as pumping from tanks to filter bags on the bank will not effectively allow the sediments to settle out of the water before release to the river.

Post Construction Restoration and Revegetation – Post construction activities include filling in areas and regrading as needed to create natural landscape elevation contours, and then planting impact areas with native vegetation. Native species to be planted in the area include Douglas fir, western hemlock, big-leaf maple, Oregon grape, red huckleberry, salal and a mixture of native herbaceous species. The post construction objective is to “finish” the area in a way that creates the most desirable conditions for it to re-establish and blend with the surrounding natural area. This will effectively reduce the potential for long-term erosion which can cause further increases in turbidity in the Sandy River.

5.2 Little Sandy Diversion Dam

Project Construction Description – Removal of the Little Sandy Diversion Dam will be done during the July 1- October 31, 2008 in-water work period as established by ODFW. The work will be completed without the use of cofferdams and without temporary fish passage. No excavation of sediments currently held behind the dam will occur. Controlled blasting, air hammers, and

excavation equipment will be used for the demolition. The concrete from the structure will be rubblized and used on area roads. The access road to the dam will be ripped up and the ground seeded with native grass herbaceous species.

Erosion and Sediment Control Measures – Erosion and sediment control measures for areas disturbed by the deconstruction activities include erosion blankets, sediment fences, sediment ditches to divert turbid water to sediment traps to allow sediments to settle out prior to release of clean water and protective coverings such as straw mulch. The location of these erosion and sediment control areas are shown on Figure 8.

Construction Methods to Reduce Turbidity – The primary construction method to be used to address turbidity beyond effective erosion control measures is to stop work if the sediment transport ditches, sediment, or additional methods such as pumping from tanks to filter bags on the bank traps become too overwhelmed to effectively allow the sediments to settle out of the water before release back into the river.

Post Construction Restoration and Revegetation – Post construction activities include regrading as needed to create natural landscape contours, and then planting impact areas with native vegetation. Native species to be planted in the area include Oregon grape, red huckleberry, salal, a native grass mixture and native herbaceous species.

5.3 Roslyn Lake

Project Construction Description – Roslyn Lake will be drained and the area regraded to provide proper drainage to an established watercourse. Embankment material from the existing dikes will be used to fill and grade the lake area. The rockfill buttress material below the northwest dike section will be salvaged and the concrete inlet and outlet structures will be rubblized or buried. The steel penstocks will be backfilled with sand, capped and left in place. Draining and regrading Roslyn Lake is scheduled during July 1, 2008 to November 2008 (see Roslyn Lake Figures 9-12).

Erosion and Sediment Control Measures – Erosion control measures will include drainage ditches, sediment fences and barriers, straw mulch, sediment traps, and check dams. A sediment pond will be “shaped” at the northern end (deep end) of the lake to collect sediments while the lake is draining. The location of these erosion and sediment control areas can be seen on Figure 12.

Construction Methods to Reduce Turbidity – Roslyn Lake will be drained at a rate which allows most of the sediments to settle out prior to discharge. The rate of drainage will be adjusted to slow or stop the drainage if sediment discharge becomes too high. Additional methods such as pumping from tanks to filter bags prior to discharge may be used to reduce sediment discharges.

Post Construction Restoration and Revegetation – The area of Roslyn Lake will be regraded to facilitate natural contours and drainage patterns. After regrading, the area will be hydroseeded with a cover species such as annual ryegrass to prevent the establishment of exotic and/or invasive plant species following decommissioning.

5.4 Concrete Canals

Project Construction Description – The concrete canal bottoms will be ripped and the concrete sides folded into the canal. The canals will be backfilled and the area regraded to blend with existing contours and prevent ponding of water. Sediment material removed from above Marmot Dam may be used to fill in the canals. A soil cover will be placed over the areas prior to seeding and revegetation (see Canal Decommissioning Figures 13 and 14A).

Erosion and Sediment Control Measures – Erosion and sediment control measures for the canals may include sediment fences on the areas downslope from the canal alignment and straw mulch or fiber mats for steeper sections (see Figure 14A).

Construction Methods to Reduce Turbidity – The primary construction method to be used to address sediment run-off that could result in increased stream turbidity beyond effective erosion control measures is to stop work. Work will cease in the event that erosion control measures become overwhelmed or otherwise compromised (by rain events, etc.). Work will resume when the erosion control devices are re-positioned and/or maintained to minimize sediment run-off.

Post Construction Restoration and Revegetation – The area of the canals will be restored and revegetated consistent with the many other upland project facilities as described in the next section.

5.5 Tunnels, Flumes, Penstocks, Powerhouse, Switchyard, Car Barn, Shops

Project Construction Description – These upland project facilities are not located within or on the banks of rivers or streams. Therefore, turbidity management is focused on effective erosion and sediment control measures that reduce sediment run-off from sites that could be transported to a stream during construction. The tunnels will be left in place with the ends blocked off with reinforced concrete. The upstream portal of tunnel 1 will have a louvered entrance to provide access for bat habitat. All other facilities will be dismantled and/or demolished pursuant to the Decommissioning Plan. The only portions of these structures that will be left in place are the concrete flume foundation footings that are not located in the Little Sandy River (see Figures 13-16).

Erosion and Sediment Control Measures – Erosion and sediment control measures for areas disturbed by the removal of these structures include sediment fences and barriers, straw mulch, sediment traps as needed and fiber mats. The detail and location of these erosion and sediment control areas can be seen on Figures 13-16.

Construction Methods to Reduce Turbidity – The primary construction method to be used to address sediment run-off that could result in increased turbidity beyond effective erosion control measures is to stop work. Work will cease in the event that erosion control devices become overwhelmed or otherwise compromised (by storms, etc.). Work will resume when the erosion control devices are re-positioned and/or maintained to minimize sediment run-off.

Post Construction Restoration and Revegetation – Post construction activities include reshaping areas as needed to facilitate natural drainages and landscape contours. Exposed soils will be seeded with native species including blue wild ryegrass, Columbia brome, slender hairgrass, alsike clover,

winter vetch, sickle-keeled lupine and large-leafed lupine. Hydroseeding will be used as the planting method on large areas with good equipment access. Broadcast seeding and harrowing with an All Terrain Vehicle will be used in areas with more limited access and hand seeding will be used in areas with difficult equipment access.

6. Construction Monitoring and Compliance

6.1 Requirements

The DEQ issued 401 Certification (October, 2003) requires that “PGE shall monitor sites directly above and below Marmot Dam, above and below Little Sandy Dam, and below Roslyn Lake. Sampling will be continuous with an averaging period of no less than every hour, encompassing the work day, and occurring at times of peak activity. The DEQ *Draft Technical Basis for Revising Turbidity Criteria*, 2005, provides some guidance on the desired location (distance from discharge point) of the monitoring sites based on stream size. For the Sandy River below Marmot Dam, the stream width is approximately 120-feet. The proposed monitoring compliance distance for streams greater than 100 feet at the discharge point is 200 feet (± 10). The stream width at the discharge point below the Little Sandy Diversion Dam is approximately 60 feet. The proposed compliance distance for streams between 30 to 100 feet at the discharge point is 100 feet. The stream width of the Bull Run River at the discharge point for draining Roslyn Lake is approximately 50 feet; therefore the compliance distance downstream of the discharge point is 100 feet.

6.2 Compliance Monitoring Sites

The location of the compliance monitoring sites are identified based on the existing locations established during the two years of pre-removal Project monitoring, the guidance set forth in the DEQ *Draft Technical Basis for Revising Turbidity Criteria*, 2005, and safe monitoring site opportunities near the Project. The monitoring sites are:

- Marmot Dam Monitoring Sites –Background monitoring points will be chosen in an undisturbed area not more than 200 feet upstream of the decommissioning activities. Three downstream monitoring compliance points will be established for the Marmot dam deconstruction work, which represent the locations of the various construction activities. They are as follows:
 - During Cofferdam Construction and Demolition of concrete structures – the downstream monitoring compliance point will be 200-feet downstream of the approach channel discharge notch.
 - During Construction of Downstream Access Road Bridge – the downstream monitoring compliance point will be 200-feet downstream of the downstream access road temporary bridge.
 - During construction of the Temporary Fish Trap and Haul Facility – the downstream monitoring compliance point will be 200-feet downstream of the facility location.

- Little Sandy Diversion Dam – The upstream background monitoring site will be located near the downstream discharge portal of Tunnel No. 1. The downstream monitoring site will be located approximately 100 feet downstream of the Little Sandy Dam spillway crest.
- Roslyn Lake – The upstream background monitoring point will be 100-feet upstream of the Powerhouse on the Bull Run River. The downstream compliance monitoring point will be 100-feet downstream of the Powerhouse on the Bull Run River.

6.3 Compliance Monitoring Methodology

Turbidity measurements at the site should be taken with a turbidimeter using nephelometric turbidity units (NTUs). Continuous turbidity measurements (at least 15 minutes intervals) shall be taken at the upstream background point and at the downstream monitoring compliance point downstream of the impact area throughout the construction work day. A running average of the turbidity measurements shall be calculated every hour at each site. At each hour interval of the work day the upstream background monitoring average NTU (background condition) shall be compared to the downstream compliance monitoring average NTU to determine the status of turbidity compliance pursuant to the standards put forth in Section 6.4. The following standards shall be applied to the selection and operation of the nephelometer:

- The nephelometers must have an accuracy of +/- 5%, and a precision of +/- 5% for compliance monitoring.
- The nephelometers shall be professionally calibrated using primary standards, or checked periodically by an independent lab.
- Field verification instrument calibration may utilize gel formazin or other secondary standards; and the instrument should be periodically checked against primary standards.
- The nephelometers should be calibrated to above maximum and below minimum values expected to be measured.
- The same specific instrument type should be used for upstream and downstream comparisons.
- Turbidity readings should be reported according to DEQ protocol.
- Background levels (upstream monitoring point) must be taken upstream of the construction activity and it must be outside of any visual plume.
- All monitoring actions must be recorded in a monitoring log.

6.4 Turbidity Compliance During Construction

The following standards for compliance with DEQ's turbidity standards will be used during the PGE Bull Run Hydroelectric decommissioning project:

- Turbidity levels are not to exceed an average of 3 NTU over background over a 30 day period. This includes turbidity averages over 24 hours of each of 30 days including non-work times.

- All construction activities shall be conducted with effective erosion and sediment control measures in place as to minimize turbidity in the project area.
- If turbidity levels are less than 5 NTU over background at the monitoring interval (1 hour), operations can continue to the next monitoring interval (1 hour).
- If turbidity levels exceed 5 NTU over background during a monitoring interval, operations shall be adjusted and adaptive management alternatives be implemented in order to minimize turbidity levels.
- If turbidity levels exceed 5 NTU over background at a second successive monitoring interval after adaptive management alternatives have been implemented, in-water operations may continue for a total of eight hours of exceedance provided NTUs do not exceed 30 NTU for more than two hours or 50 NTU over background and all practicable adaptive management measures are implemented. Eight hours of exceedance, two hours of 30 NTU exceedance, or the first instance of a 50 NTU exceedance will stop work for the day.
- Despite implementing all practicable measures to minimize turbidity as a result of the proposed in-water activities, limited duration exceedances may occur during:
 1. Building the Upstream Cofferdam,
 2. Building the Downstream Cofferdam and Bridge,
 3. Demolition of the Marmot Dam Concrete Structures, and
 4. While breaching the Upstream Cofferdam.

These limited duration exceedances may only occur once in a 24-hour period and be in compliance with the following standards established by DEQ.

Table 4.2 – DEQ Technical Basis for Revising Turbidity Criteria

Limited Duration Exceedances (single exceedance period per 24-hour period); & may enlist only one category from the list below per day		
Hrs per 24 hrs	Maximum NTUs	Exceedance Period Limit per 30-days (month)
2	50	6
4	40	5
8	30	4
12	25	3
24	20	2 (non-consecutive)

- In the event that PGE is unable to comply with the turbidity compliance standards set forth above, after all reasonable erosion and sediment control measures and adaptive management alternatives have been implemented, PGE will follow the compliance steps outlined in this management plan including stop work periods, and will report exceedances to DEQ within 24 hours. PGE may consult with DEQ to determine if there are other compliance options available.

