Johnson Creek Oxbow
Oxbow Scour Project

DRAFT
Post-Excavation Sampling
Work Plan

Township:1S, Range: 2E Section: 19CC,
in the Ardenwald-Johnson Creek/Woodstock Neighborhood
Portland, Oregon 97206

BES Project E10996
CSA 1796

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Acronyms and Abbreviations

µg/Kg	micrograms per kilogram
µg/L	micrograms per liter
mg/Kg	milligrams per kilogram
ACOE	U.S. Army Corps of Engineers
Ag	Silver
As	Arsenic
BES	City of Portland Bureau of Environmental Services
bgs	below ground surface
Cd	Cadmium
CGIS	Corporate Geographic Information System
CoC	Contaminants of Concern
Cr	Chromium
CSA	Coordinated Site Analysis (within BES)
Cu	Copper
CWA	Clean Water Act
CY	Cubic yard
DBH	Diameter at Breast Height
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
DMMU	Dredge Material Management Unit
DQOs	Data Quality Objectives
DSL	Department of State Lands
DU	Decision Unit
ECSI	Environmental Cleanup Site Information
EFOC	Environmental Feature of Concern
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FES	Fabric-Encapsulated Soil
GA	General Authorization
GPS	Global Positioning System
Hg	Mercury
HVOCs	Halogenated Volatile Organic Compounds
ISM	Incremental Sampling Methodology
IWWP	In Water Work Period
IWWW	In Water Work Window
LODs	Limits of Detection
LUST	Leaking Underground Storage Tank
MDL	Method Detection Limit
MRL	Method Reporting Limit
NELAP	National Environmental Laboratory Accreditation Program
Ni	Nickel
NMFS	National Marine Fisheries Services

OC	Organochlorine
OHW	Ordinary High Water
ORELAP	Oregon Environmental Laboratory Accreditation Program
ORS	Oregon Revised Statutes
OSFM	Oregon State Fire Marshal
PAH, HPAH, LPAH	Polycyclic Aromatic Hydrocarbons, High/Low molecular weight PAH
Pb	Lead
PCB	Polychlorinated Biphenyl
PCC	Precision Castparts Corporation
PCE	Tetrachloroethylene
PDS	Post-Dredge Surface
PSET	Portland Sediment Evaluation Team
QA	Quality Assurance
QC	Quality Control
REC	Recognized Environmental Condition
RCRA	Resources Conservation and Recovery Act
RI	Remedial Investigation
RM	River Mile
SAP	Sampling and Analysis Plan
SCR	Sediment Characterization Report
Se	Selenium
SEF	Sediment Evaluation Framework
SEMS	Superfund Enterprise Management System
SLs	Screening Levels
SLV	Screening Level Value
SVOC	Semi-Volatile Organic Compounds
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
USFWS	U.S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WPA	Works Progress Administration
WPCL	Water Pollution Control Laboratory
Zn	Zinc

1.0 Introduction

The Johnson Creek Oxbow Scour Project proposes to provide a long-term solution to rapid erosion that has been occurring along the outer bank of the Johnson Creek Oxbow, located near SE 44th Avenue between SE Umatilla Street and SE Tenino Street in Portland, Oregon. Rates of stream migration at the oxbow have been significant in the past few years, endangering nearby residential properties. Since 2014, the City of Portland Bureau of Environmental Services (BES) has been exploring opportunities to address the ongoing bank erosion and channel migration concerns.

The primary goals of this project are to stop the ongoing erosion at the oxbow, improve water quality, enhance riparian and channel habitat, and improve fish passage. This work is included in the broader context of the *Johnson Creek Restoration Plan* (BES, 2001), which aims to rehabilitate the watershed's natural functions. This project will achieve its goals by installing large wood into the outer oxbow bank where the severe erosion is occurring to dissipate the energy being directed there. The work will also involve excavating in-stream sediment to install a pool beneath and to the west of the large wood installations, which will serve the purpose of providing refuge for juvenile salmonids during high flows. In-stream construction is occurring from July 15th through August 31st, 2018.

To obtain the necessary permits, the project is being evaluated through the Sediment Evaluation Framework (SEF). The interagency Portland Sediment Evaluation Team (PSET) implements the SEF guidance for the Portland District. It includes representatives from the ACOE, EPA-Region 10, NMFS, USFWS, and DEQ. The Corps Project number for this project is NWP-2016-367 and the Department of State Lands (DSL) permit number is 60931.

The sediment evaluation process is guided by the *Sediment Evaluation Framework for the Pacific Northwest* (SEF) (Corps et al., 2016). The SEF is primarily used to determine the suitability of dredged material for unconfined, aquatic disposal or placement; however, a secondary use of the SEF is to evaluate the need to manage the exposure of the post-dredge surface (PDS). As a permit requirement, the PDS must be evaluated for the presence of Contaminants of Concern (CoCs). This is to determine if organisms can be exposed to harmful concentrations of CoCs existing in the PDS.

The project lies within an area that is currently going through a Remedial Investigation (RI) for contaminant discharges to Johnson Creek from PCC Structurals (a.k.a. Precision Castparts Corporation). A City-owned stormwater outfall that discharges to the creek approximately 40 feet upstream of the project area has historically discharged contaminated sediment-laden stormwater originating from PCC Structurals to the creek. Landau Associates, on behalf of PCC Structurals, collected sediment samples from the Oxbow reach of Johnson Creek including from locations very near and within the project area in support of the RI prior to construction of this project. Since this project alters the surface of the streambed within the area being investigated, DEQ has requested that the City collect new baseline data of the PDS after the in-stream excavation and disturbance below ordinary high water (OHW) is complete and before the stream is allowed to return to the excavation area.

The purposes of the Post-Excavation Sampling will be, (1) to provide to the PSET data related to the physical and chemical conditions of the PDS in order to demonstrate that ecological receptors exposed to the PDS will not be negatively impacted, and (2) to provide to DEQ the new baseline data from the PDS and any disturbed area below OHW in support of the PCC Structurals RI. This Post-Excavation Sampling Work Plan outlines the two phases the post-excavation sampling will follow to address the purposes of sampling listed above. The first follows SEF guidance (Corps et al., 2016) and will follow the sampling plan approved by the PSET that was completed prior to excavation, as applied to the new surface. The second follows DEQ's recommendations for collecting new baseline data in support of the PCC Structurals RI. This work plan first presents a brief description of the project and its environmental concerns and then provides the sampling and analysis plans for the two phases of the post-excavation sampling and analysis.

1.1 Site Description

Johnson Creek is a 26-mile long, free-flowing tributary to the Willamette River, beginning with its headwaters in Boring, OR and terminating at river mile (RM) 18.5 in Milwaukie, OR. The Johnson Creek Oxbow site is an actively eroding meander bend on Johnson Creek located between RMs 3 and 3.5, bounded by SE Caesar Chavez Blvd. to the west, SE 44th Avenue to the east, SE Tenino Street to the north and the Springwater Corridor Trail to the south. It is located in Township: 1S, Range: 2E, Section: 19CC of the Willamette Meridian, in the Ardenwald-Johnson Creek/Woodstock Neighborhood of Portland, Oregon 97206 (**Figure 1**). The subject site is currently owned by the City of Portland Bureau of Environmental Services. The Johnson Creek oxbow area includes a bypass channel to the south, constructed by the Works Progress Administration (WPA) in the 1930s. The WPA work involved channelizing and armoring the creek bed and banks with cobbles to enhance downstream flood water conveyance and installing a fish ladder to allow fish passage. This work left the oxbow area hydrologically disconnected, which led to degradation of adjacent floodplains and wetland habitat (Inter-fluve, 2017).

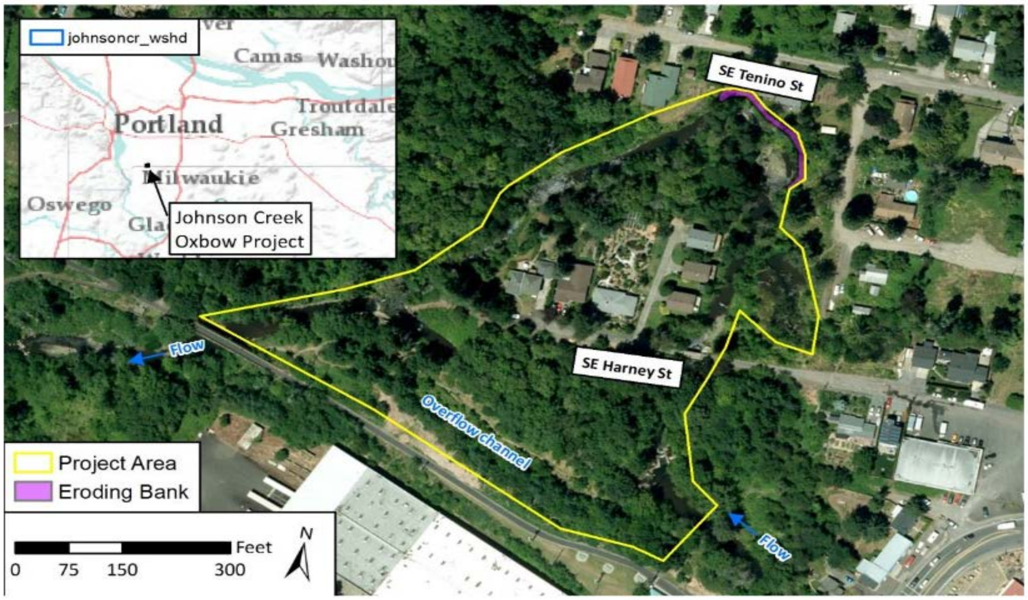


Figure 1: Johnson Creek Oxbow Project Locator Map
(Inter-fluve, 2017)

Despite the WPA effort to convey floodwaters downstream, the oxbow still experiences flows that have caused the creek to erode the right bank significantly. During one flood event in December 2015, the creek moved 10-30 feet to the east, endangering nearby properties and creating a scarp that was approximately 100 feet long and 6 feet tall, with sands, silts and clays composing the upper 3 to 4 feet and gravels and cobbles composing the lower 2 to 3 feet of exposed soil. During the fall of 2017, BES provided a temporary solution to the erosion problem by installing jute bags filled with sorted spawning gravel along the scarp under permit NWP-2016-367-1. **Figures 2a and 2b** below are aerial images of the creek (2a) in 2012 prior to the major erosion event, and (2b) in 2016 after the major event. The blue overlay is the mapped creek in the City of Portland Corporate Geographic Information System (CGIS) and is included as a comparison to where the right bank of the creek is now located. **Figures 3a and 3b** below show the scarp before and after the temporary jute bags were placed.