7. Construction Compliance Turbidity Action Plan

Compliance with the turbidity requirements will require close attention and coordination by the construction site supervisor and the person conducting the actual monitoring during construction. Construction site actions taken as a result of the monitoring data will need to be documented in a monitoring or construction log. A clear chain of work authorization between the monitoring person and the construction team/construction manager also needs to be established to insure that there is adherence to the monitoring compliance requirements and follow-up on actions necessary to adjust operations if necessary to reduce turbidity incidents which trigger stop work orders. The following actions will be taken to insure that turbidity compliance is adhered to on site during construction:

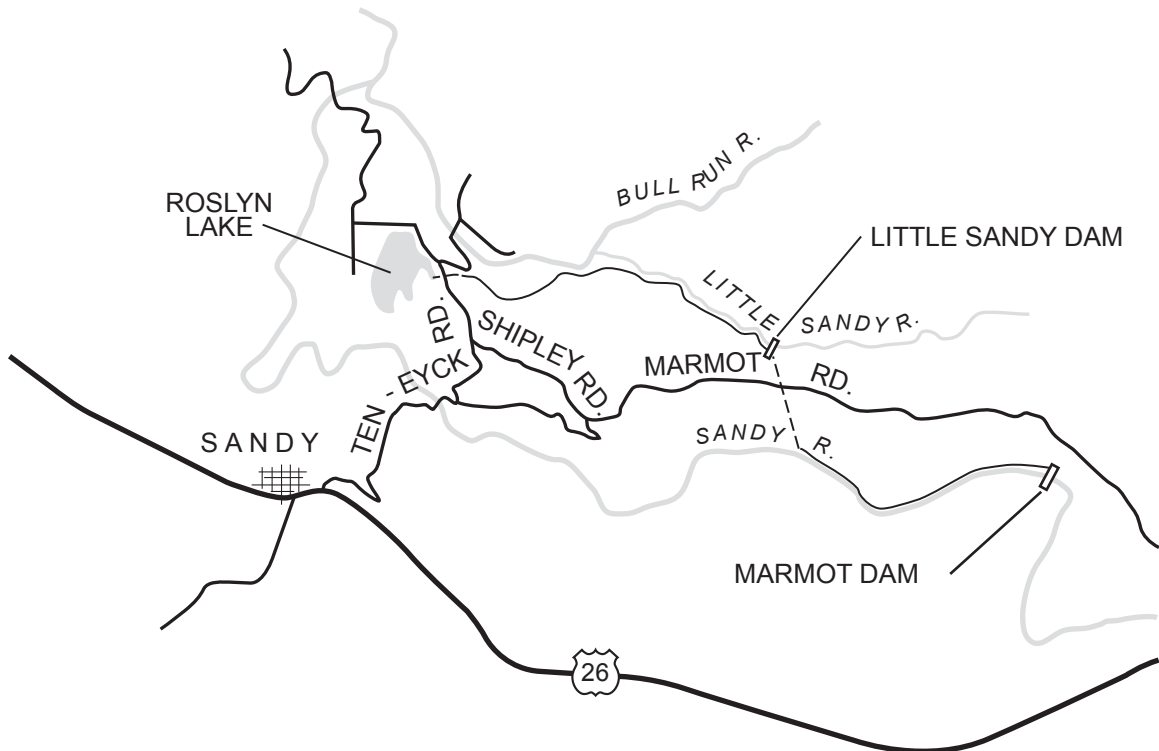
- The Monitoring person will have the on-site construction manager initial the results of the pre-construction NTU levels each day after they have been determined.
- The Monitoring person will notify the construction manager immediately of the NTU results after each monitoring interval. This notification will be first by cell phone/radio if the NTU reading requires work to stop and will follow-up with having the construction manager initial the incident in the monitoring data log.
- If the NTU reading requires work to stop, the monitoring person will discuss the incident with the construction manager to determine if there will be on-site construction operational changes made to reduce turbidity. This discussion and any subsequent changes in construction operations will be documented in the monitoring log and initialed by the construction manager.
- In the unlikely event that the construction manager does not stop operations in view of exceedance of the NTU compliance standards, the monitoring person will first notify PGE and then DEQ. A written incident report will be developed that documents the non-compliance circumstances. The report will be initialed by the construction manager and sent to PGE and DEQ.
- After a “stop work” notification based on exceedance of NTU standards, the Monitoring person shall notify the construction manager when construction activities can be re-initiated. If the construction manager allows in-water construction activities to occur prior to being notified by the Monitoring person that conditions are okay to proceed, then an incident report will be completed, initialed by the construction manager and sent to PGE and DEQ.

8. Post Construction Turbidity Monitoring

Post construction turbidity monitoring will occur consistent with the requirements set forth in the Decommissioning Plan. These requirements include:

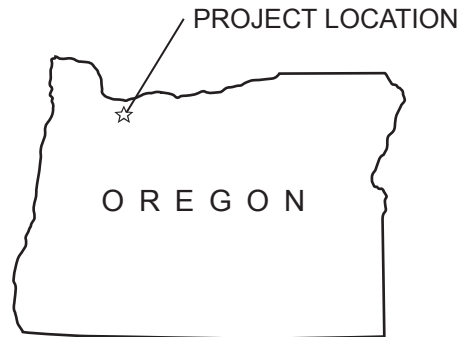
- Continuous turbidity data will be collected at each of these five sites: one each above the Marmot and Little Sandy Dams, one each below the dams, and one downstream of all Project influence (below the Bull Run confluence). The location of the sites are as follows:
 - Marmot (Sandy River) Upstream Site – Located on the Sandy River at approximately RM 31, at the same location as USGS gage #14137000. This site was used for the *Sandy River Baseline Turbidity Monitoring* data collection (pre-removal monitoring).
 - Marmot (Sandy River) Downstream Site – The downstream monitoring site is approximately 1,000 feet below the crest of Marmot Dam (below the temporary fish trap and haul facility).
 - Little Sandy Diversion Dam Upstream Site – Located at the USGS stream gage immediately above the Little Sandy Diversion Dam on the Little Sandy River.
 - Little Sandy Diversion Dam Downstream Site – Located approximately 200 feet downstream of the Little Sandy Diversion Dam.
 - Roslyn Lake – located at RM 18 on the Sandy River, approximately 800 yards downstream from the USGS gage #14142500, just below the junction of the Bull Run River with the Sandy River.
- Turbidity monitoring through Reach 1 will be conducted during the first year following dam removal and continue until there are two successive years with (1) no barriers to fish passage, and (2) either improved channel complexity or channel complexity within the range of values prior to dam removal. Turbidity monitoring will continue until the “endpoint”, defined in Reach 3 of the Sandy River as one year plus two consecutive years with no barriers to fish passage and improved channel complexity, or channel complexity within the range of values prior to dam removal; plus two more consecutive years with no barriers to fish passage and either improved channel complexity or channel complexity within the range of values prior to dam removal as determined by the Monitoring Implementation Team (MIT) (PGE Decommissioning Plan pgs. 30-47). (Reach 3 requires two additional consecutive years beyond Reach 1 which could result in monitoring for at least 5 years).
- A shorter time period may be agreed to by PGE and DEQ once turbidity impacts are understood. However, monitoring will occur for a minimum of two years after dam removal. Post construction monitoring data will be submitted to DEQ annually, including data from October through September submitted by January 1 of the following year. The monitoring data results will be presented in a similar format (report) as that developed for the pre-construction monitoring results, i.e. the *Sandy River Basin Turbidity Monitoring Report*, Romey and Associates, 2004.

- PGE will closely monitor sediment transport impacts to ESA protected fish in the Sandy River. The various types of potential sediment impacts which can trigger the need for action have been identified in PGE's Decommissioning Plan pgs. 22-47. When these impacts occur, PGE will implement the best method to resolve the impact including removing barriers to fish passage, creating channel complexity, conducting emergency fish recovery and agency consultation.



NORTH

NOT TO SCALE



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172301 MWT

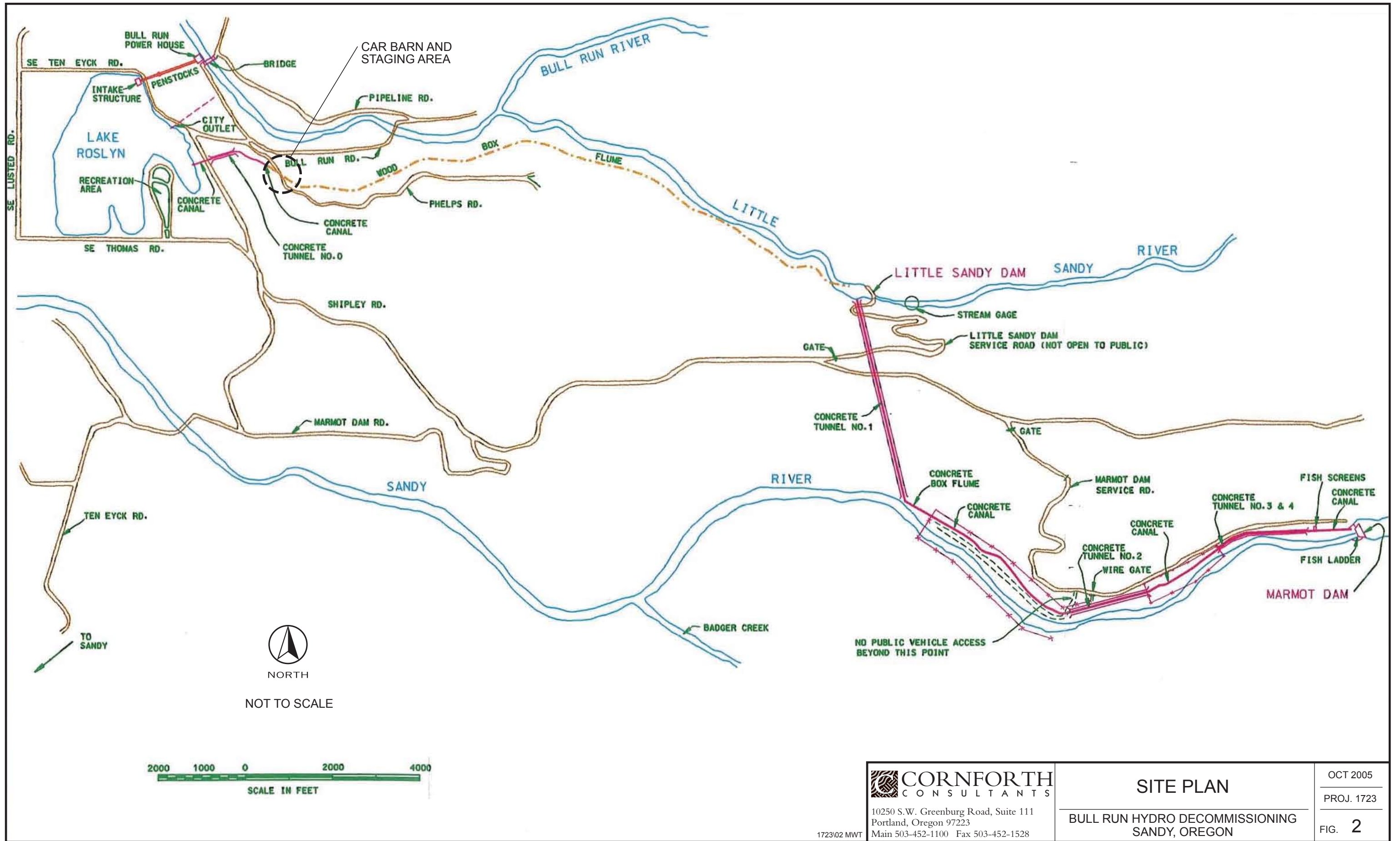
VICINITY MAP

**BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON**

OCT 2005

PROJ. 1723

FIG. **1**



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SITE PLAN
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 2



ROMEY & ASSOCIATES

Draft Report – PGE Sandy River Turbidity
December, 2004

Table 4. Monthly peak turbidity¹ with corresponding stream flow values and average monthly turbidity from August 2003 through July 2004. Suspect data are not included in this table. [cfs., cubic feet per second; NTU, nephelometric turbidity units]

Station Name and Data	Month											
	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04
Marmot												
Peak turbidity (NTU)	53.6	986	1047 ²	903	485.5	274.8	30.3	97.8	18	268.9	120.1	91.9
Peak day and time	29-14:00	12-3:30	29-6:45	11-7:00	13-13:45	30-16:45	19-4:45	26-5:15	19-5:30	27-6:00	23-10:30	25-10:30
Peak stream flow (cfs)	307	689	866	1990	2140	--	2180	1570	1160	2550	970	510
Average turbidity (NTU)	20.3	39.7	69.0	65.5	18.9	8.8	3.8	2.1	1.5	9.7	8.2	13.1
Sample size (N)	339	2880	2965	1355	1972	5942 ³	2784	2974	2871	2971	2877	2973
BRC												
Peak NTU	24.8	375.7	1009 ²	875	--	--	--	--	--	--	42.8	60.4
Peak day and time	30-10:45	13-0:45	29-13:45	11-12:30	--	--	--	--	--	--	24-21:30	8-10:30
Peak stream flow (cfs)	375	810	1210	3110	--	--	--	--	--	--	1170	713
Average turbidity (NTU)	12.2	24.8	54.7	40.4	--	--	--	--	--	--	7.1	10.0
Sample size (N)	328	2880	2974	2790	--	--	--	--	--	--	1952	2976

¹ Readings recorded on the quarter-hour.

² The peak turbidity values at the Marmot and BRC stations during these events may have been higher, as the maximum possible turbidity reading for this probe design is near 1,000 NTU.

³ Large sample size is due to turbidity recorded every minute from 1/16/04 @ 10:47 hrs to 1/19/04 @ 10:29 hrs.



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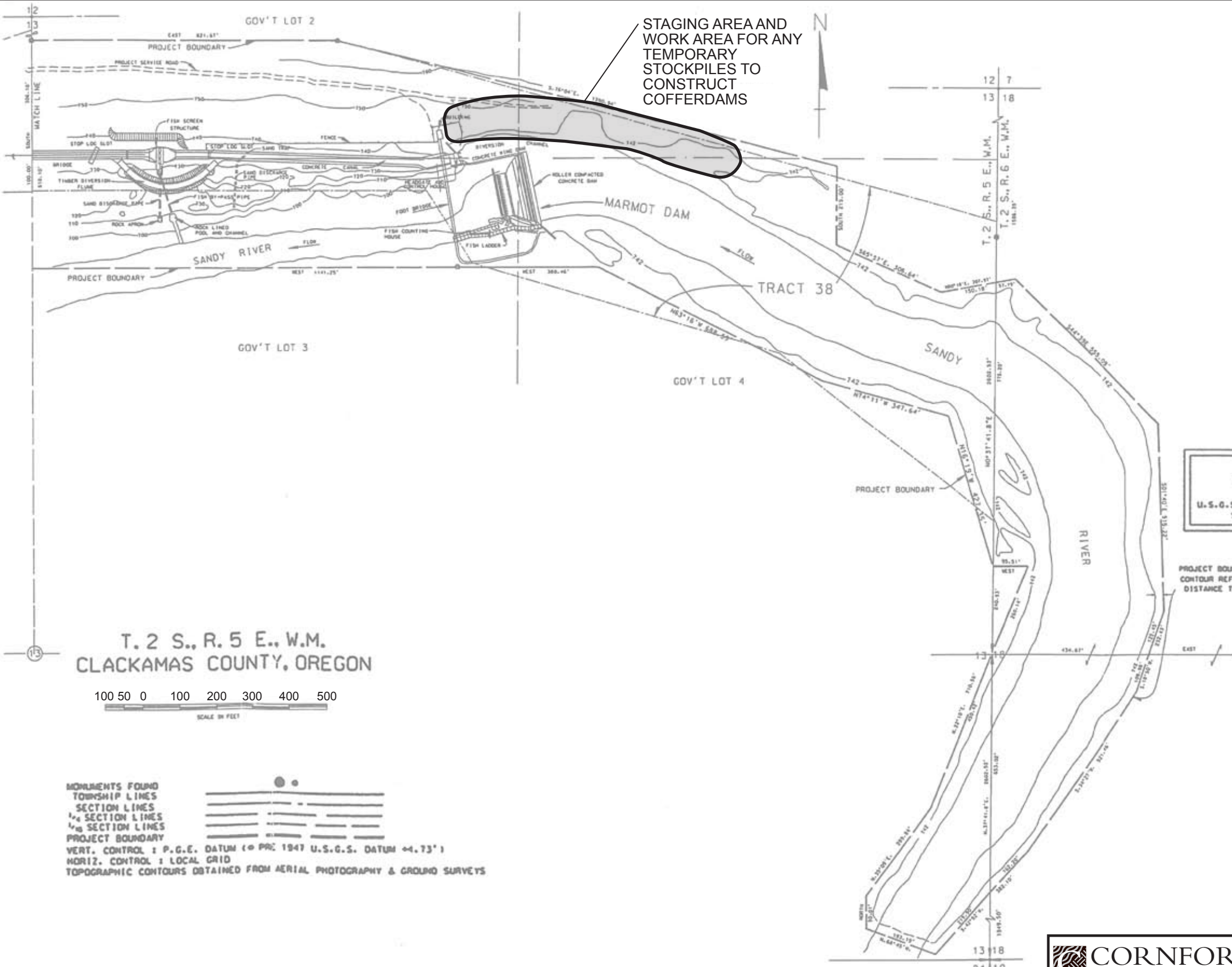
PGE SANDY RIVER TURBIDITY RESULTS

BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005

PROJ. 1723

FIG. **3**



STAGING AREA AND
WORK AREA FOR ANY
TEMPORARY
STOCKPILES TO
CONSTRUCT
COFFERDAMS

THE ELEVATIONS ON
THIS DRAWING ARE IN
P.G.E. DATUM
TO CONVERT TO
U.S.G.S. DATUM, (WITH 1947 ADJ.)
SUBTRACT 3.62 FEET

PROJECT BOUNDARY AND
CONTOUR REFERENCE LINE (20' MINIMUM
DISTANCE TO 742 CONTOUR, TYPICAL)

T. 2 S., R. 5 E., W.M.
CLACKAMAS COUNTY, OREGON



MONUMENTS FOUND
TOWNSHIP LINES
SECTION LINES
1/4 SECTION LINES
1/16 SECTION LINES
PROJECT BOUNDARY
VERT. CONTROL : P.G.E. DATUM (+ PRC 1947 U.S.G.S. DATUM +4.73')
HORIZ. CONTROL : LOCAL GRID
TOPOGRAPHIC CONTOURS OBTAINED FROM AERIAL PHOTOGRAPHY & GROUND SURVEYS

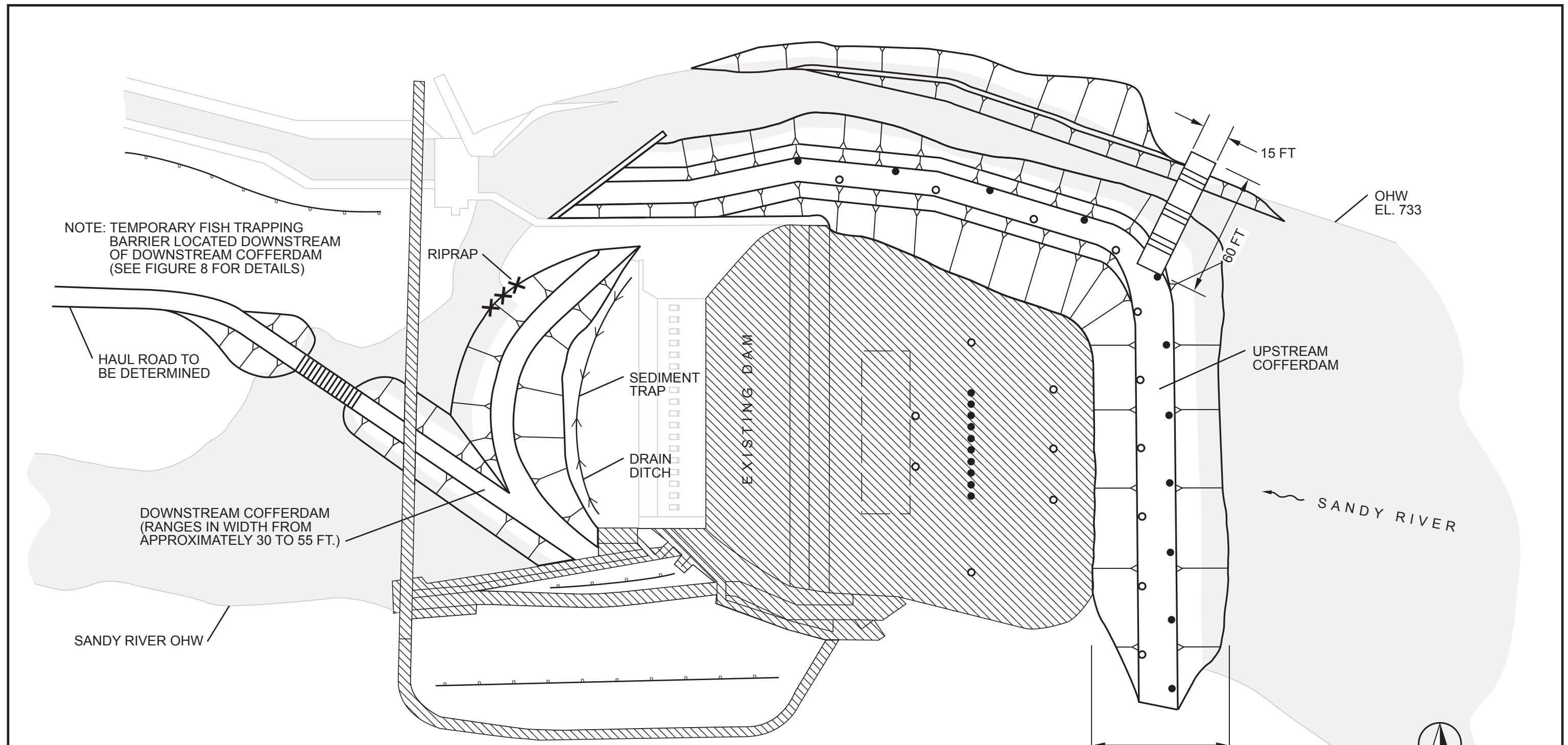
0	6-19	ISSUED FOR INFORMATION PER	YES				
	2000	JOB NO. 17669					
REVISED	DATE	DESCRIPTION	BY	CHK	ENGR	SUPV	MR
REVISIONS							
PORTLAND GENERAL ELECTRIC CO. PORTLAND, OREGON							
BULL RUN PROJECT							
MARMOT DAM AREA							
GENERAL PLAN							
APPROVALS				SCALE AS SHOWN			
DESIGNER				DRAWN BY	ML. V. C. WONG		
DESIGN ENGR	GREG BUSCH			CHECKED BY			
ENGR SUPV				DATE	6-19-2000		
ENGR MANAGER					BU-SK.A		

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**MARMOT DAM GENERAL
PLAN EXISTING CONDITIONS**
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 4

1723/04 MWT



NOTE: TEMPORARY FISH TRAPPING BARRIER LOCATED DOWNSTREAM OF DOWNSTREAM COFFERDAM (SEE FIGURE 8 FOR DETAILS)

HAUL ROAD TO BE DETERMINED

DOWNSTREAM COFFERDAM (RANGES IN WIDTH FROM APPROXIMATELY 30 TO 55 FT.)

SANDY RIVER OHW

RIPRAP

SEDIMENT TRAP

DRAIN DITCH

EXISTING DAM

15 FT

60 FT

OHW EL. 733

UPSTREAM COFFERDAM

SANDY RIVER

APPROXIMATELY 65 FT.



NOTES

1. APPROXIMATELY 30,000 yd³ OR 0.5 ACRE OF EXISTING SEDIMENT WILL BE REMOVED BETWEEN UPSTREAM COFFERDAM AND RCC DAM.
2. COFFERDAMS CONSIST OF APPROXIMATELY 15,000 yd³ OR 1.1 ACRES OF FILL. (INCLUDING TEMPORARY FILL FOR UPSTREAM BRIDGE ABUTMENT).

LEGEND

- DEWATERING WELLS
- PIEZOMETER
- SEDIMENT FENCE

NOTE: BASE MAP TAKEN FROM PGE DRAWING DATED 5/19/89 PGE-8593-G-103

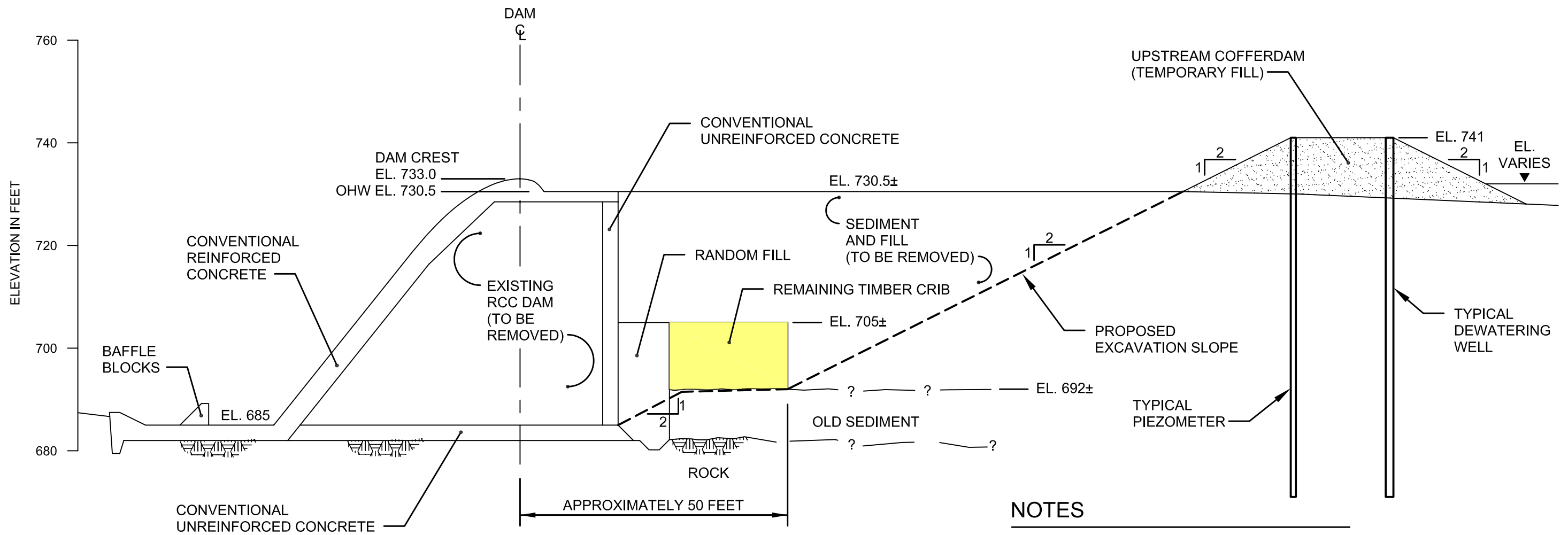


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LAYOUT OF MARMOT DAM COFFERDAMS
 BULL RUN HYDRO DECOMMISSIONING SANDY, OREGON

OCT 2005
 PROJ. 1723
 FIG. 5

1723105 MWT



NOTES

1. APPROXIMATELY 30,000 yd³ OR 0.5 acre OF EXISTING SEDIMENT AND FILL WILL BE REMOVED BETWEEN UPSTREAM COFFERDAM AND RCC DAM.
2. THE UPSTREAM COFFERDAM CONSISTS OF APPROXIMATELY 11,000 yd³ OR 0.8 acre OF FILL.