Figure 2a: Oxbow Scour, Winter 2012

Figure 2b: Oxbow Scour, Summer 2016

Figure 3a: Scarp at Johnson Creek Oxbow prior to temporary jute bag installation (Landau, 2017)

Figure 3b: Scarp at Johnson Creek Oxbow after temporary jute bag installation (Inter-fluve, 2017)

The Johnson Creek Oxbow site is accessible by several salmonid populations (steelhead, Chinook Salmon, Coho Salmon, and chum salmon) listed as threatened under the federal Endangered Species Act (ESA), as well as Oregon-listed species of concern Pacific lamprey and other fish species, beavers and a variety of bird species. Factors limiting habitat availability and quality in the oxbow reach of Johnson Creek include reduced habitat complexity, with minimal large wood available as cover for fish refuge, elevated temperatures and substandard water quality.

1.2 Project Description

Much of this project description was taken from the *Johnson Creek Oxbow Scour Project DRAFT 60% Design Report* prepared by Inter-Fluve for BES in December 2017, and a more detailed description of the project can be found in that report, however please note that changes to design occurred between 60% and 90% and the final drawings should be referenced for technical details of construction. The goals of the Johnson Creek Oxbow Scour Project include:

- Stabilizing the right bank of the Johnson Creek Oxbow to arrest the erosion and protect nearby residential properties;
- Increasing the quantity of large wood in this reach of Johnson Creek;
- Adding low-velocity refuge for fish during high flows;
- Enhancing riverine habitat complexity.

The project proposes to achieve those goals by installing large wood into the right bank to dissipate the energy being directed there, digging out a 2 to 4 ft. deep pool beneath and to the west of the large wood installation, and revegetating the bank with appropriate native species. A final plan set of the site is provided in **Appendix 1,** which includes cross-sections of the area to be excavated for the scour pool installation.

1.2.1 Large Wood Installation

For the large wood installation, two layers of rootwads and logs will be buried in the right bank. The rootwads will be installed at appropriate angles to dissipate flow energy directed at the bank and will extend out into the channel to provide cover for fish refuge. Slash generated during construction will be added in between the log layers to provide smaller interstital spaces for juvenile salmonids.

Logs will be 30 ft. in length and 18 in. diameter at breast height (DBH). Logs will be secured in place by burial, with logs buried 20 to 25 ft. into the bank. Logs that are not buried two-thirds in length will be attached to the other logs by fully-threaded rods.

The bank behind the structure will be laid back at a 3 to 1 grade and strengthened with biodegradable fabric-encapsulated soil (FES) lifts and plantings. Ordinary High Water (OHW) will land between the first and second FES lift. The jute bags currently in use as a temporary fix at the site will be re-integrated below OHW to create a 2 to 3-foot buffer for the lower FES lift, and 12” DBH “footer logs” will be installed at the base of the stone embankment material.

1.2.2 Habitat and Flood Refuge Creation

A scour pool will be excavated in conjunction with the large wood installation. The pool will be excavated 2-4 feet in depth as compared to the current elevation of the streambed, along much of the 100 ft. of impacted bank. An estimated 110 cubic yards of sediment is expected to be removed permanently from below OHW. A copy of the final plan set is provided in **Appendix 1**.

Material to be excavated from within the scour pool, also known as the Dredge Prism, was not found to exceed DEQ Upland Clean-Fill Values for the Portland Basin (DEQ, 2014), and therefore may be used as fill material behind stone embankment material and footer log.

1.2.3 Bank Revegetation

Three inches of clean soil will be placed between lifts and live willow cuttings will be placed in the soil between those lifts. In addition, a mix of seeds from native riparian plant species will be placed in soil under the fabric on all exposed surfaces. All graded slopes and disturbed areas will be revegetated with appropriate native plant species.

1.3 Project Personnel

The personnel involved with the project and their respective responsibilities are provided in **Table 1** below.

Table 1. *Key Personnel for the Johnson Creek Oxbow Scour Project and Their Roles*

Name	Role in Project
Sean Bistoff	Project Manager, BES
Ali Young	Design Phase Manager, BES
Daniel Tariku	Construction Phase Manager, BES
Nichol Moore	Technician, BES
Tonia Mathieu	Senior Inspector, BES
Inter-fluve, Greenworks	Design Consultants
Bethany Nabhan, Taryn Meyer, Julia Bond	Field Sampling, BES
City of Portland Water Pollution Control Laboratory (WPCL)	Primary chemical testing laboratory
ALS Environmental	Secondary chemical testing laboratory and laboratory ISM sample preparation
Apex Laboratory	Pesticides analysis
Jennifer Shackelford	Quality Assurance (QA) management and data validation, BES
Bethany Nabhan, Taryn Meyer	Final Report Preparation, BES

2.0 Summary of Environmental Concerns and Sampling Rationale

2.1 Potential Sources of Contamination

An SEF Level 1 and Level 2A SAP was completed for the sediment evaluation on April 11th, 2018. Complete results of the Level 1 can be found in the *Johnson Creek Oxbow, Oxbow Scour Project, Sediment Evaluation Framework, Level 1 Site History and Project Information and UPDATED Level 2A Sampling and Analysis Plan* (City of Portland, 2018).

Several environmental features of concern (EFOCs) and recognized environmental conditions (RECs) were identified for locations adjacent to or near the project area with the potential to discharge contaminated media to Johnson Creek and impact the surface sediment in the project area. Two records in the Superfund Enterprise Management System (SEMS), eleven records in the EPA Envirofacts database, eleven records for Oregon DEQ cleanup sites in the Environmental Cleanup Site Information (ECSI) System, two Oregon State Fire Marshal hazardous materials spills records, and records for several leaking and potentially leaking underground storage tanks were found during the Level 1 records search.

One of the DEQ ECSI sites is for the Johnson Creek Areawide Study (ECSI 4020). Surface water, sediment and biological analysis indicate that Johnson Creek has been impacted by urban development and the historic practice of using the creek as a means of waste disposal. Land uses adjacent to the creek range from agricultural, to commercial and industrial, to residential. Johnson Creek was added to the Clean Water Act 303(d) list for the pesticides dieldrin and DDT, which appear to originate from the upper watershed from overland runoff from farming and nursery operations, as well as PCBs and PAHs, which were found at elevated concentrations in sediment and water. PAHs and PCBs are assumed to originate primarily from point sources. The sediment risk screening evaluation indicates that PAHs, due to their pervasive extent and concentrations exceeding applicable screening level values (SLVs), is thought to present the biggest overall threat to sediment quality in Johnson Creek (DEQ, 2005).

The most notable finding of the Level 1 was related to the impacts to sediment at the Johnson Creek Oxbow from the PCC Structurals site, which discharges contaminated stormwater to a stormwater outfall (City of Portland Outfall ACZ290) located approximately 40 feet south of the project location. The PCC Structurals Johnson Creek campus (a.k.a. Precision Castparts Corp.) is an industrial complex that has been operating since 1957. PCC Structurals manufactures parts and components from various alloys using an investment casting process. Hazardous materials that have been used at the site include nitric and hydrofluoric acids, potassium and sodium hydroxides, slightly radioactive thorium sands, and chlorinated solvents (PCE, TCE). Primary site contaminants appear to be chlorinated solvents detected in soil and shallow groundwater, metals, and PCBs. Shallow groundwater has been found to contain chlorinated solvents, and the concentrations are increasing over time. The primary concern for metals and PCBs is discharge of these contaminants to Johnson Creek via stormwater releases.

According to the summary information in the DEQ ECSI Database, the source of PCBs detected by the City of Portland in site stormwater appears to be site soil. The soils are being characterized and prioritized for removal and disposal. According to Paul Seidel of DEQ during the PSET conference call on March 28th, 2018, the entire storm system from PCC Structurals that discharges to outfall ACZ290 has been cleaned out, groundwater has been routed around the facility to prevent large volumes of water from mixing with their stormwater, and in June 2016 they installed a stormwater treatment system that includes filtration with sand, chitosan and activated carbon (P.Seidel, personal communication, March 28, 2018). This work will minimize the likelihood of more contamination originating from PCC Structurals making it to Johnson Creek and recontaminating sediment at the project location. Landau Associates, on behalf of PCC Structurals, has also investigated in-stream sediments at the Johnson Creek Oxbow. A review of that data and its applicability to this project is provided in section 2.2 below.

2.2 Available Data

As part of their Remedial Investigation (RI) for the PCC Structurals site, Landau Associates has completed several rounds of sediment sampling along the Johnson Creek Oxbow. Four sets of data were reviewed for their applicability to evaluating the sediment for the Oxbow Scour Repair. The first two sets of data were presented in Table 5-14 and Table 5-15 in the *Agency Review Draft Remedial Investigation Report for PCC Structurals, Inc. Large Parts Campus* (Landau, 2013). The third set of data was presented in Table 1. Johnson Creek Sediment Sampling Analytical Results, PCC Structurals, Inc. Large Parts Campus, Portland, Oregon (Landau, 2015). The fourth set of data was presented in Table 2. Johnson Creek Discrete Sediment Sample Results PCC Large Parts Campus, Portland, Oregon (Landau, 2017) provided to the project team by the DEQ project manager Dan Hafley in an email dated 1/10/2018. Copies of the data sets and associated figures are provided in the *Johnson Creek Oxbow, Oxbow Scour Project, Sediment Evaluation Framework, Level 1 Site History and Project Information and UPDATED Level 2A Sampling and Analysis Plan* (City of Portland, 2018).

The first set of data reviewed, Table 5-14 in the *Agency Review Draft Remedial Investigation Report for PCC Structurals, Inc. Large Parts Campus,* was collected in August 2010 and consisted of three discrete sediment sample locations just downstream of the outfall location. The sample point that falls closest to the Johnson Creek Oxbow Scour Repair project is sample “JCSD-01.” Sediment sample results exceeded applicable screening levels (DEQ Default Background Concentrations of Metals from 2013, DEQ Level II Screening Level Values (SLV) for Freshwater Sediment from 2001) for chromium and nickel. The chromium concentration of 85.1 mg/kg exceeded the default background concentration for chromium of 76 mg/kg and the Level II SLV of 37 mg/kg. The nickel concentration of 216 mg/kg exceeded the default background concentration for nickel of 47 mg/kg and the Level II SLV of 18 mg/kg. HVOCs were not detected above the reported concentrations and no screening values were listed for those analytes.