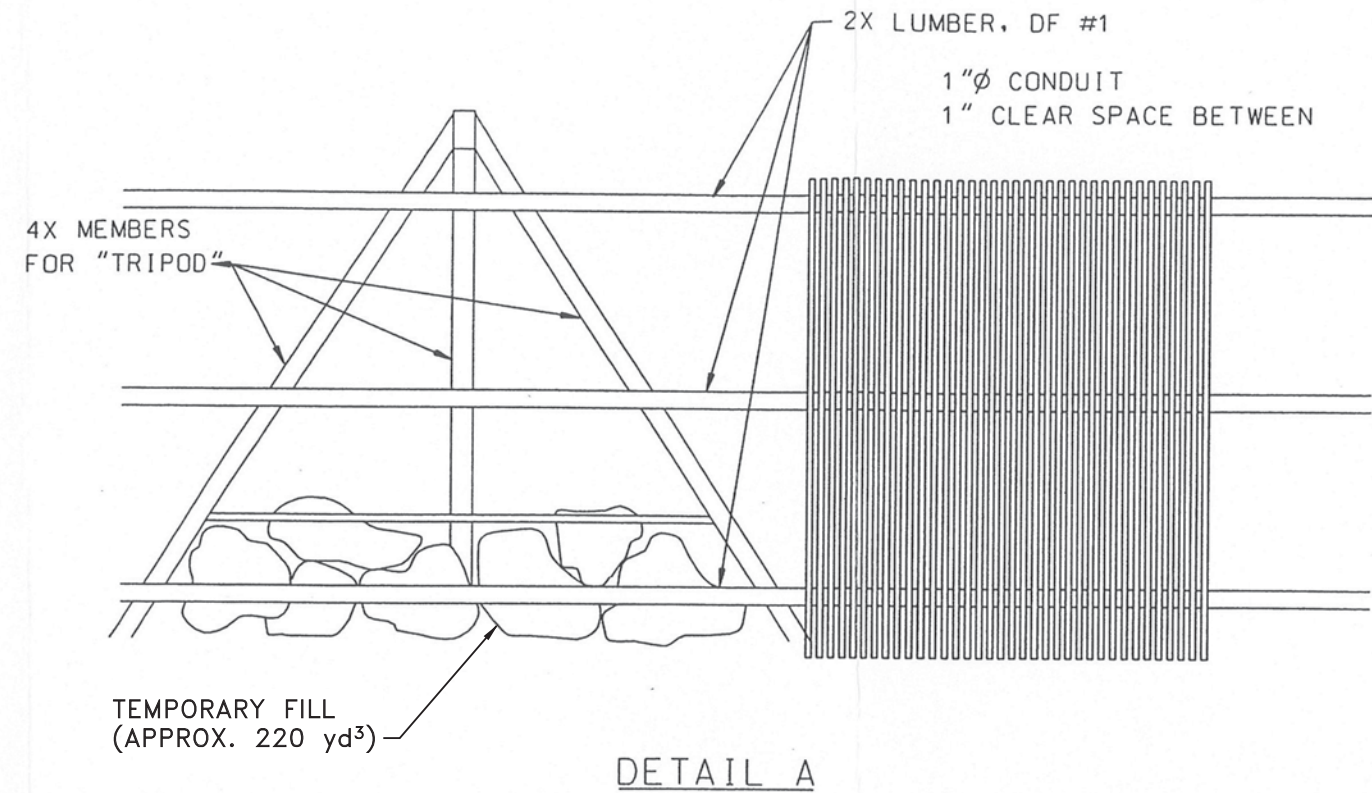
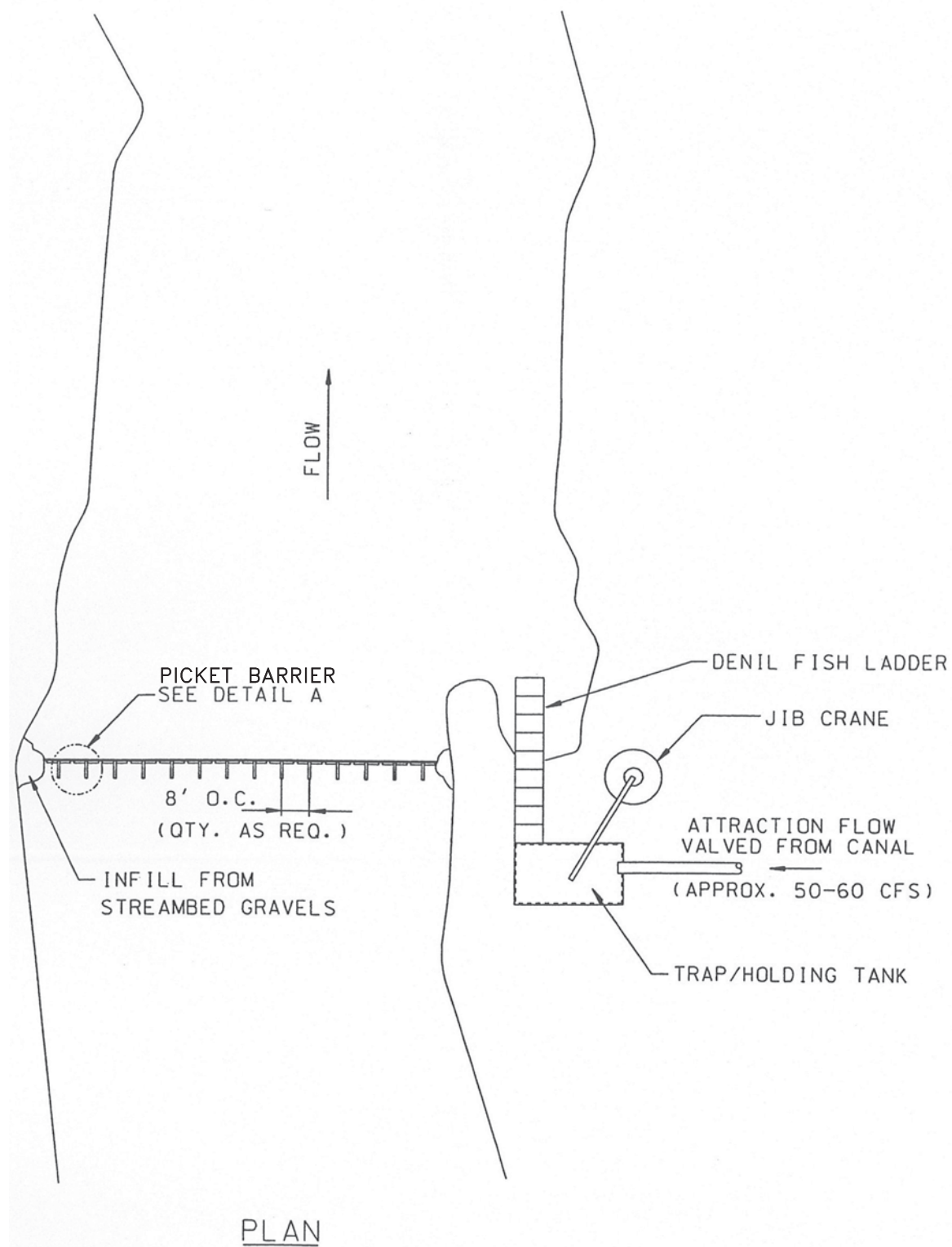
NOTE: CROSS SECTION BASED ON EBASCO AS-BUILT CROSS SECTIONS, FEB. 1990.



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MARMOT DAM
CROSS SECTION
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 6



NOTES

1. SEE FISH MONITORING AND CONTINGENCY PLAN (DECOMMISSIONING PLAN, APPENDIX A FERC FEIS) FOR DETAILS ON FISH TRAP AND HAUL.
2. IF NECESSARY, TRAP AND HAUL FACILITY WILL BE CONSTRUCTED IN 2008 FOLLOWING REMOVAL OF MARMOT DAM.
 - PICKET SECTION TO BE PREFABRICATED FOR RAPID INSTALL.
 - BUILD FLOATING PUMP STATION AND DENIL FISH LADDER.
 - TRAP AND HAUL FACILITY PLANNED TO BE INSTALLED AND OPERATIONAL WITHIN 2 DAYS OF DETERMINATION IF IT IS NECESSARY.



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**MARMOT DAM TEMPORARY
FISH TRAP AND HAUL**

BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005

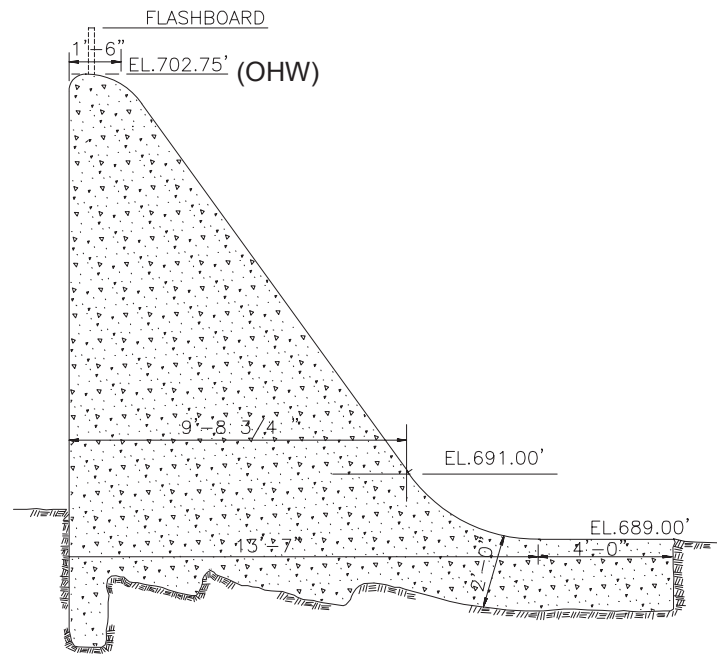
PROJ. 1723

FIG. 7

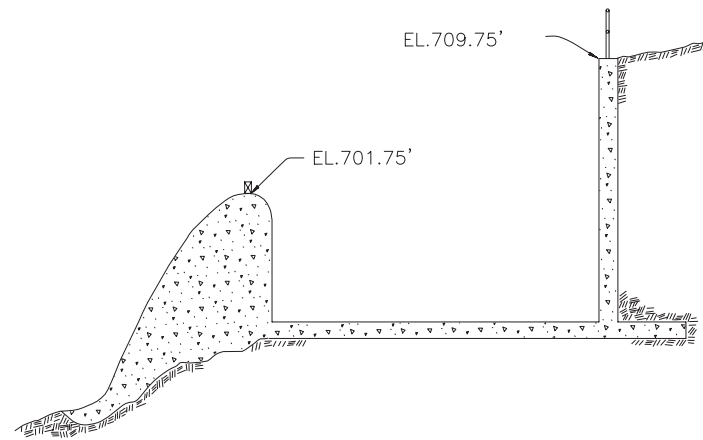
NOTES

1. SEDIMENT FENCES TO BE INSTALLED DOWNSLOPE OF ALL DISTURBED AND REGRADED AREAS. STRAW MULCH TO BE PLACED OVER DISTURBED GROUND
2. EXISTING SEDIMENT/FILL WILL BE ALLOWED TO FLUSH DOWNSTREAM WITH NATURAL RIVER FLOWS, FOLLOWING DAM REMOVAL. (JULY-OCTOBER 2008).
3. NO COFFERDAMS WILL BE NECESSARY AND NO TEMPORARY OR PERMANENT FILLS ARE PLANNED

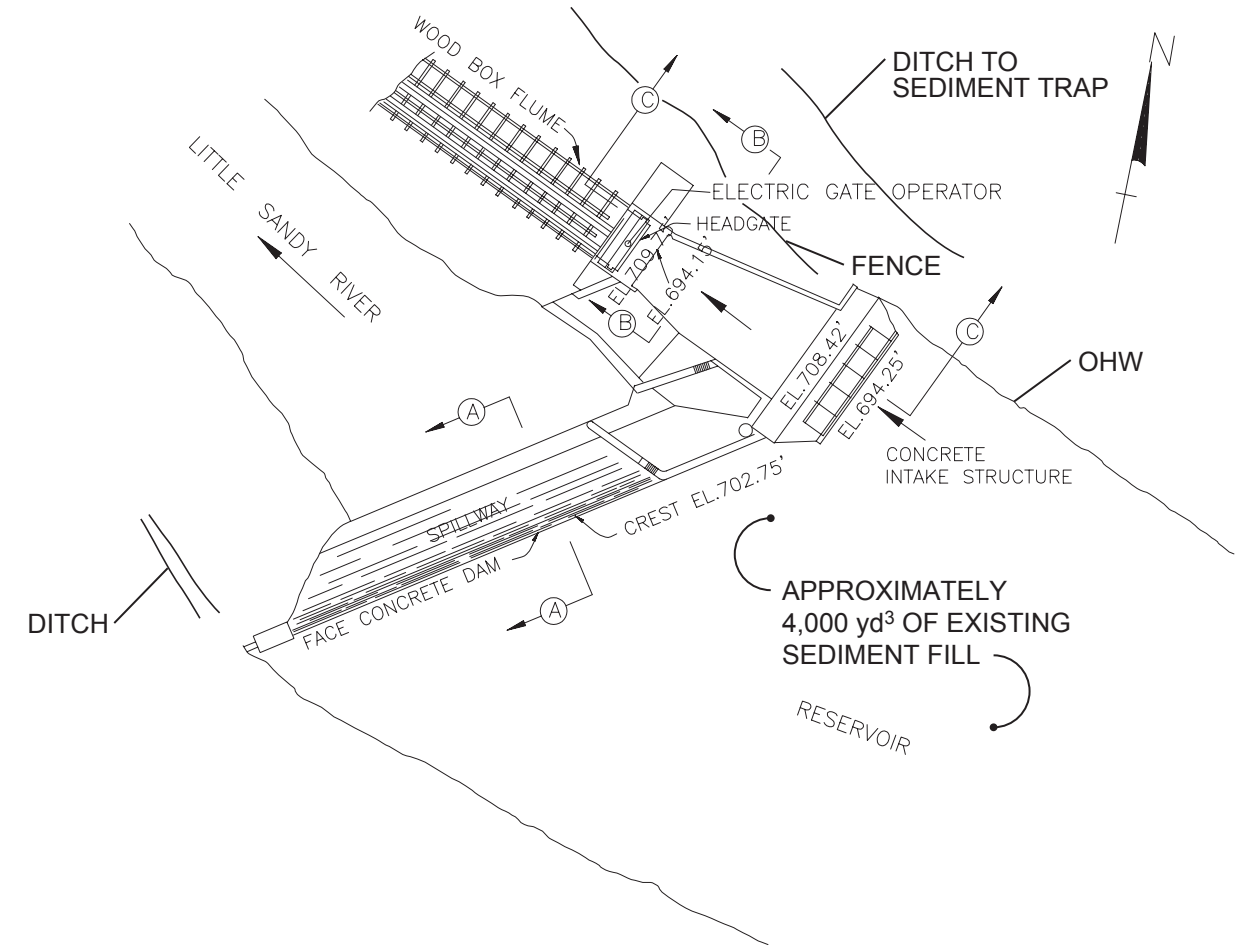
THE ELEVATIONS ON THIS DRAWING ARE IN P.G.E. DATUM. TO CONVERT TO U.S.G.S. DATUM. (WITH 1947 ADJ.) SUBTRACT 3.48 FEET



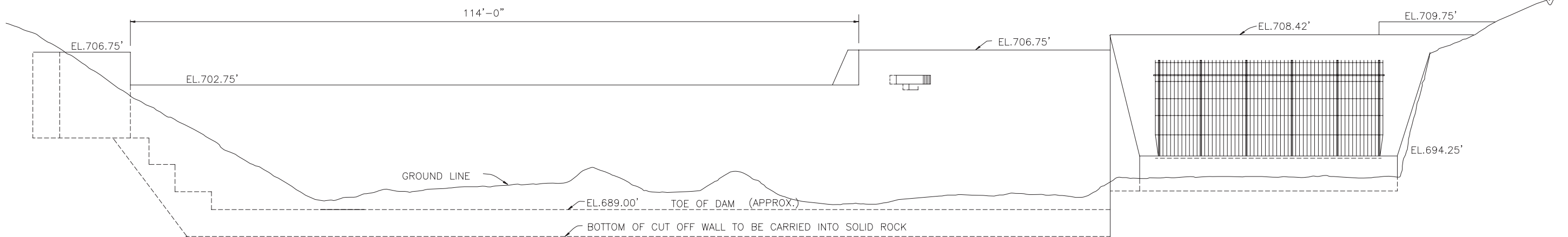
SECTION A - A



SECTION B - B



PLAN - LITTLE SANDY DAM
NO SCALE



FRONT ELEVATION



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LITTLE SANDY DAM

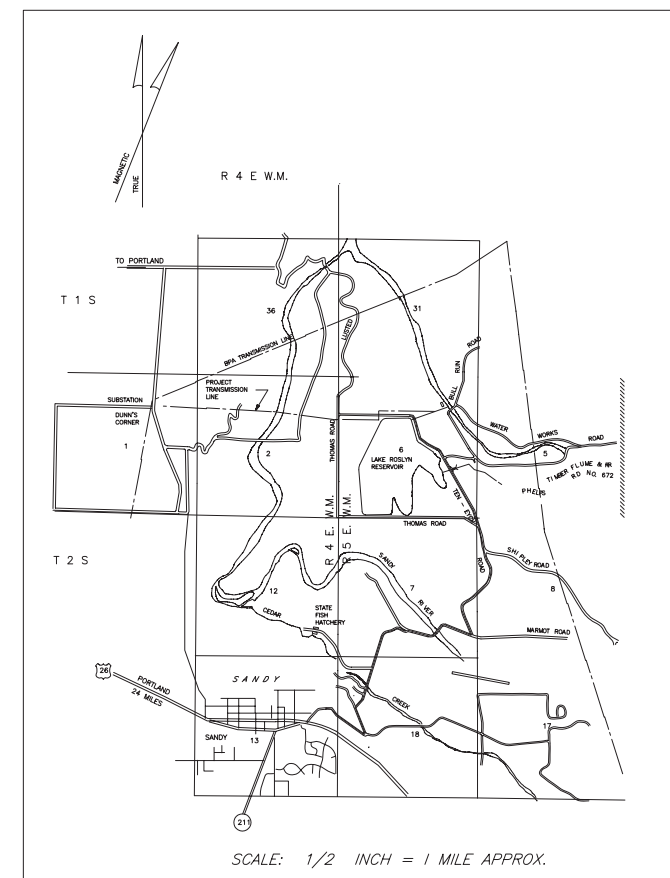
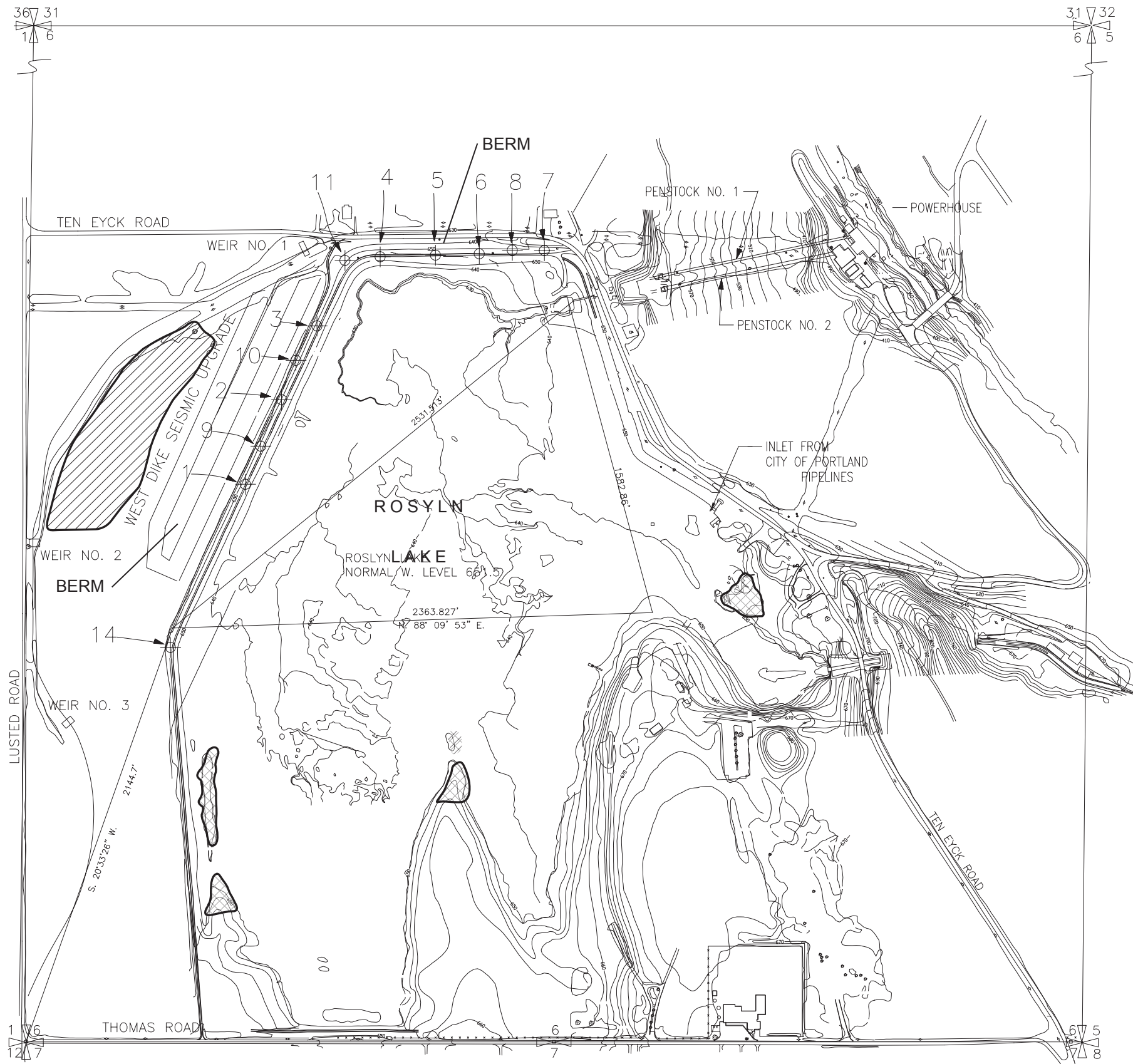
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005

PROJ. 1723

FIG. 8

1723/08 MWT



VICINITY MAP

LEGEND

- FORESTED WETLAND
- SCRUB-SHRUB WETLAND

NOTES

FOR ADDITIONAL DETAILS ON EXISTING WETLAND AREAS, SEE "ROSLYN LAKE WETLAND DELINEATION REPORT" DATED SEPTEMBER 2005 BY CORNFORTH AND CROCKETT



NORTH



SCALE IN FEET (APPROXIMATE)

REFERENCE DRAWINGS

SPENCER-GROSS 1996 AERIAL PHOTO BASED
COMPUTER AIDED AND GENERATED TOPOGRAPHY MAP



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ROSLYN LAKE EXISTING CONDITIONS
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 9



LEGEND

-  644 PROPOSED RE-GRADING CONTOUR AND ELEVATION (CONTOUR INTERVAL 2 FEET)
-  A CROSS-SECTION LINE AND LOCATION



NORTH

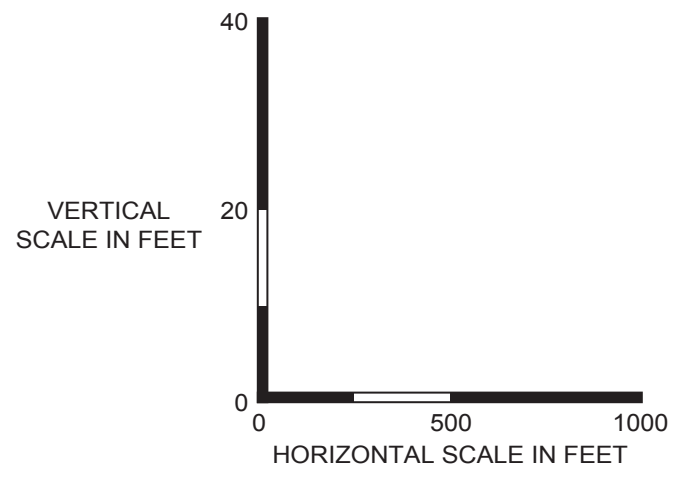
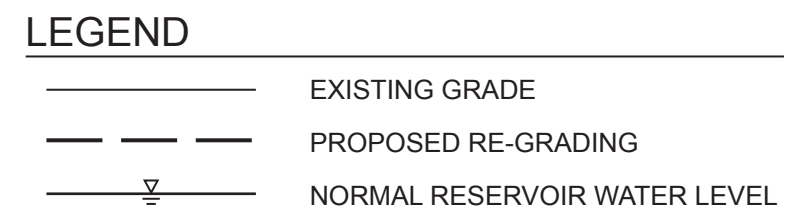
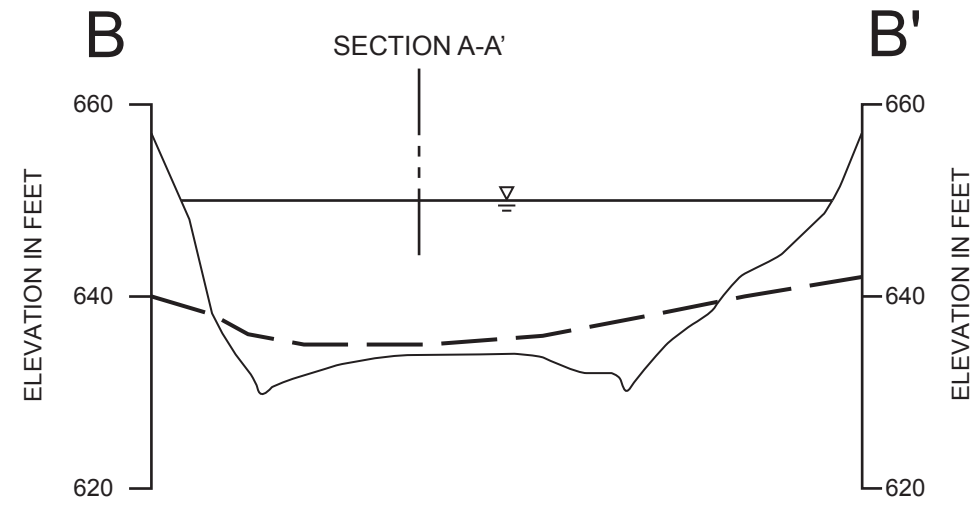
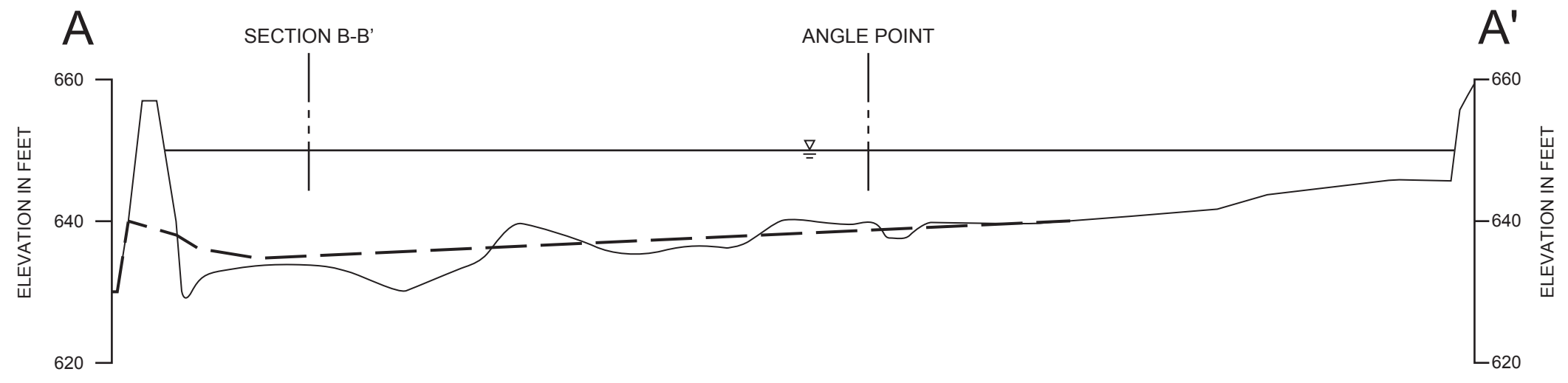