The second set of data reviewed, Table 5-15 in the *Agency Review Draft Remedial Investigation Report for PCC Structurals, Inc. Large Parts Campus,* was collected in January 2012 and consisted of twenty-six samples, ten within 100 feet upstream of the outfall and sixteen within 300 feet downstream of the outfall. Four samples, “JSCD-3-1,” “JSCD-4-1,” “JSCD-5-1,” and “JSCD-5-2,” were collected closest to the excavation area planned for the Oxbow Scour Repair. PCBs were not detected, and metals were below the default background concentration for metals in samples “JCSD-4-1” and “JCSD-5-1.” Concentrations of nickel were found to be 148 mg/kg in “JSCD-4-1” and 165 mg/kg in “JCSD-5-2,” above the background concentration for nickel of 47 mg/kg and Level II SLV of 18 mg/kg. Concentrations of Aroclor 1254 were found to be 29.2 µg/kg in sample” JCSD-4-1” and 16.7 µg/kg in sample “JCSD-5-2,” above the Level II SLV of 7 µg/Kg.

The third set of data reviewed, Table 1. Johnson Creek Sediment Sampling Analytical Results, PCC Structurals, Inc. Large Parts Campus, Portland, Oregon, was collected in October of 2014 and consisted of the collection and analysis of forty samples along ten transects, approximately four per transect, with eight collected within 100 feet upstream and thirty-two collected within 300 feet downstream of the outfall. Three samples, “JSCD-E-50,” “JSCD-F-28,” and “JSCD-F-30,” were collected closest to the excavation area planned for the Oxbow Scour Repair project. All three samples exceeded applicable screening values for chromium, nickel and the PCB Aroclor 1254. The sample, “JSCD-E-50,” also exceeded screening values for zinc. Chromium was detected in “JSCD-E-50” at 95 mg/kg, in “JSCD-F-28” at 230 mg/kg, and in “JSCD-F-30” at 240 mg/kg, exceeding the default background concentration for chromium of 76 mg/kg and the Level II SLV of 37 mg/kg. Nickel was detected in “JSCD-E-50” at 230 mg/kg, in “JSCD-F-28” at 640 mg/kg, and in “JSCD-F-30” at 690 mg/kg, exceeding the default background concentration for nickel of 47 mg/kg and the Level II SLV of 18 mg/kg. The PCB Aroclor 1254 was detected in “JSCD-E-50” at 130 µg/kg, in “JSCD-F-28” at 96 µg/kg, and in “JSCD-F-30” at 230 µg/kg, exceeding the Level II SLV of 7 µg/kg.

It is worth noting that the three sets of data discussed above were collected prior to the major erosion event of December 2015 that uncovered the current streambed where the project in-stream excavation will occur and are not representative of the project location conditions. However, the data is an indication that impacts to the streambed from nearby industrial processes and discharges exist near the project location.

A fourth set of data, Table 2. Johnson Creek Discrete Sediment Sample Results PCC Large Parts Campus, Portland, Oregon, was also provided by Dan Hafley at DEQ, which consists of Incremental Sampling Methodology (ISM) samples from three decision units (DUs) as well as three discrete samples collected from the top foot of sediment within DU2, the DU that includes the project area. The discrete sample, “DU2-02,” was collected within the footprint of the proposed excavation and was collected in October of 2017, less than a year prior to the proposed timeframe for construction. This data set was compared to the Freshwater Benthic Toxicity Screening Levels from Chapter 6 of the 2016 SEF as well as the DEQ Level II Ecological Screening Level Values (SLVs) from December 2001 and the DEQ Regional Background Concentrations for Metals in Soil from January 2018. Table 10 of the *Johnson Creek Oxbow, Oxbow Scour Project, Sediment Evaluation Framework, Level 1 Site History and Project Information and UPDATED Level 2A Sampling and Analysis Plan* provides the data comparison (City of Portland, 2018).

All detected concentrations of metals and PCBs and laboratory method reporting limits (MRLs) for those analytes not detected were all below the Freshwater Benthic Toxicity Screening Levels (SEF 2016 SLs). The laboratory MRL for cadmium of 0.492 mg/kg exceeds the bioaccumulation Level II SLV of 0.0003 mg/kg but is below the DEQ default background concentration for cadmium of 0.63 mg/kg. Copper was detected at 18.1 mg/kg, exceeding the bioaccumulation value of 10 mg/kg for copper but below other applicable screening values, including the default background concentration for copper of 34 mg/kg. Nickel was detected at 20.7 mg/kg, exceeding the freshwater sediment Level II SLV of 18 mg/kg but below other applicable screening values including the default background concentration of nickel of 47 mg/kg. Selenium was not detected above the MRL of 0.984 mg/kg, which exceeds the bioaccumulation Level II SLV of 0.1 mg/kg as well as the default background concentration for selenium of 0.71 mg/kg. The PCB Aroclor 1242 was not detected above the MRL of 10.3 µg/kg, which exceeds the bioaccumulation SLV of 2 µg/kg. The PCB Aroclor 1248 was not detected above the MRL 9.38 µg/kg, which exceeds the bioaccumulation Level II SLV of 4 µg/kg. Aroclor 1254 was detected at a concentration of 10.6 µg/kg, exceeding the bioaccumulation Level II SLV of 10 µg/kg. The Total PCBs value of 10.6 µg/kg is below its freshwater sediment Level II SLV of 34 µg/kg.

2.3 Sampling Location Rationale

The initial sampling event conducted to meet SEF requirements was completed on May 9th, 2018. The *Johnson Creek Oxbow, Oxbow Scour Project, Sediment Evaluation Framework, Level 1 Site History and Project Information and UPDATED Level 2A Sampling and Analysis Plan* includes the sampling and analysis plan that was approved by the PSET and specifies the procedures and methods used for sample collection, record keeping, sample handling, storage and transport of samples to the laboratory and quality assurance/quality control. This post-excavation sampling will include a re-creation of the May 9th sampling event as applied to the post-excavation surface prior to the large wood installation to evaluate the actual PDS that will be exposed to ecological receptors once the stream is returned to the project area.

In addition to evaluating the PDS for SEF purposes, DEQ has requested that the City collect new baseline data of the modified streambed in support of the RI that is being conducted to evaluate impacts from PCC Structurals. DEQ has requested a 30-point composite sample be collected in triplicate using ISM methodology of the excavation area and any disturbed surfaces that will be exposed to ecological receptors below OHW once the large wood and stone embankment material are placed and the stream is allowed to return to the project area.

Based on the characteristics of the site and based on feedback received during the PSET conference call on March 28, 2018 as well as input received from DEQ project managers Paul Seidel and Dana Bayuk in June and July 2018, we prepared a sampling plan that involves the collection of a four-point composite sample of the top six-inches of surface material within the creek on a transect of the excavated scour pool to evaluate the actual PDS for SEF purposes as well as a separate sampling effort that will utilize ISM methodology to collect a 30-point composite sample on a grid in triplicate of the top 1 foot of surface material within the entire area of disturbed streambed. Maps (**Figures 4 and 5**) showing the proposed subsample locations can be found at the end of this report.

3.0 Sampling and Analysis Plan – Transect Sampling

This sampling and analysis plan follows the suggested template provided in Attachment A of the PSET 2009 Supplemental Guidance as well as feedback received during the PSET meeting on Wednesday, March 28th, 2018.

3.1 Data Quality Objectives

This SAP outlines the methods and procedures that will be used to evaluate the condition of the PDS prior to the stream being reintroduced to the project area. The following data quality objectives (DQOs) will be followed for the evaluation of the PDS:

- Collect a composite sample of the PDS at the Johnson Creek Oxbow Scour excavation location and analyze for physical and chemical parameters as outlined in the 2016 SEF. Analytical methods and sample quantitation limits are provided in **Table 2** and discussed in section 3.5 below (Corps et al., 2016, Table 5-1).
- Collect, handle and analyze PDS samples in accordance with SEF protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Generate data that meets DQOs, which can then be used to compare to applicable screening values as described in the 2016 SEF.

3.2 Personnel Responsibilities

Personnel responsibilities for the project were provided in **Table 1**. Field work will be coordinated and conducted by the Bethany Nabhan and Taryn Meyer, R.G., Environmental Specialists for the CSA Program, part of the Environmental Investigations Division of Pollution Prevention Services with the City of Portland. The primary chemical testing laboratory will be the City of Portland Water Pollution Control Laboratory (WPCL). The secondary testing laboratory will be ALS Environmental. Due to recent issues with their organics analysis department, ALS Environmental will not be used for pesticides analysis. Instead, Apex Laboratories LLC will be used to fulfill the pesticides analysis needs. Jennifer Shackelford with the WPCL will provide QA/QC review of laboratory data. Bethany Nabhan will prepare the final report.

3.3 Sample Collection and Handling Procedures

<u>3.3.1 Sample Locations and Compositing Scheme</u>

A four-point composite will be collected along a transect of the dredge footprint, as shown in **Figure 4**.

The composite PDS sample will be labeled as "JCOxbowScour_PDSComp"

A discrete sample will be collected at each subsample location and held at the laboratory pending results of the composite sample. Each discrete sample will be labeled using the following convention: "JCOxbowScour_PDS1," through "JCOxbowScour_PDS4," with numeric order increasing from west to east along the transect. The transect will be approximately 28 feet long and the subsample locations will be spaced approximately 7 feet apart.

3.3.2 Field Sampling Schedule

This sampling event is scheduled to take place on Thursday, August 9th, 2018. This sampling event will occur over the course of one day.

3.3.3 Field Notes

Field notes will be collected on a field log during the sampling event. A copy of the field notes log is provided as **Appendix 2**. The following details will be recorded:

- Names of field staff collecting and logging in the composite sample,
- Date,
- Project name and number,
- Address or description of project location,
- Weather conditions,
- Start and stop times of sample collection and composite operations,
- Location of each sub-sample location along the graduated transect and number of sampling attempts at each location,
- The subsample location names and a description of material at each subsample location,
- Deviations from the approved sampling plan or PSET SAP recommendations.

3.3.4 Positioning

Proposed subsample locations are shown on **Figure 4**. The lat/long coordinates of the transect location at each side of the bank will be recorded into a Trimble GeoXT handheld GPS unit with a Zephyr antenna prior to the sample collection event. Once each end of the transect location is located using the Trimble GPS unit, a measuring tape will be staked to the top of the bank on the east side of the excavation area and stretched across the transect location to the gravel bar on the west side of the excavation area. The subsample locations will be found using the measuring tape. Subsample locations will be spaced approximately 7 feet apart along the 28-foot long transect.

3.3.5 Sample Handling and Decontamination

All sampling equipment will be decontaminated prior to collection of each subsample using the following procedure:

1. Rinse equipment with site water,
2. Wash equipment with clean brush and Alconox detergent,
3. Rinse with laboratory-grade deionized water.