SCALE IN FEET

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**ROSLYN LAKE PROPOSED
RE-GRADING TOPOGRAPHY**
BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 10



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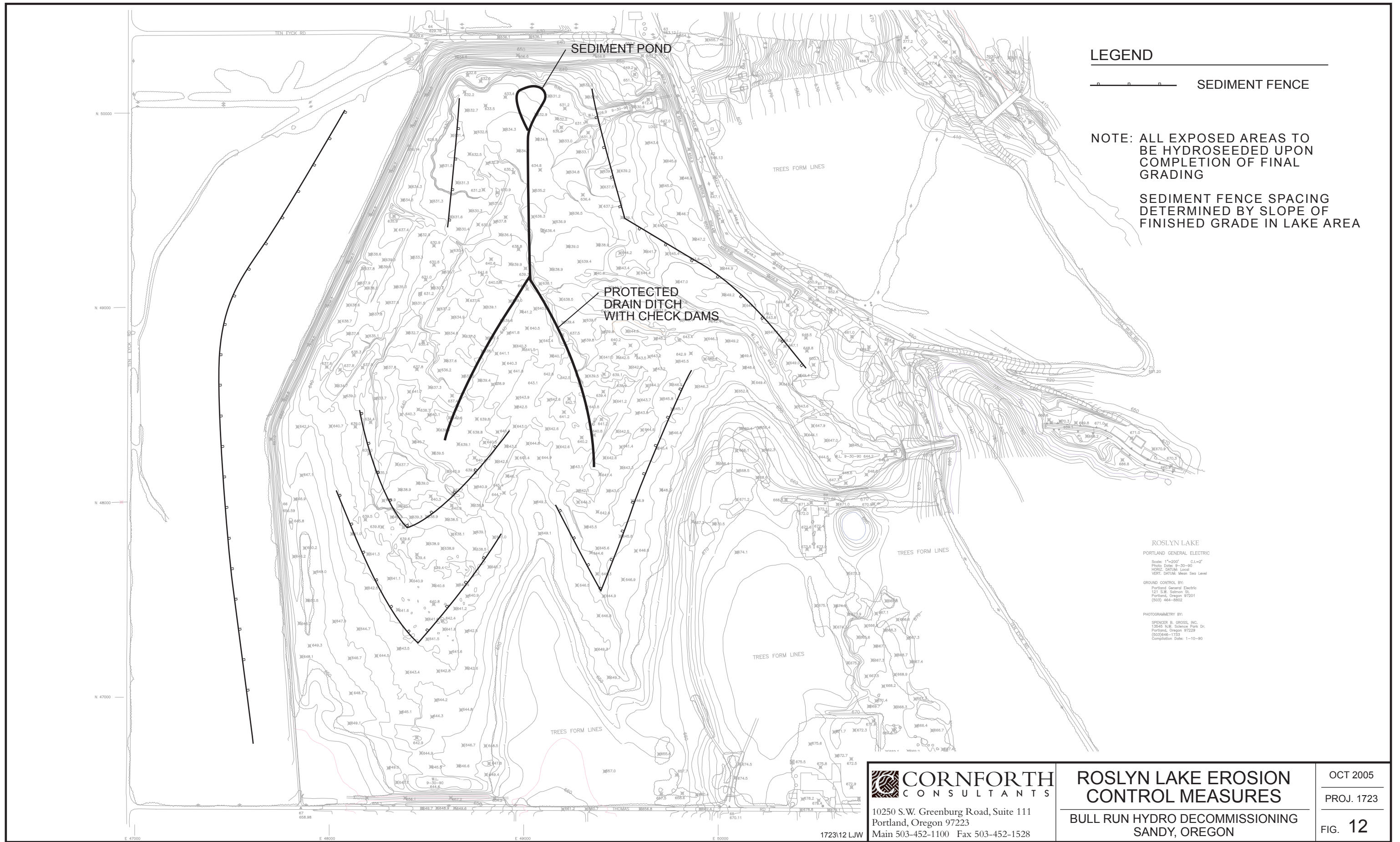
10250 S.W. Greenburg Road, Suite 111
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**ROSLYN LAKE PROPOSED
RE-GRADING CROSS-SECTIONS**

BULL RUN HYDRO DECOMMISSIONING
SANDY, OREGON

OCT 2005
PROJ. 1723
FIG. 11

1723\11 MWT



LEGEND

— S — SEDIMENT FENCE

NOTE: ALL EXPOSED AREAS TO BE HYDROSEEDED UPON COMPLETION OF FINAL GRADING

SEDIMENT FENCE SPACING DETERMINED BY SLOPE OF FINISHED GRADE IN LAKE AREA

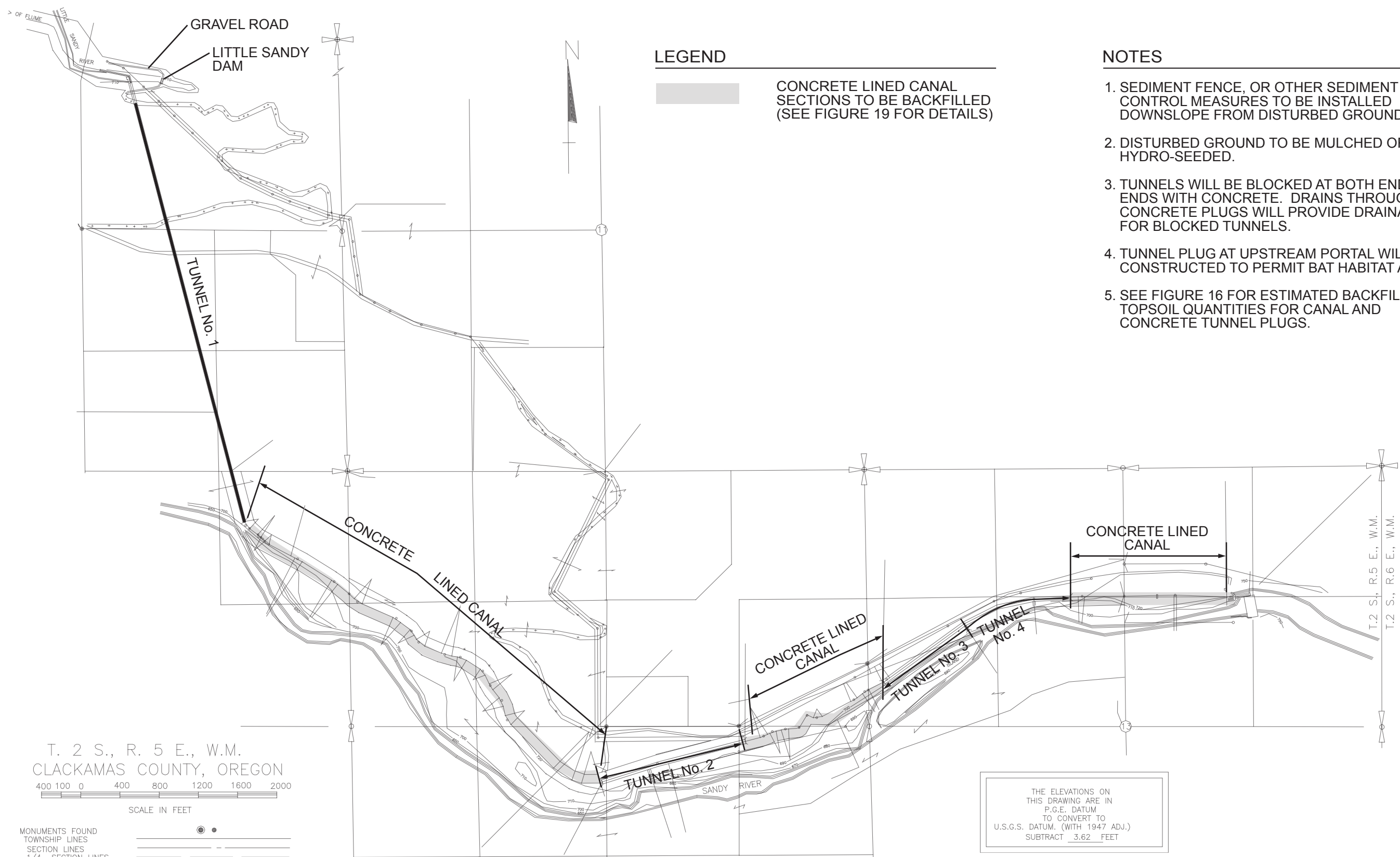
ROSLYN LAKE
 PORTLAND GENERAL ELECTRIC
 Scale: 1"=200' C.L.=2"
 Photo Date: 9-30-90
 HORIZ. DATUM: Local
 VERT. DATUM: Mean Sea Level
 GROUND CONTROL BY:
 Portland General Electric
 121 S.W. Salmon St.
 Portland, Oregon 97201
 (503) 464-8802
 PHOTOGRAMMETRY BY:
 SPENCER B. GROSS, INC.
 13546 N.W. Science Park Dr.
 Portland, Oregon 97229
 (503) 464-1733
 Compilation Date: 1-10-90


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ROSLYN LAKE EROSION CONTROL MEASURES
 BULL RUN HYDRO DECOMMISSIONING SANDY, OREGON

OCT 2005
 PROJ. 1723
 FIG. 12

172312 LJW



LEGEND


CONCRETE LINED CANAL SECTIONS TO BE BACKFILLED (SEE FIGURE 19 FOR DETAILS)

NOTES

1. SEDIMENT FENCE, OR OTHER SEDIMENT CONTROL MEASURES TO BE INSTALLED DOWNSLOPE FROM DISTURBED GROUND.
2. DISTURBED GROUND TO BE MULCHED OR HYDRO-SEEDED.
3. TUNNELS WILL BE BLOCKED AT BOTH ENDS WITH CONCRETE. DRAINS THROUGH CONCRETE PLUGS WILL PROVIDE DRAINAGE FOR BLOCKED TUNNELS.
4. TUNNEL PLUG AT UPSTREAM PORTAL WILL BE CONSTRUCTED TO PERMIT BAT HABITAT AREA.
5. SEE FIGURE 16 FOR ESTIMATED BACKFILL AND TOPSOIL QUANTITIES FOR CANAL AND CONCRETE TUNNEL PLUGS.

T. 2 S., R. 5 E., W.M.
 CLACKAMAS COUNTY, OREGON
 400 100 0 400 800 1200 1600 2000
 SCALE IN FEET

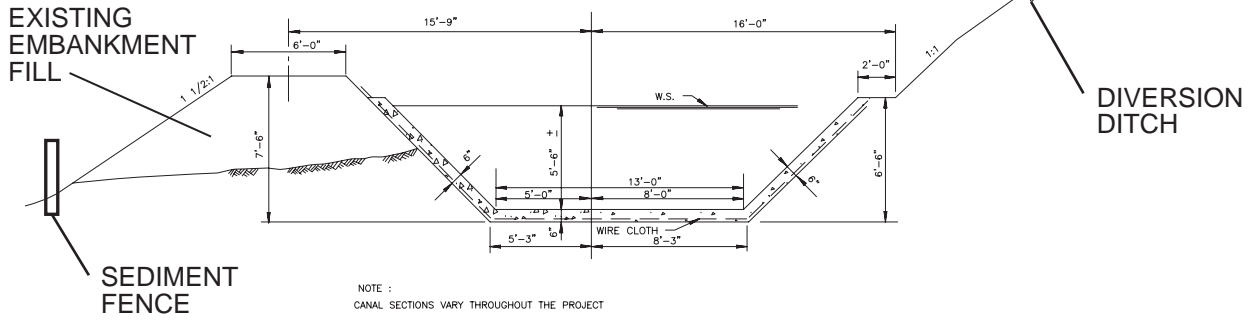
MONUMENTS FOUND
 TOWNSHIP LINES
 SECTION LINES
 1/4 SECTION LINES
 1/16 SECTION LINES
 PROJECT BOUNDARY
 VERT. CONTROL : P.G.E. DATUM (* PRE 1947 U.S.G.S. DATUM +4.73')
 HORIZ. CONTROL : LOCAL GRID
 TOPOGRAPHIC CONTOURS OBTAINED FROM AERIAL PHOTOGRAPHY & GROUND SURVEYS

THE ELEVATIONS ON THIS DRAWING ARE IN P.G.E. DATUM TO CONVERT TO U.S.G.S. DATUM. (WITH 1947 ADJ.) SUBTRACT 3.62 FEET


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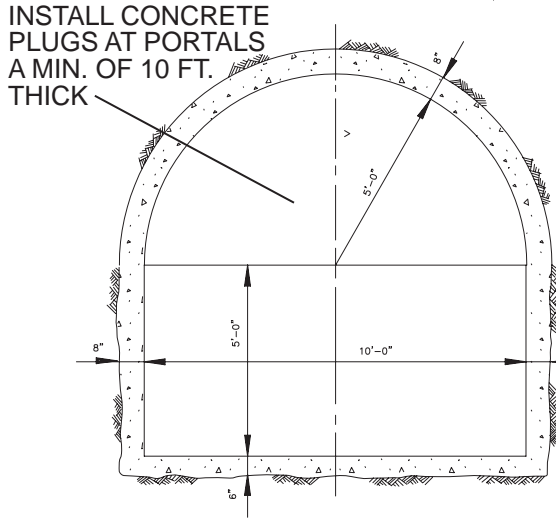
CANAL AND TUNNEL ALIGNMENT
 BULL RUN HYDRO DECOMMISSIONING SANDY, OREGON

OCT 2005
 PROJ. 1723
 FIG. 13



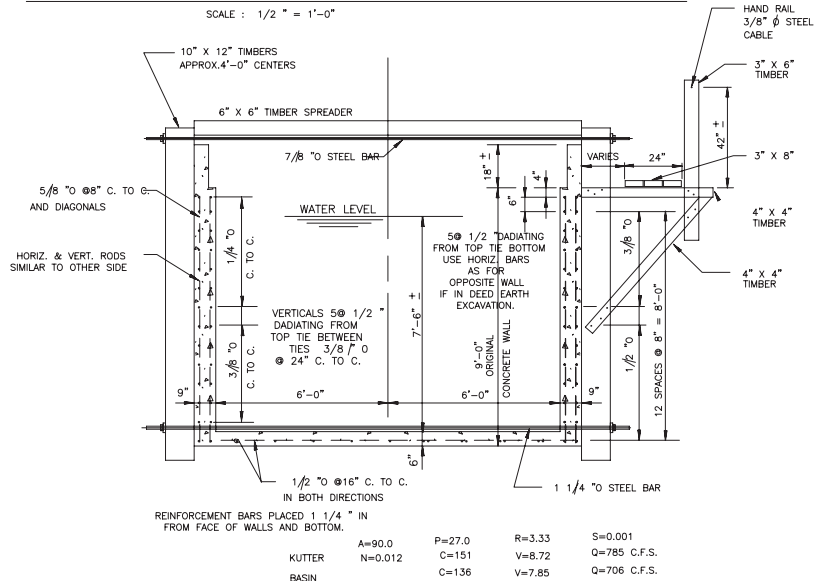
A CROSS SECTION OF CONCRETE LINED CANAL

SCALE : 1/4" = 1'-0"



B CROSS SECTION OF CONCRETE LINED TUNNEL

SCALE : 1/2" = 1'-0"



NOTES

1. SEDIMENT FENCES TO BE PLACED DOWNSLOPE FROM DISTURBED GROUND.
2. CANAL CONCRETE TO BE RIPPED, SIDES FOLDED IN AND EXISTING EMBANKMENT FILL USED TO BACKFILL AND REGRADE TO PRE-EXISTING GRADE.