Field staff will wear nitrile gloves for sample collection and will don new gloves for the collection of each subsample. PDS material will be removed from the sampling equipment with gloved hands and placed into decontaminated mixing bowls.

3.3.6 Sampling Methods and Field Compositing

PDS material will be collected with a stainless-steel hand auger with a 3 ¼ inch diameter bucket. A sand bucket and a mud bucket will be decontaminated on-site and available for use, depending on which is found to be more effective for sample collection. Stainless steel spoons will also be decontaminated on-site and available for use if the hand auger buckets are found to be ineffective at collecting surface material.

Material from each subsample location will be removed from the hand auger bucket or spoon with gloved hands and placed in a separate mixing bowl for each subsample. A description of material from each subsample location will be recorded in the field notes and each subsample will be photographed. Bowls containing the subsamples will be covered with foil and the top of the foil will be labeled with a sharpie for each subsample location (e.g., PDS1, PDS2, PDS3, PDS4) until all subsamples are collected. A separate decontaminated mixing bowl will be used to mix the composite sample with measured amounts of material from each subsample bowl. Remaining material in each subsample bowl will be used for the discrete samples that will be held at the laboratory pending results of the composite sample. Once the composite sample is mixed to a uniform consistency and color, it will be placed in sample containers appropriate to the analyses planned. Each subsample will also be mixed in their respective bowls and placed in appropriate sample containers to be held at the laboratory. Field staff will don new nitrile gloves to mix and collect the composite and each subsample.

3.3.7 Field Replicates

No field replicates are planned for this sampling event.

3.3.8 Sample Transport and Chain of Custody

The sample containers will be labeled and placed in an iced cooler for transport under chain-of-custody to the City of Portland Water Pollution Control Laboratory for analysis. The cooler will be iced with reusable blue ice gel packs to prevent melting and the presence of free-flowing water in the cooler that could leach into sample containers. Field staff will fill out the chain-of-custody form and will deliver the iced cooler containing the samples immediately after the sampling event is concluded.

3.4 Laboratory Physical and Chemical Sediment Analysis

The organic and inorganic CoCs within the primary medium (sediment) of the project are total metals (As, Cd, Cr, Pb, Se, Ag, Ni, Cu, Zn, Hg), PAHs and other freshwater SVOCs (select phthalates, phenols, miscellaneous extractable organic compounds) from the 2016 SEF Table 5-1, PCBs (particularly Aroclor 1254), diesel and residual-range total petroleum hydrocarbons, and

OC Pesticides (particularly DDT and dieldrin). **Table 2** at the back of this report provides analytical methods, sample quantitation limits and appropriate sample containers that will be used for this project. **Table 3** below provides SEF-recommended sample volumes and storage criteria.

3.4.1 Laboratory Analysis Protocol

Laboratory testing procedures for chemical and conventional (including physical) parameters will be conducted in accordance with the 2016 SEF guidance. The PDS sample will be analyzed for the freshwater sediment parameters listed in sections 3.4.3 and 3.4.4 below and summarized in **Table 2** provided at the back of this report. The City of Portland Water Pollution Control Laboratory (WPCL), ALS Environmental, and Apex Laboratory, LLC, all certified NELAP and ORELAP analytical laboratories, will conduct physical and chemical analyses.

3.4.2 Detection Limits

All reasonable means, including cleanup steps and method modifications, will be used to meet target levels. Detection of analytes between the method reporting limit (MRL) and the method detection limit (MDL) will be "J" flagged and reported as an estimate. All analytes should meet quantitation limits listed in Table 5-1 of the 2016 SEF and provided in **Table 2** attached to this report. For undetected chemicals, the laboratory must achieve MDLs or limits of detection (LODs) below the 2016 SEF freshwater benthic toxicity SLs. If the laboratory is unable to achieve sufficiently low MDLs for particular analytes, reasons for the elevated MDLs must be reported.

3.4.3 PDS Conventional and Chemical Analyses

Each analytical laboratory will provide the following analyses:

WPCL –

- Total Solids
- Total Volatile Solids
- Ammonia
- Total Metals (via EPA 6020, not including Hg via EPA 7471B)
- Total Petroleum Hydrocarbons (diesel-range and residual-range)
- SVOCs (PAHs, phthalates)
- PCBs

ALS Environmental –

- Total Organic Carbon
- Total Sulfides
- Grain Size
- Total Metals (Hg via EPA 7471B)
- SVOCs (phenols, misc. extractable organic compounds)

Apex Laboratory, LLC –

- Pesticides

Sample preparation and analysis methods are provided in **Table 2** attached to this report.

3.4.4 Holding Times

All samples will be delivered in iced coolers by field personnel directly to the WPCL immediately after sample collection. Couriers from ALS Environmental and Apex Laboratory, LLC will pick up the jars for pesticides analysis from the WPCL sample custodian and will transport the samples directly to the outside laboratories in iced coolers under chain-of-custody. The laboratories will provide analytical results within 20 business days to the maximum extent practicable. All samples relinquished to the laboratory will be maintained at temperatures specified in the SEF table 4-3. Holding times, necessary sample volumes, and sample transport and storage temperatures are provided in **Table 3** below.

Table 3. *SEF Recommended Sample Volume and Storage – PDS Transect Samples*

Sample Type	Holding Time[1]		Sample Size[2]	Container Type, (Quantity)
	Analysis	Archival & Hg		
	4 ± 2 °C	18 ± 2 °C		
Grain Size	6 months	Do not freeze	100-200 g (75-100 mL)	1-gallon freezer bag, (1)
Total solids, total volatile solids, and total organic carbon	14 days	6 months	125 g (100 mL) per each analysis	8-oz. glass jar, 1 per each (3)
Metals (except Hg)	6 months	2 years	50 g (40 mL)	4-oz. glass jar, (1)
Mercury	28 days	Do not freeze	50 g (40 mL)	4-oz. glass jar, (1)
Semivolatiles, pesticides and PCBs	14 days until extraction; 40 days after extraction	1 year until extraction	150 g (120 mL) per each analysis	8-oz. glass jar, 1 per each (3)
Total petroleum hydrocarbons	14 days	Do not freeze	100 g (80 mL)	8-oz. glass jar, (1)
Ammonia	7 days	Do not freeze	25 g (20 mL)	4-oz. glass jar, (1)
Total Sulfides	7 days[3]	Do not freeze	50 g (40 mL); add zinc acetate and shake sample vigorously	4-oz. glass jar, (1)

[1] Samples will be stored on blue ice gel packs in a cooler during transport to the lab. The samples to be archived will be frozen immediately upon receipt at the lab. Samples in jars to be frozen must include headspace to prevent breakage.
[2] Recommended minimum field sample sizes for one laboratory analysis from Table 4-3 of the 2016 SEF. Actual volumes to be collected have been increased to provide a margin of error and allow for retesting.
[3] The sulfides sample will be preserved with 5 mL of 2N zinc acetate for every 30 g of sediment.

3.4.5 Laboratory Quality Assurance/Quality Control

The QA/QC procedures that will be followed by the analytical laboratories are described in **Table 4** below:

Table 4. *Minimum Laboratory QA/QC – PDS Transect Samples*

Analytical Type	Method Blank[1]	Duplicate[1]	RM[1]	Matrix Spikes	LCS	Surrogates[3]
Grain Size		X				
Total Solids	X	X				
Total Organic Carbon	X	X	X			
Metals	X	X	X	X		
Semivolatiles	X	X		X	X	X
Pesticides	X				X	X
PCBs	X	X[2]		X	X	X
Diesel/Residual-Range Hydrocarbons	X	X			X	X

[1] One per batch; [2] A matrix spike duplicate will be run;
[3] Surrogates will be included with every sample for these analytes, including matrix spikes, blanks and RM
RM = Reference Material, LCS = Laboratory Controlled Sample/Spike

3.4.6 Laboratory Analytical Report

The laboratory analytical report will be provided by the WPCL and will document activities associated with the sample analyses. The ALS Environmental report and the Apex Laboratory report will be attached to the WPCL laboratory report. These reports will include the following:

- A case narrative, including descriptions of the laboratory analytical protocols and summary of issues encountered during analysis,
- Results of laboratory analyses and QA/QC results,
- All protocol used during analyses,
- Laboratory MRLs and MDLs for each analysis,
- Chain of custody procedures, including explanation of any deviation from those identified in this sampling plan.

3.5 Biological Testing

Biological testing is not planned for this sampling event. The City of Portland will consult with the PSET regarding bioassay testing if PDS chemical concentrations exceed the 2016 SEF freshwater SLs in the samples collected and analyzed for the sampling event described in this report.

3.6 Reporting

3.6.1 Quality Assurance Report

The laboratory QA/QC reports will be incorporated in the laboratory analytical reports and attached to the back of the final PDS quality evaluation report. It will outline the details of the QA/QC procedures used by the laboratories and will describe the overall validity and usability of the data collected.

3.6.2 PDS Quality Evaluation Report

The City of Portland will prepare a written report describing the results of sampling and analysis of the PDS sample(s) collected during this sampling event as compared to the 2016 SEF freshwater SLs. The report will include a discussion of the implications of the results to the post-project condition of the site. The laboratory analytical reports presenting physical and chemical results will be attached to the report for reference. The following details will be included in the report:

- Project and location summary,
- A map of actual sample locations,
- A description of sampling protocols used and any deviations from the plan,
- A table of chemical data compared to the 2016 SEF Freshwater SLs,
- A narrative of analytical results and how they compare to the SLs,
- A conclusion based on the results and data comparison.

4.0 Sampling and Analysis Plan – ISM Grid Sampling

This sampling and analysis plan outlines the scope of work that will be used to confirm the condition of the streambed in the area that will be excavated for the Johnson Creek Oxbow Scour Project.

4.1 Data Quality Objectives

The following data quality objectives (DQOs) will be followed for confirmation sampling of the post-dredge surface in support of the PCC Structurals RI:

- Use ISM, random grid methodology to collect a 30-point composite sample, in triplicate, of the PDS within the Johnson Creek Oxbow Scour excavation location and analyze for chemicals of concern. Analytical methods and sample quantitation limits are provided in **Table 5** and discussed in section 4.4 below.
- Collect, handle and analyze surface sediment samples in accordance with Quality Assurance/Quality Control (QA/QC) requirements.
- Generate data that meets DQOs, which can then be used as new baseline data for the disturbed streambed and to compare to applicable screening values.

4.2 Personnel Responsibilities

Personnel responsibilities for the project were provided in **Table 1**. Field work will be coordinated and conducted by the Bethany Nabhan and Taryn Meyer, R.G., Environmental Specialists for the CSA Program, part of the Environmental Investigations Division of Pollution Prevention Services with the City of Portland. The primary chemical testing laboratory will be the City of Portland WPCL. The samples will first be sent to ALS Environmental for laboratory ISM prep and then sent back to the WPCL for analysis. Jennifer Shackelford with the WPCL will provide QA/QC review of laboratory data. Bethany Nabhan will prepare the final report.

4.3 Sample Collection and Handling Procedures

4.3.1 Sample Locations and Compositing Scheme

A 34-point composite will be collected from the top foot of soil within the excavation area. The composite will be replicated in triplicate using random placement of subsample locations within grids laid out on the excavation area (the Decision Unit). The grids and subsample locations are shown in **Figure 5**. The grids and subsample locations were generated with Visual Sample Plan version 7.10 using the Non-Statistical Sampling Approach with a Predetermined Number of Samples set at a minimum of 30 subsamples placed randomly on a grid laid over the decision unit.

The first composite sample will be labeled as “JCOxbowScour_DU1.”

The replicate composite samples will be labeled as “JCOxbowScour_DU1_A” and “JCOxbowScour_DU1_B.”

4.3.2 Field Sampling Schedule

This sampling event is scheduled to take place on Friday, August 10th, 2018. This sampling event will occur over the course of one day.

4.3.3 Field Notes

Field notes will be collected on a general Daily Fieldwork Report log. A copy of the log is provided in **Appendix 2**. The following details will be recorded:

- Names of field staff collecting and logging in the composite samples,
- Date,
- Project name and number,
- Address or description of project location,
- Weather conditions,
- A summary of the work completed,
- The composite sample names and a description of material collected for each composite,
- The times of the composite sample collections,
- On-site problems or issues,
- Deviations from the approved sampling plan.

4.3.4 Positioning

Proposed subsample locations are shown on **Figure 5**. The lat/long coordinates of each subsample location will be recorded into a Trimble GeoXT handheld GPS unit with a Zephyr antenna prior to the sample collection event. Once each of the subsample locations are located using the GPS and antenna, they will be flagged with a white utility locate flag. Soil from each subsample location will then be collected and the subsamples will be composited into one sample for analysis. This subsample positioning method will be repeated two additional times to collect the random grid subsamples in triplicate.

4.3.5 Sample Handling and Decontamination

All sampling equipment will be decontaminated prior to collection of each subsample using the following procedure:

1. Rinse equipment with site water,
2. Wash equipment with clean brush and Alconox detergent,
3. Rinse with laboratory-grade deionized water.

Field staff will wear nitrile gloves for sample collection and will don new gloves for the collection of each subsample. PDS material will be removed from the sampling equipment with gloved hands and placed into decontaminated mixing bowls.

4.3.6 Sampling Methods and Field Compositing

PDS material will be collected with a stainless-steel hand auger with a 3 ¼ inch diameter bucket. A sand bucket and a mud bucket will be decontaminated on-site and available for use, depending on which is found to be more effective for sample collection. Stainless steel spoons will also be decontaminated on-site and available for use if the hand auger buckets are found to be ineffective at collecting new surface material.

Subsample locations were determined using random grid methodology in Visual Sample Plan 7.10 as shown in **Figure 5**. Thirty-four subsample locations were placed for within the excavation area for each composite ISM sample. Material from each subsample location will be removed from the hand auger bucket or spoon with gloved hands and placed in a decontaminated stainless-steel bowl for mixing. A description of material collected for each composite sample will be recorded in the field log and the composite sample will be photographed. Once the composite sample is mixed to a uniform consistency and color, it will be placed in sample containers appropriate to the analyses planned. Field staff will don new nitrile gloves to collect and mix the composite sample.

4.3.7 Field Replicates

Random grid sampling will be conducted in triplicate, for a total of three samples collected and analyzed.

4.3.8 Sample Transport and Chain of Custody

The sample containers will be labeled and placed in an iced cooler for transport under chain-of-custody to the City of Portland Water Pollution Control Laboratory for analysis. The cooler will be iced with reusable blue ice gel packs to prevent melting and the presence of free-flowing water in the cooler that could leach into sample containers. Field staff will fill out the chain-of-custody form and will deliver the iced cooler containing the samples immediately after the sampling event is concluded.

4.4 Laboratory Physical and Chemical Sediment Analysis

4.4.1 Laboratory Analysis Protocol

The CoCs for this phase of sampling in support of confirming streambed conditions are total metals (As, Be, Cd, Cr, Co, Pb, Sb, Se, Tl, Ag, Ni, Cu, Zn, Hg) and PCBs. These analytes were selected based on the CoCs associated with PCC Structurals and the previous sampling events conducted within the Johnson Creek Oxbow reach in support of the PCC Structurals RI. **Table 5** at the back of this report provides analytical methods, sample quantitation limits and appropriate sample containers that will be used for this project.

ALS Environmental will process the samples using ISM methodology and then will send the processed samples back to the WPCL for chemical analysis. The WPCL does not have the capabilities to process the samples using ISM methodology, but they are able to achieve the desired MRLs/MDLs for PCBs for this sampling event. ALS will dry, sieve, grind, and process the ISM samples in accordance with the ITRC sample preparation methodology (ITRC 2012) and the laboratory's standard operating procedures for ISM sample process.

4.4.2 Detection Limits

All reasonable means, including cleanup steps and method modifications, will be used to meet target levels. Detection of analytes between the method reporting limit (MRL) and the method detection limit (MDL) will be "J" flagged and reported as an estimate. All analytes should meet quantitation limits provided in **Table 5** attached to this report. For undetected chemicals, the laboratory must achieve MDLs or limits of detection (LODs) below the applicable screening levels. If the laboratory is unable to achieve sufficiently low MDLs for particular analytes, reasons for the elevated MDLs must be reported.

4.4.3 PDS Conventional and Chemical Analyses

Each analytical laboratory will provide the following analyses/services:

WPCL –

- Total Metals (via EPA 6020)
- PCBs

ALS Environmental –

- ISM prep of samples

Sample preparation and analysis methods are provided in **Table 5** attached to this report.

4.4.4 Holding Times

All samples will be delivered in iced coolers by field personnel directly to the WPCL immediately after sample collection. A courier from ALS Environmental will pick up the sample jars for ISM laboratory preparation from the WPCL sample custodian and will transport the samples directly to ALS in an iced cooler under chain-of-custody. Once the samples are prepared in the ALS laboratory using ISM methodology, the samples will be returned to the WPCL in an iced cooler under chain-of-custody for chemical analysis. The WPCL will provide analytical results within 20 business days to the maximum extent practicable. Holding times, necessary sample volumes, and sample transport and storage temperatures are provided in **Table 6** below.

Table 6. *Recommended Sample Volume and Storage – ISM Samples*

Sample Type	Holding Time[1]		Sample Size[2]	Container Type, (Quantity)
	Analysis	Archival & Hg		
	4 ± 2 °C	18 ± 2 °C		
Metals (except Hg)	6 months	2 years	50 g (40 mL)	4-oz. glass jar, (1)
Mercury	28 days	Do not freeze	50 g (40 mL)	4-oz. glass jar, (1)
PCBs	14 days until extraction; 40 days after extraction	1 year until extraction	150 g (120 mL) per each analysis	8-oz. glass jar, 1 per each (3)

[1] Samples will be stored on blue ice gel packs in a cooler during transport to the lab.
[2] Recommended minimum field sample sizes for one laboratory analysis from Table 4-3 of the 2016 SEF. Actual volumes to be collected have been increased to provide a margin of error and allow for retesting.

4.4.5 Laboratory Quality Assurance/Quality Control

The QA/QC procedures that will be followed by the analytical laboratory are described in **Table 7** below:

Table 7. *Minimum Laboratory QA/QC – ISM Samples*

Analytical Type	Method Blank[1]	Duplicate[1]	RM[1]	Matrix Spikes	LCS	Surrogates[3]
Metals	X	X	X	X		
PCBs	X	X[2]		X	X	X

[1] One per batch; [2] A matrix spike duplicate will be run;
[3] Surrogates will be included with every sample for these analytes, including matrix spikes, blanks and RM
RM = Reference Material, LCS = Laboratory Controlled Sample/Spike

4.4.6 Laboratory Analytical Report

The laboratory analytical report will be provided by the WPCL and will document activities associated with the sample analyses. This report will include the following:

- A case narrative, including descriptions of the laboratory analytical protocols and summary of issues encountered during analysis,
- Results of laboratory analyses and QA/QC results,
- All protocol used during analyses,

- Laboratory MRLs and MDLs for each analysis,
- Chain of custody procedures, including explanation of any deviation from those identified in this sampling plan.

4.5 Biological Testing

Biological testing is not planned for this sampling event.

4.6 Reporting

4.6.1 Quality Assurance Report

The laboratory QA/QC reports will be incorporated in the laboratory analytical report and attached to the back of the final environmental data report. It will outline the details of the QA/QC procedures used by the laboratories and will describe the overall validity and usability of the data collected.

4.6.2 PDS Quality Evaluation Report

The City of Portland will prepare a written report describing the results of sampling and analysis of the ISM samples collected during this sampling event as compared to the Oregon DEQ Level II Screening Level Values (SLVs) for freshwater sediment (DEQ, 2001). The report will include a discussion of the implications of the results to the post-project condition of the site. The laboratory analytical reports presenting chemical results will be attached to the report for reference. The following details will be included in the report:

- Project and location summary,
- A map of actual sample locations,
- A description of sampling protocols used and any deviations from the plan,
- A table of chemical data compared to the DEQ Level II SLVs for freshwater sediment,
- A narrative of analytical results and how they compare to the SLs,
- A conclusion based on the results and data comparison.

8.0 Conclusion

The work performed in support of this PDS sampling and analysis plan preparation has been conducted in general accordance with the SEF (2016) and with feedback from DEQ project managers. We look forward to working with PSET and DEQ to advance this project forward to protect the bank of Johnson Creek and nearby properties while working collaboratively to address contaminant concerns within the streambed.

9.0 References

City of Portland Bureau of Environmental Services. June 2001. *Johnson Creek Restoration Plan.*

Inter-Fluve. December 2017. *Johnson Creek Oxbow Scour Project, DRAFT 60% Design Report.*

ITRC. 2012. *"Incremental Sampling Methodology: Executive Summary." http://www.itrcweb.org/ism-1/executive_summary.html.* Interstate Technology and Regulatory Council

Landau Associates. July 17, 2013. *Agency Review Draft Remedial Investigation Report, PCC Structurals, Inc. Large Parts Campus, Portland, Oregon.*

Landau Associates. July 28, 2015. *Johnson Creek Sediment Sampling TM,* Table 1. Johnson Creek Sediment Sampling Analytical Results, PCC Structurals, Inc. Large Parts Campus, Portland, Oregon.