C CROSS SECTION OF CONCRETE BOX FLUME

SCALE : 3/8" = 1'-0"

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 Main 503-452-1100 Fax 503-452-1528

CANAL, TUNNEL AND FLUME DETAILS
 BULL RUN HYDRO DECOMMISSIONING
 SANDY, OREGON

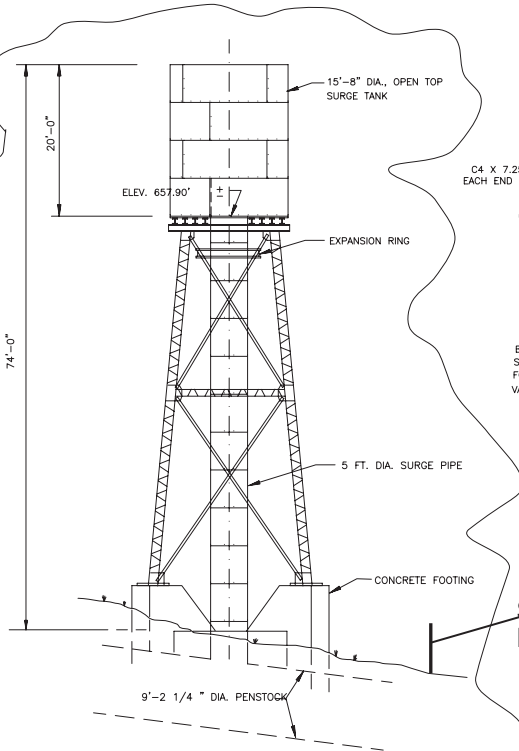
OCT 2005
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 FIG. 14A

1723/14 MWT

NOTE

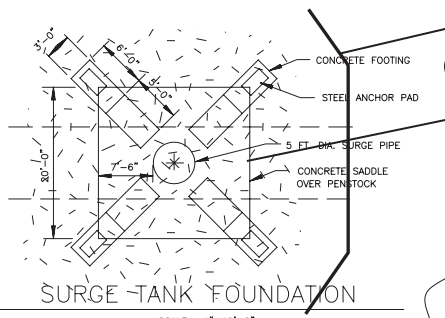
1. SEDIMENT FENCES TO BE PLACED DOWNSLOPE FROM DISTURBED GROUND.

LAKE ROSYLN DIKES



SURGE TANK ELEVATION

SCALE : 1"=10'-0"



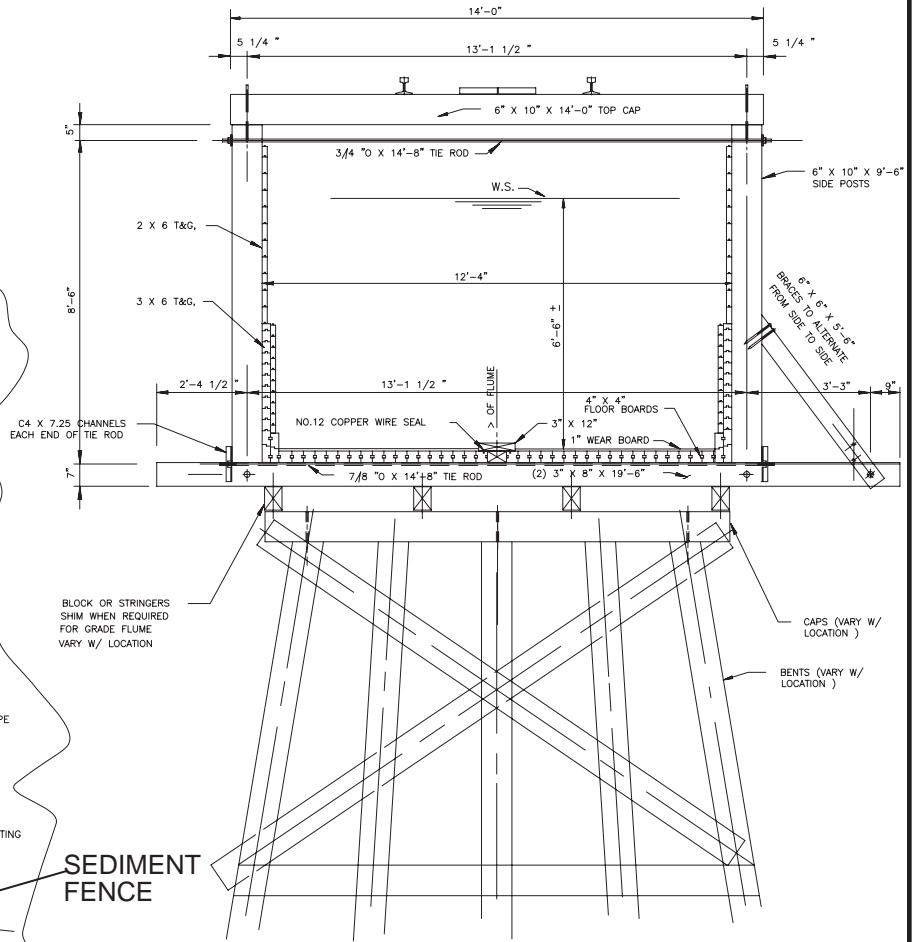
SURGE TANK FOUNDATION

SCALE : 1"=10'-0"

SEDIMENT FENCE

SEDIMENT FENCE

PLACE STRAW MULCH ON DISTURBED GROUND



CROSS SECTION OF WOOD BOX FLUME

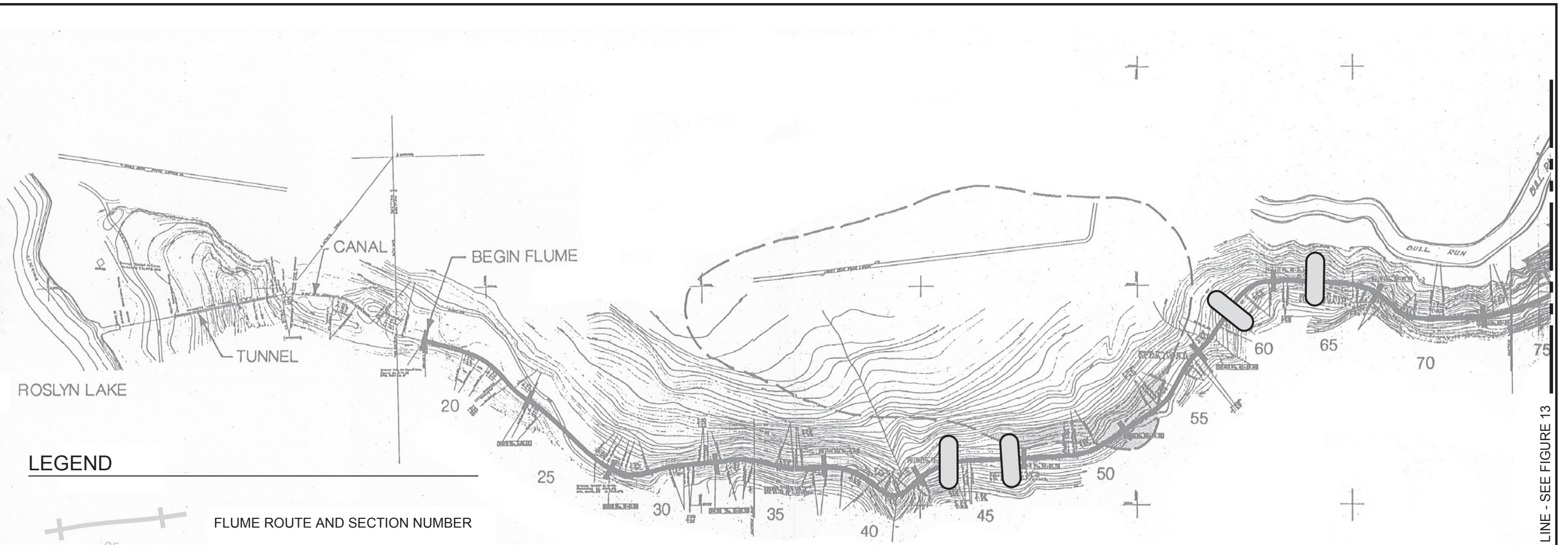
SCALE : 1/2" = 1'-0"

VERTICAL CONTROL U.S.G.S. DATUM (WITH 1947 ADJUSTMENT)

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CANAL, TUNNEL AND FLUME DETAILS
 BULL RUN HYDRO DECOMMISSIONING
 SANDY, OREGON

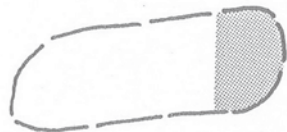
OCT 2005
 PROJ. 1723
FIG. 14B



LEGEND



FLUME ROUTE AND SECTION NUMBER



OLD LANDSLIDE AREA OBSERVED IN RECONNAISSANCE (SHADED) AND AERIAL PHOTOGRAPHS (DASHED LINE)



SMALL CONCRETE DIVERSION STRUCTURES SUBJECT TO SPECIFIC EROSION CONTROL MEASURES: MATS, STRAW MULCH, SAND BAGS

NOTES

1. BASE MAP PROVIDED BY PGE AND REDUCED TO 20 PERCENT.
2. CONCRETE FOOTINGS FOR TRESTLES TO REMAIN IN PLACE AFTER FLUME REMOVAL EXCEPT FOR FOOTINGS IN LITTLE SANDY RIVER.



NORTH



SCALE IN FEET

CONTOUR INTERVAL 5 FEET

SPECIFIC WORK TO BE DONE FOR FLUME REMOVAL

LOCATION/FLUME STATIONS	REMOVAL ACTIVITY
FLUME/RIVER CROSSING	REMOVE 4 LARGE CONCRETE FOOTINGS LOCATED IN LITTLE SANDY CHANNEL
160-61	REMOVE OR NOTCH 3' x 12' TRIBUTARY DAM
155-100	REMOVE WIRE BASKETS FROM LARGE GABION WALL, LEAVE ROCK "IN PLACE"
155-40	REMOVE OR NOTCH 2' x 6' TRIBUTARY DAM
145-20	REMOVE OR NOTCH 2' x 5' TRIBUTARY DAM
135-100	REMOVE OR NOTCH SMALL TRIBUTARY DAM
105-50.1	REMOVE A 6' SECTION FROM 2' x 15' TRIBUTARY DAM
65-20	LEAVE SMALL TIMBER CRIB WALL IN PLACE
60-45	REMOVE CONCRETE SLABS FROM CONCRETE LINED CHANNEL
45-100	ENLARGE OUTLET TRENCH TO DRAIN CLOSED DEPRESSION UNDER FLUME
40-115	REMOVE OR NOTCH 4' x 20' TRIBUTARY DAM

"NOTCH" AS USED ABOVE IS DEFINED AS REMOVING CONCRETE DAM MATERIAL TO CONFORM TO NATURAL CHANNEL SIZE AND GRADIENT.