Landau Associates. September 20, 2017. *Johnson Creek Sediment Sampling Work Plan, PCC Structurals, Inc. Large Parts Campus, Portland, Oregon.* Project No. 0883002.040.044.

Landau Associates. December 2017. Table 2. Johnson Creek Discrete Sediment Sample Results, PCC Large Parts Campus, Portland, Oregon, part of the draft report for sediment ISM sampling

Northwest Regional Sediment Evaluation Team (RSET). 2016. Sediment Evaluation Framework for the Pacific Northwest. *Prepared by* the RSET Agencies, July 2016, 160 pp plus appendices.

Oregon Department of Environmental Quality. 2013. *Development of Oregon Background Metals Concentrations in Soil, Technical Report.* Table 4.

Oregon Department of Environmental Quality. May 5, 2005. *Field Investigation Report, Johnson Creek Toxics Evaluation Project (JCTEP) Area-wide Sediment Investigation, Clackamas and Multnomah County, Oregon.* Document Control Number : 04-NWR-021-REPORT

Portland Sediment Evaluation Team. September 20, 2011, Revised: August 9, 2012. *Supplemental Guidance for the Portland District: Sampling and Analysis Plan Preparation under the 2009 Sediment Evaluation Framework for the Pacific Northwest.*

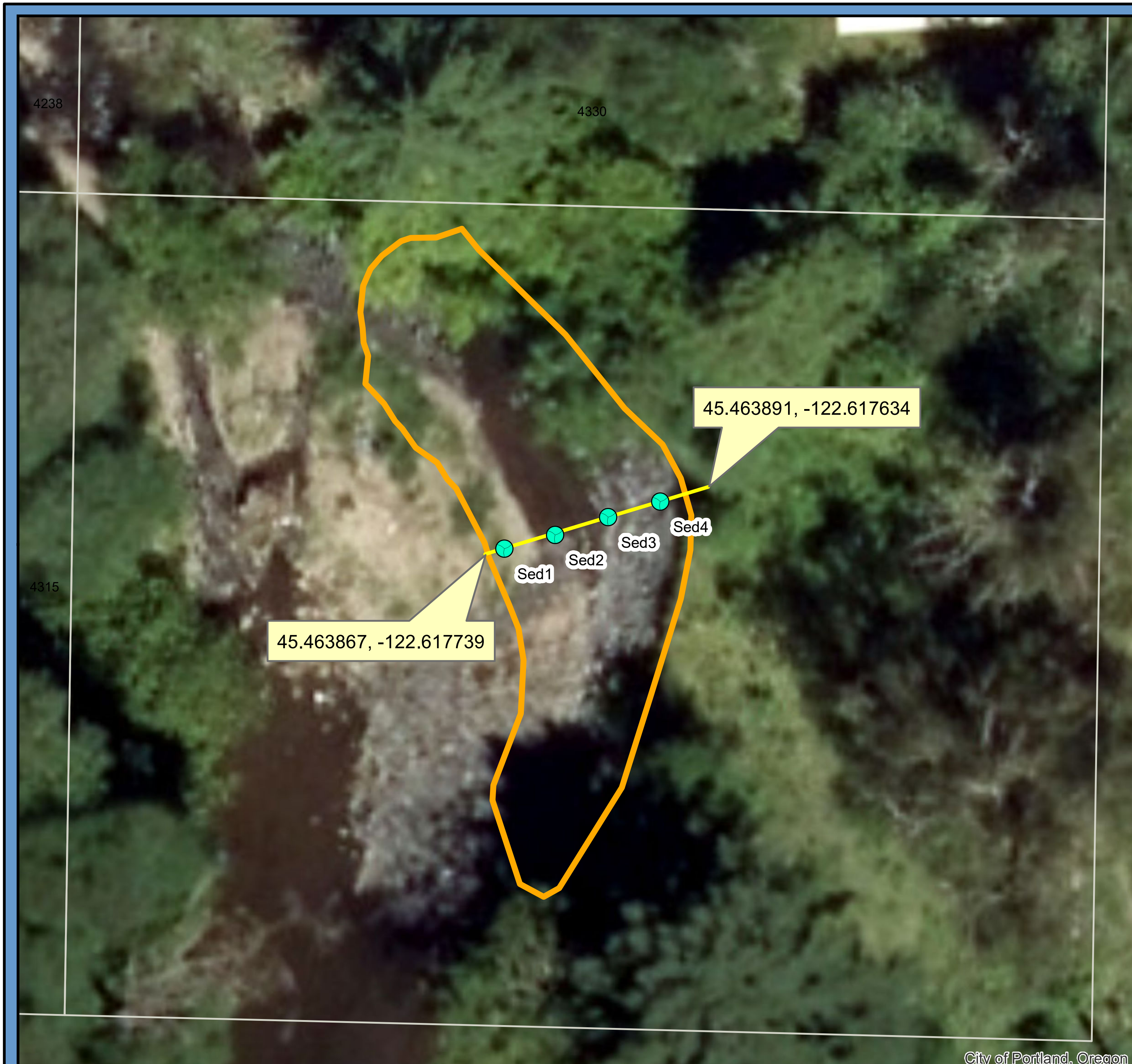


Figure 4:
Johnson Creek Oxbow Scour Project Location PDS Transect and Subsample Locations

Legend

Instream Subsamples

Sample Transect

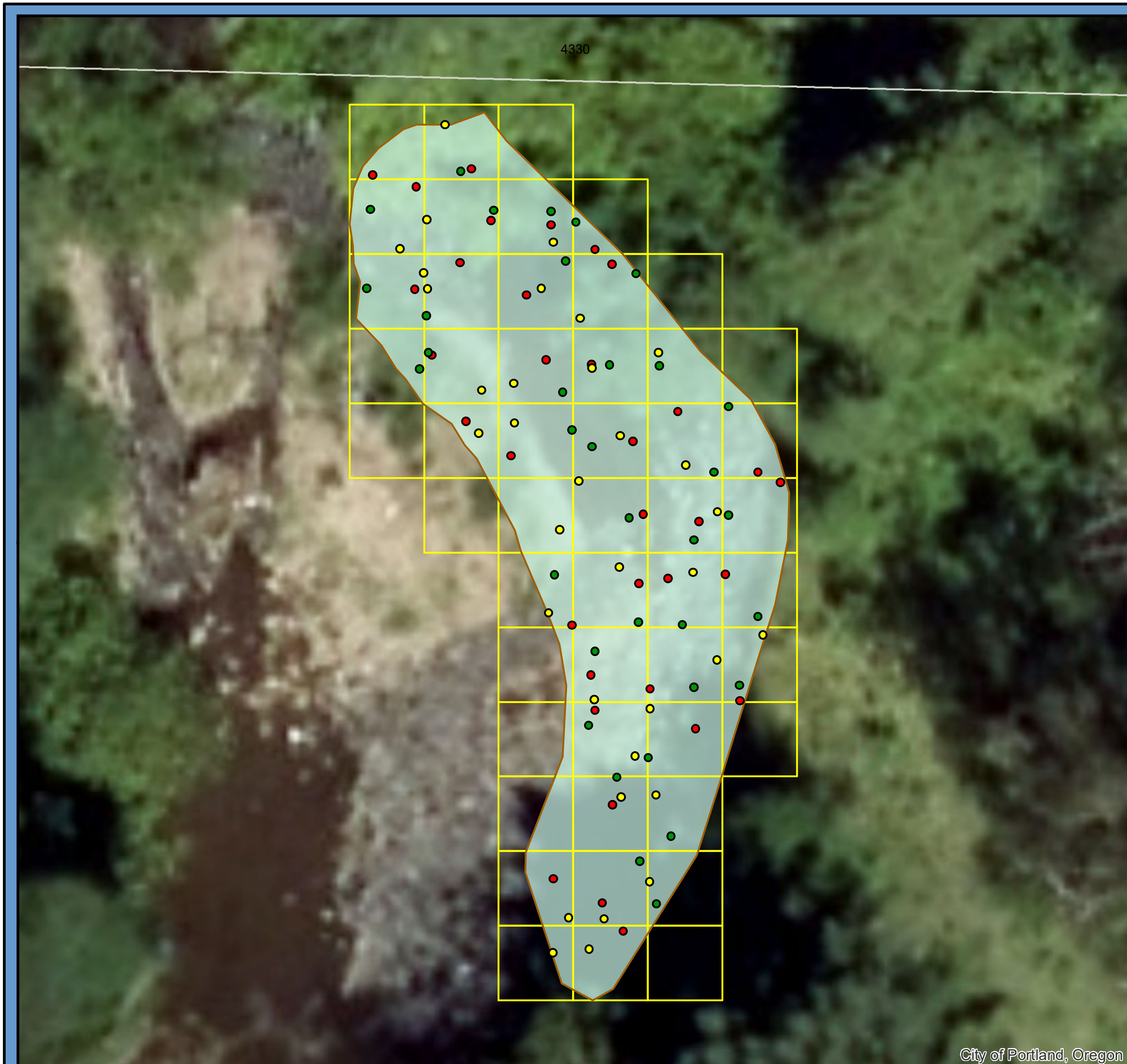
Taxlots

1 inch = 16.67 feet

N
W E
S

Map Created by: bethanyn August 3, 2018

Map Produced in ArcMap



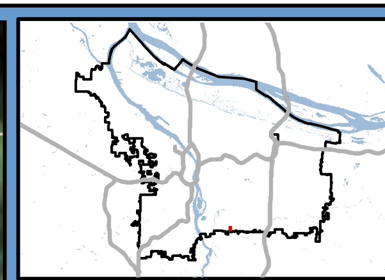


Figure 5:
Johnson Creek Oxbow Scour Project Location ISM Random Grid Proposed Sample Locations