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TIMBER FLUME DIVERSION STRUCTURE REMOVAL SITES
 BULL RUN HYDRO DECOMMISSIONING SANDY, OREGON

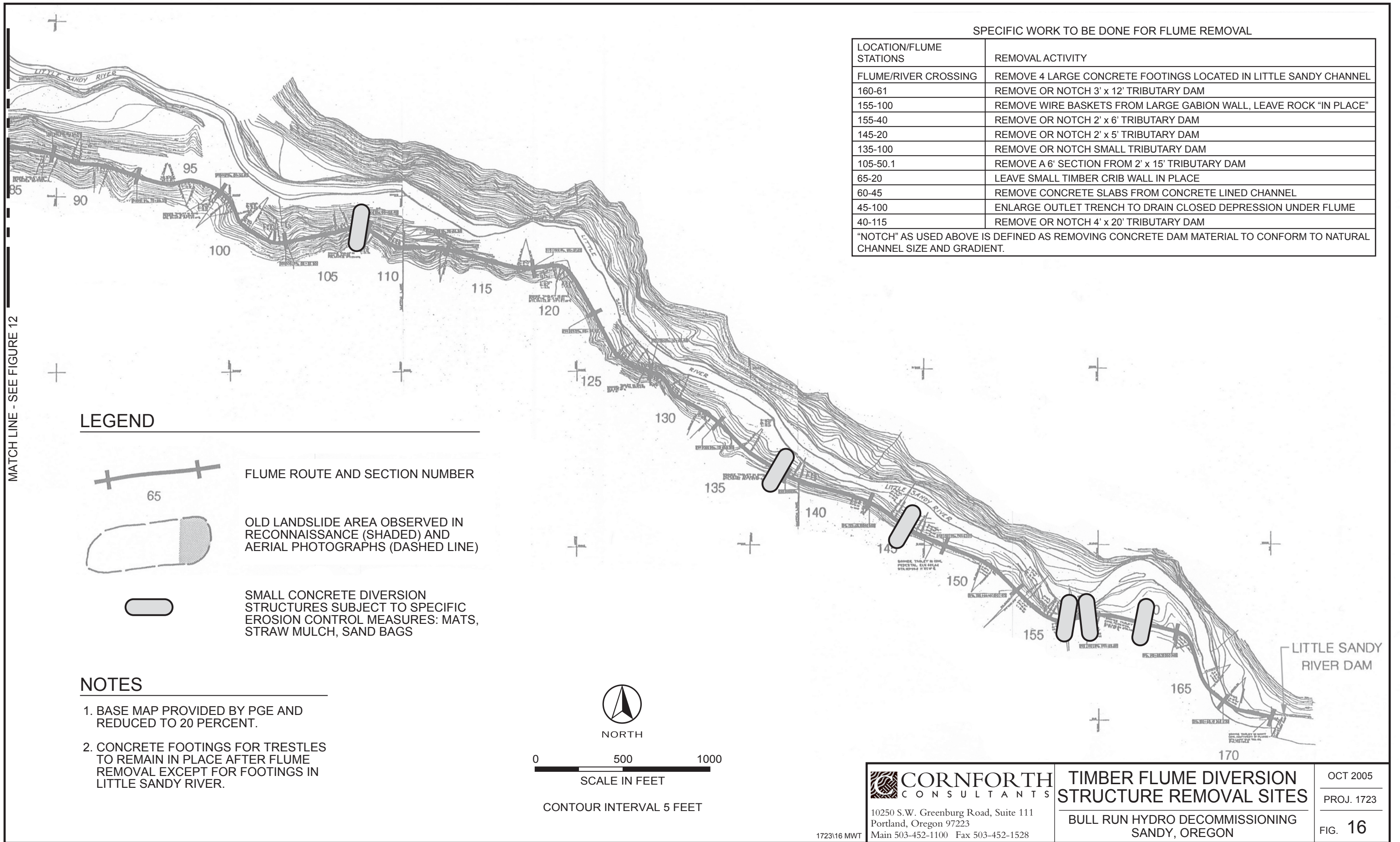
OCT 2005

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FIG. 15

MATCH LINE - SEE FIGURE 13

MATCH LINE - SEE FIGURE 12



SPECIFIC WORK TO BE DONE FOR FLUME REMOVAL

LOCATION/FLUME STATIONS	REMOVAL ACTIVITY
FLUME/RIVER CROSSING	REMOVE 4 LARGE CONCRETE FOOTINGS LOCATED IN LITTLE SANDY CHANNEL
160-61	REMOVE OR NOTCH 3' x 12' TRIBUTARY DAM
155-100	REMOVE WIRE BASKETS FROM LARGE GABION WALL, LEAVE ROCK "IN PLACE"
155-40	REMOVE OR NOTCH 2' x 6' TRIBUTARY DAM
145-20	REMOVE OR NOTCH 2' x 5' TRIBUTARY DAM
135-100	REMOVE OR NOTCH SMALL TRIBUTARY DAM
105-50.1	REMOVE A 6' SECTION FROM 2' x 15' TRIBUTARY DAM
65-20	LEAVE SMALL TIMBER CRIB WALL IN PLACE
60-45	REMOVE CONCRETE SLABS FROM CONCRETE LINED CHANNEL
45-100	ENLARGE OUTLET TRENCH TO DRAIN CLOSED DEPRESSION UNDER FLUME
40-115	REMOVE OR NOTCH 4' x 20' TRIBUTARY DAM

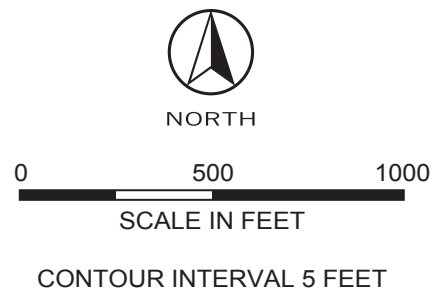
"NOTCH" AS USED ABOVE IS DEFINED AS REMOVING CONCRETE DAM MATERIAL TO CONFORM TO NATURAL CHANNEL SIZE AND GRADIENT.

LEGEND

- FLUME ROUTE AND SECTION NUMBER
- OLD LANDSLIDE AREA OBSERVED IN RECONNAISSANCE (SHADED) AND AERIAL PHOTOGRAPHS (DASHED LINE)
- SMALL CONCRETE DIVERSION STRUCTURES SUBJECT TO SPECIFIC EROSION CONTROL MEASURES: MATS, STRAW MULCH, SAND BAGS

NOTES

1. BASE MAP PROVIDED BY PGE AND REDUCED TO 20 PERCENT.
2. CONCRETE FOOTINGS FOR TRESTLES TO REMAIN IN PLACE AFTER FLUME REMOVAL EXCEPT FOR FOOTINGS IN LITTLE SANDY RIVER.



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**TIMBER FLUME DIVERSION
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FIG. 16

APPENDIX A

**401 CERTIFICATION FOR THE DECOMMISSIONING
OF THE BULL RUN HYDROELECTRIC PROJECT (FERC 477)**

Clean Water Act § 401 Certification

**For the
Decommissioning
of the
Bull Run Hydroelectric Project
(FERC No. 477)
Sandy River Basin
Clackamas County, Oregon**

Based upon the *Evaluation Report and Findings on the Application for Certification Pursuant to Section 401 of the Federal Clean Water Act for the Decommissioning of the Bull Run Hydroelectric Project in Clackamas County, Oregon, FERC No. 477*, dated October 22, 2003, the Oregon Department of Environmental Quality (DEQ) certifies that the decommissioning of the Bull Run Hydroelectric Project will comply with applicable provisions of Sections 301, 302, 303, 306, and 307 of the federal Clean Water Act, Oregon water quality standards, and other appropriate requirements of state law. This Certification is subject to and incorporates the following conditions, in accordance with 33 USC 1341(d).

Certification Conditions

1) Sediment

- a) **Fish passage Impairment:** PGE shall implement the Fish Passage Monitoring and Contingencies Plan as specified in Section 4.6 of the *Decommissioning Plan* submitted with the *Settlement Agreement Concerning Removal of the Bull Run Hydroelectric Project, FERC Project No. 477*.
- b) **Channel Complexity Measures:** PGE shall monitor the affected reaches of the Sandy River to characterize the channel complexity changes in the river related to dam removal, and to identify PGE's endpoint for ESA related activities, as specified in Section 4.7 of the *Decommissioning Plan*.
- c) **Erosion Control during and after Construction:** No less than 120 days before submitting an application to the Corps of Engineers for a § 404 Dredge and Fill Permit for Project removal activities, PGE shall submit an Erosion Control Plan for review, public comment, and approval by DEQ. This plan must identify areas that may be disturbed during construction activities, measures that will be taken to control erosion in these areas, a plan for monitoring affected sites and stream reaches after project facilities have been removed, and measures that will be taken to control erosion and restore vegetation in these areas.

2) Turbidity

- a) **Turbidity Monitoring:** PGE shall conduct turbidity monitoring before, during, and after Project removal.

Before Removal: For two years beginning in August 2003, PGE shall collect turbidity data using continuous monitors at two sites in the Sandy River. One site must be located above Marmot Dam, and the other site must be located below the mouth of the Bull Run River. Data collected from August through July must be submitted to DEQ by January 1 of the following year.

During Project Removal: PGE shall monitor sites directly above and below Marmot Dam, above and below

Little Sandy Dam, and below Roslyn Lake. Sampling intervals must be no less than every four hours, encompassing the work day, and occurring at times of peak activity. Details of the sampling sites, sampling schedule, and data reporting must be set out in the Turbidity Management Plan.

After Project Removal: PGE shall use continuous recording instruments to monitor turbidity at five sites. These are: above and below Marmot Dam, above and below the Little Sandy Dam, and in the Sandy River below the mouth of the Bull Run River. Monitoring must continue until PGE is no longer responsible for fish passage as determined by the ESA Monitoring and Implementation Team established under the *Decommissioning Plan*, or until DEQ determines that monitoring is no longer necessary. At a minimum, monitoring must continue for at least two years after the dams and lake have been removed. Data must be submitted to DEQ annually, including data from October through September submitted by January 1 of the following year.

- b) Turbidity Management During Project Removal:** No less than 120 days prior to applying for a § 404 Dredge and Fill Permit for Project removal activities, PGE shall submit a Turbidity Management Plan for review, public comment, and DEQ approval. This plan must describe the management activities that will be implemented during removal activities at all Project sites to control turbidity originating from project lands disturbed by construction activity. Data collected on background turbidity levels prior to Project removal may be used to develop construction management action levels.

3) Biological Criteria; Protection of Beneficial Uses of Salmonid Spawning, Salmonid Rearing, and Resident Fish & Aquatic Life; Other Appropriate Requirements of State Law

- a) Water Elevation in Marmot Canal: Beginning in 2005, and continuing until Marmot Dam is removed, the water level in the Marmot Dam diversion canal may not exceed 4.7 feet from February 15 through March 15. From March 15, and continuing for 8 weeks, the canal must operate at 4.2 feet for 8 hours, beginning at dusk. The Canal may not be operated at levels exceeding 4.7 feet during the remaining hours during this period. The initiation of the 8 week period may be adjusted at the request of the National Marine Fisheries Service and the Oregon Department of Fish and Wildlife based on information regarding the arrival of downstream migrating juvenile salmonids at Marmot Dam. After May 31, these elevation restrictions will no longer apply.
- b) Fish Passage: PGE shall provide for the continued operation of the existing fish ladder and sorting facility at Marmot Dam, until a temporary fish ladder is in place and the coffer dam above Marmot Dam has been constructed, as specified in Section 3.1 of the *Decommissioning Plan*.

Prior to construction of the coffer dam above Marmot Dam, PGE shall construct, operate, and maintain, a temporary fish ladder and trap and haul facility as specified in Section 3.3 of the *Decommissioning Plan*.

4) Temperature/TMDL

- a) In the event removal of the Marmot and Little Sandy Dams is not completed by December 31, 2009, DEQ may reconsider this Certification or modify these Certification conditions, in accordance with OAR Chapter 340 Division 48, as necessary to ensure implementation of TMDLs.

5) General

- a) Certification Modification. Subject to OAR Chapter 340 Division 48, and, as applicable, 33 USC 1341, DEQ may reconsider this Certification, and add, delete, or modify certification conditions, as necessary to address changes in knowledge, Project conditions, or water quality standards or to address any failure of Certification conditions to protect water quality and beneficial uses. Any added or modified condition shall, so long as it is in effect, become a condition of any federal license or permit subsequently issued for the Project.
- b) Removal-Fill Permit. Before commencing dam removal activities, PGE shall obtain a removal-fill permit

from the Oregon Division of State Lands.

- c) Subsequent Federal Permits or Licenses. Upon applying for a federal permit or permits for decommissioning activities, including a § 404 dredge and fill permit from the Corps of Engineers, PGE shall provide written notice to DEQ of such application and of any proposed changes in decommissioning activities since the date of issuance of this Certification. Within 60 days of DEQ's receipt of notice from the Corps or other federal permitting agency that it is processing PGE's application, DEQ will notify the federal agency and PGE either (i) that this Certification is sufficient for purposes of the federal permit and permit conditions, or (ii) that, in light of new information related to the water quality impacts of decommissioning activities since issuance of this Certification, there is no longer reasonable assurance of compliance with state water quality standards. In the latter event, DEQ will consider the new information, solicit and consider public and agency comment as required by law, and issue a Section 401 certification determination for purposes of the federal permit and decommissioning activities. In the event DEQ determines that this Certification is sufficient for purposes of a federal permit or permits for decommissioning activities, PGE shall perform decommissioning in accordance with these Certification conditions.
- d) Project Changes. PGE shall obtain DEQ review and approval before undertaking any change to the Project or *Decommissioning Plan* that might significantly affect water quality, including changes to Project structures, operations, and flows.
- e) Project Repair or Maintenance. PGE shall obtain DEQ review and approval before undertaking Project repair or maintenance activities that might significantly affect water quality. DEQ may, at PGE's request, provide such prior approval effective prospectively for specified repair and maintenance activities.
- f) Access. PGE shall allow DEQ such access as necessary to the Project area and Project records at reasonable times as necessary to monitor compliance with these Certification conditions.
- g) Posting of Certification. PGE shall post a copy of these Certification conditions in a prominent location at the Bull Run Powerhouse Control Center.
- h) Spill Management. PGE shall maintain and implement current Spill Prevention, Control, and Countermeasure (SPCC) plans for oil and hazardous materials prepared in accordance with the Clean Water Act requirements of 40 CFR 112. These plans shall address all locations at the Project where Project operations may potentially result in a spill or release or threatened spill or release to Project reservoirs or the Sandy River, the Little Sandy River or the Bull Run River. In the event of a spill or release or threatened spill or release to Project waters or to the Sandy River, the Little Sandy River or the Bull Run River, PGE shall immediately implement the site's SPCC plans and notify the Oregon Emergency Response System (OERS) at 1-800-452-0311.