Legend

- Random Samples 1
- Random Samples 2
- Random Samples 3
- GridLines
- Taxlots

1 inch = 12.5 feet

N
W E
S

Map Created by: bethanyn August 3, 2018

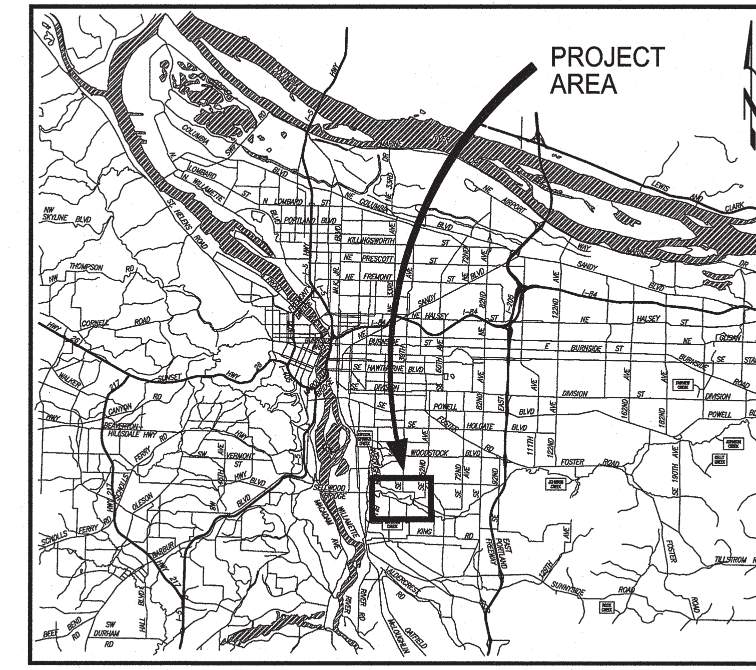
Map Produced in ArcMap

Appendix 1

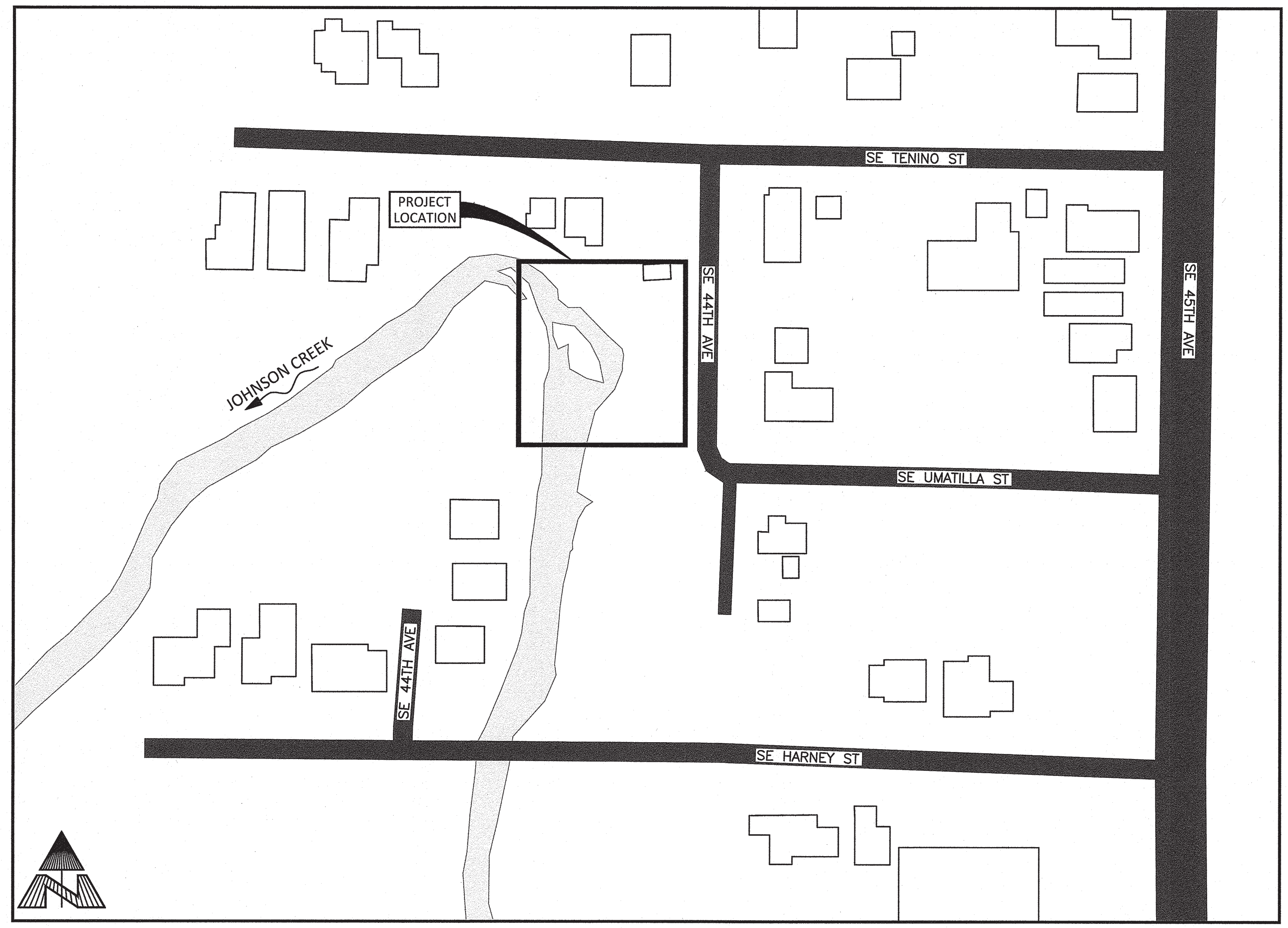
Johnson Creek Oxbow Scour

Final Design Plan and Profile

----CITY OF PORTLAND----
BUREAU OF ENVIRONMENTAL SERVICES
JOHNSON CREEK OXBOW



PORTLAND, OREGON
VICINITY MAP
NOT TO SCALE



PROJECT AREA
NOT TO SCALE

SHEET INDEX:

SHEET NUMBER	SHEET NAME	SHEET DESCRIPTION
1	G01	COVER, VICINITY MAP AND SHEET INDEX
2	G02	GENERAL NOTES
3	C01	EXISTING CONDITIONS
4	C02	PROPOSED SITE PLAN
5	C03	CROSS-SECTIONS FOR PROPOSED CONDITIONS
6	C04	CROSS-SECTIONS FOR PROPOSED CONDITIONS
7	CE01	PROPOSED SITE ACCESS AND SOIL EROSION CONTROL SITE PLAN
8	CD01	DETAILS FOR EROSION CONTROL AND COFFERDAM
9	CD02	DETAILS FOR EROSION CONTROL
10	CD03	DETAILS FOR FABRIC ENCAPSULATED SOIL LIFTS
11	CD04	DETAILS FOR FABRIC ENCAPSULATED SOIL LIFTS
12	CD05	LOG STRUCTURE SEQUENCING
13	CD06	LOG STRUCTURE SEQUENCING
14	L01	PERMANENT EROSION CONTROL PLAN

NOTICE TO EXCAVATORS:

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.
(NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-232-1987).

POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.
Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

EMERGENCY TELEPHONE NUMBERS

NW NATURAL GAS	
M-F 7am-6pm	503-226-4211 Ext.4313
AFTER HOURS	503-226-4211
PGE	503-464-7777
CENTURYLINK	1-800-573-1311
CITY BUREAU OF MAINTENANCE	503-823-1700
CITY WATER	503-823-4874
VERIZON	1-800-483-1000

CITY OF PORTLAND DATUM AND NAD 1983-91

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NO.	DATE	DESCRIPTION	APPD.
		REVISION	

XREF(S) USED:
ROTATION ANGLE:
CONSTRUCTED BY
PROJECT COMPLETED
MAP CORRECTED BY ______ CHECKED BY ______
FINAL MAP DATA
DRAWING NAME: IFI_JohnsonCreekOxbow_BES.dwg

DESIGNED BY WM | DATE APPD. 3-22-18
DRAWN BY NS | PROGRAM MGR. SCL
CHECKED BY | CONST. MGR. LM
DESIGN MGR. SMB | LMH

APPROVAL:
William F. Ryan 3/22/18
BES CHIEF ENGINEER REG. PROF. ENGR. NO. 16301PE

CITY OF PORTLAND
ENVIRONMENTAL SERVICES
NICK FISH COMMISSIONER
WILLIAM F. RYAN, P.E. CHIEF ENGINEER

inter-fluve
GREENWORKS

REGISTERED PROFESSIONAL ENGINEER
OREGON
FEB. 3, 1997
WILLIAM P. NORRIS
Expires: 12-31-18

CITY OF PORTLAND OREGON 1851

JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
COVER, SHEET INDEX AND VICINITY MAP

1/4 SECTION —
JOB NO. E10996
SHEET NO. G01
1 OF 14

ALL WORK SHALL CONFORM TO THE 2010 EDITION OF THE "CITY OF PORTLAND STANDARD CONSTRUCTION SPECIFICATIONS" UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL. IN-WATER WORK SHALL BE DONE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL PERMITS.

THESE NOTES ARE NOT COMPREHENSIVE OF THE CONTRACT REQUIREMENTS AND PROJECT SPECIFICATIONS.

ODFW IN-WATER WORK PERIODS

ALL WORK BELOW ORDINARY HIGH WATER ELEVATION SHALL OCCUR DURING THE ODFW PERMITTED IN-WATER WORK PERIOD: JULY 15–AUGUST 31, UNLESS OTHERWISE COORDINATED WITH ODFW AND APPROVED IN WRITING BY OWNER'S REPRESENTATIVE.

EXISTING DATA

TOPOGRAPHIC DATA WERE PROVIDED BY BES. SUPPLEMENTAL TOPOGRAPHIC DATA COLLECTED BY INTER-FLUVE STAFF USING TOTAL STATION ON OCTOBER 5, 2017 AND JANUARY 18, 2018. DATA ARE REFERENCED TO CITY OF PORTLAND DATUM AND NAD83, OREGON STATE PLANE, NORTH ZONE, INTERNATIONAL FEET.

HYDRAULIC MODELING WAS PERFORMED BY BES AND SUPPLEMENTED BY INTER-FLUVE STAFF USING USACE HEC-RAS (4.1.0).

GIS DATA PROVIDED BY CITY OF PORTLAND.

SOILS

SOILS ARE ASSUMED TO BE NATIVE ALLUVIUM. CONTRACTOR MAY PERFORM SUBSURFACE SOILS INVESTIGATION AT OWN EXPENSE.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL CALL (800-322-2344) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.

THE CONTRACTOR SHALL PROVIDE EQUIPMENT AND LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST TO OWNER.

FISH RESCUE

OWNER SHALL PERFORM FISH RESCUE AT ALL IN-WATER WORK AREAS. ALL FISH RESCUE EFFORTS SHALL BE PERFORMED BY PERSONNEL EXPERIENCED WITH THE COLLECTION AND HANDLING OF SALMONIDS FROM CONSTRUCTION SITES.

CONTRACTOR SHALL BE REQUIRED TO SUPPORT AND COORDINATE ACTIVITIES WITH FISH RESCUE.

CONSTRUCTION MATERIALS

LOCATION, ALIGNMENT, AND ELEVATION OF LOGS AND LOGS WITH ROOTWADS ARE SUBJECT TO ADJUSTMENT BASED ON FIELD CONDITIONS AND MATERIAL SIZE.

CONSTRUCTION STAKING

CONSTRUCTION STAKING TO BE PERFORMED BY CONTRACTOR. REFER TO SPECIAL PROVISION 00305.

CONSTRUCTION ACCESS/TRAFFIC CONTROL

CONTRACTOR SHALL SUBMIT AN ACCESS AND EROSION CONTROL PLAN TO OWNER FOR APPROVAL PRIOR TO MOBILIZATION.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR OBTAINING ANY REQUIRED TRAFFIC CONTROL OR ACCESS PERMITS AND FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS.

TREE REMOVAL TO BE COMPLETED BY OWNER PRIOR TO CONSTRUCTION. CLEARLY MARKED SNAGS MAY BE REMOVED BY CONTRACTOR IF NEEDED FOR OPERATION, WITH COORDINATION FROM OWNER'S REPRESENTATIVE.

ALL EQUIPMENT, MATERIALS, AND PERSONNEL SHALL REMAIN WITHIN THE LIMITS OF DISTURBANCE.

THE CONTRACTOR SHALL KEEP THE WORK AREAS IN A NEAT CONDITION, FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.

CONTRACTOR SHALL IMPLEMENT MEASURES TO CONTROL AND MINIMIZE WIND BLOWN DUST FROM THE SITE.

ALL DISTURBED AREAS INCLUDING ROADS, DRIVEWAYS AND ACCESS ROUTES SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE INDICATED IN DRAWINGS.

OWNER REQUIRES MECHANIZED EQUIPMENT TO BE CLEANED (PRESSURE WASHED OR BLOWN WITH PRESSURIZED AIR) AND INSPECTED BEFORE MOVING INTO THE PROJECT AREA TO REDUCE THE RISK OF SPREADING NOXIOUS WEED SEEDS ONTO DISTURBED AREAS. EQUIPMENT INSPECTION WILL BE ARRANGED WITH THE OWNER'S REPRESENTATIVE.

ABBREVIATIONS:

APPROX	APPROXIMATE
AVE	AVENUE
CY	CUBIC YARDS
DBH	DIAMETER AT BREAST HEIGHT
DIA	DIAMETER
EA	EACH
FESL	FABRIC ENCAPSULATED SOIL LIFT
FF	FACE FEET
FT OR '	FEET
FTR	FULLY THREADED ROD
H	HORIZONTAL
IE	INVERT ELEVATION
IN OR "	INCHES
MAX	MAXIMUM
MIN	MINIMUM
OC	ON CENTER
ODFW	OREGON DEPARTMENT OF FISH AND WILDLIFE
OHW	ORDINARY HIGH WATER
P/L	PROPERTY LINE
SE	SOUTH EAST
ST	STREET
V	VERTICAL
YR	YEAR

LEGEND:

- POLE ANCHOR
- POWER POLE
- EXISTING FENCE
- P/L P/L — PROPERTY LINE
- TEMPORARY ACCESS
- BULK BAG COFFERDAM, SEE DETAIL 2, SHEET CD01
- TEMPORARY SEDIMENT FENCE, SEE DETAIL 1, SHEET CD02
- STRAW WATTLES, SEE DETAIL 1, SHEET CD01
- TEMPORARY TURBIDITY CURTAIN, SEE DETAIL 2, SHEET CD02
- DEWATERING LOCATION
- GRAVEL ROAD RESURFACING
- DECIDUOUS TREE
- EVERGREEN TREE
- SNAG
- EXISTING HEDGE
- TEMPORARY CL-6 CHAIN-LINK FENCE
- TEMPORARY ORANGE PLASTIC MESH FENCE
- TEMPORARY STAGING AREA
- EXISTING CHANNEL
- EXISTING WETLAND
- EXISTING GRAVEL BAR
- EXISTING RIPRAP
- EXISTING GRAVEL-FILLED BURLAP BAGS
- WORK LIMITS
- EXISTING CONTOURS (2FT)
- PROPOSED CONTOURS (2FT)
- EXCAVATION
- BACKFILL
- PROPOSED LOG WITH ROOTWAD PLACEMENT
- OR — PROPOSED FOOTER LOG PLACEMENT
- EXISTING GROUND PROFILE
- PROPOSED GROUND PROFILE
- SUB-GRADE PROFILE
- FABRIC ENCAPSULATED SOIL LIFT, SEE DETAILS SHEETS CD02 & CD03
- WILLOW CUTTING
- FULLY THREADED ROD CONNECTION, SEE DETAIL 2, SHEET CD05
- SLASH, SEE SPECIFICATIONS
- SELECTED GENERAL BACKFILL, SEE SPECIFICATIONS
- STONE EMBANKMENT MATERIAL, SEE SPECIFICATIONS
- FABRIC ENCAPSULATED SOIL LIFTS WITH NATIVE SEED
- TOP SOIL, NATIVE SEED AND STRAW MULCH AREA

NO.	DATE	DESCRIPTION	APPD.
		REVISION	

XREF(S) USED:
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PROJECT COMPLETED
MAP CORRECTED BY CHECKED BY
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DESIGNED BY WM · BN · DATE APPD. 3-22-18
DRAWN BY NS · NS · PROGRAM MGR.
CHECKED BY · EA · CONST. MGR. LM
DESIGN MGR. SMB · SB · LMH

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REGISTERED PROFESSIONAL ENGINEER
OREGON
FEB. 3, 1997
WILLIAM P. NORRIS
Expires: 12-31-18

JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT

GENERAL NOTES

1/4 SECTION
JOB NO. E10996
SHEET NO. G02
2 OF 14

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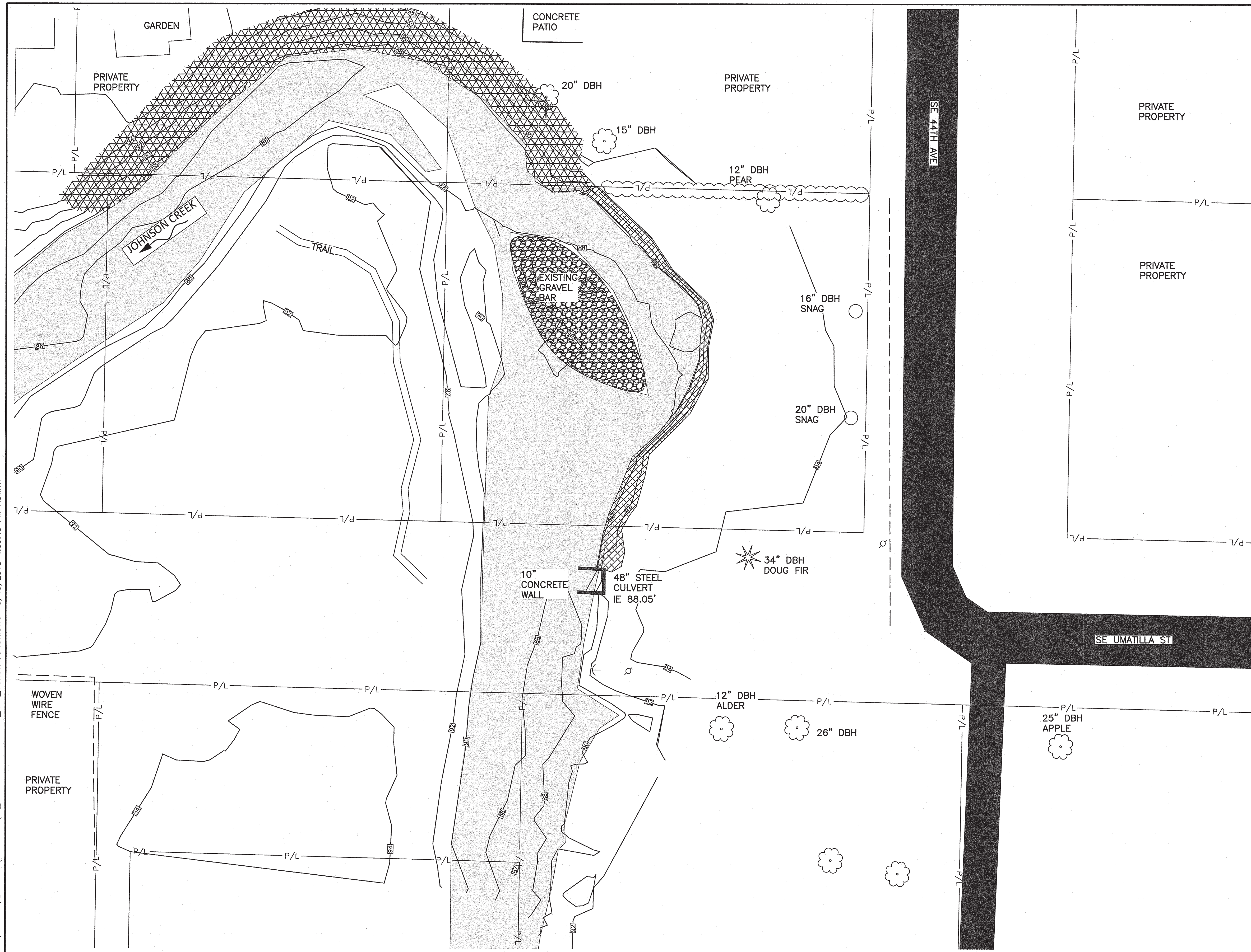

SCALE
15 0 15 30
SCALE FEET

LEGEND:

- POLE ANCHOR
- POWER POLE (APPROX LOCATION)
- EXISTING WOVEN WIRE FENCE
- PROPERTY LINE
- DECIDUOUS TREE
- EVERGREEN TREE
- EXISTING SNAG
- EXISTING HEDGE
- EXISTING CHANNEL
- EXISTING GRAVEL BAR
- EXISTING RIPRAP
- EXISTING GRAVEL-FILLED BURLAP BAGS
- EXISTING CONTOUR (2FT)

NOTES:

1. UTILITY LOCATIONS TO BE VERIFIED BY CONTRACTOR.
2. CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING GRAVEL FILLED BURLAP BAGS. REFER TO SPECIAL PROVISION 00330.

EXISTING TREES TO PROTECT

TAG	SPECIES	DBH
144355	DOUGLAS FIR	34
144359	PEAR	12
NA	APPLE	25

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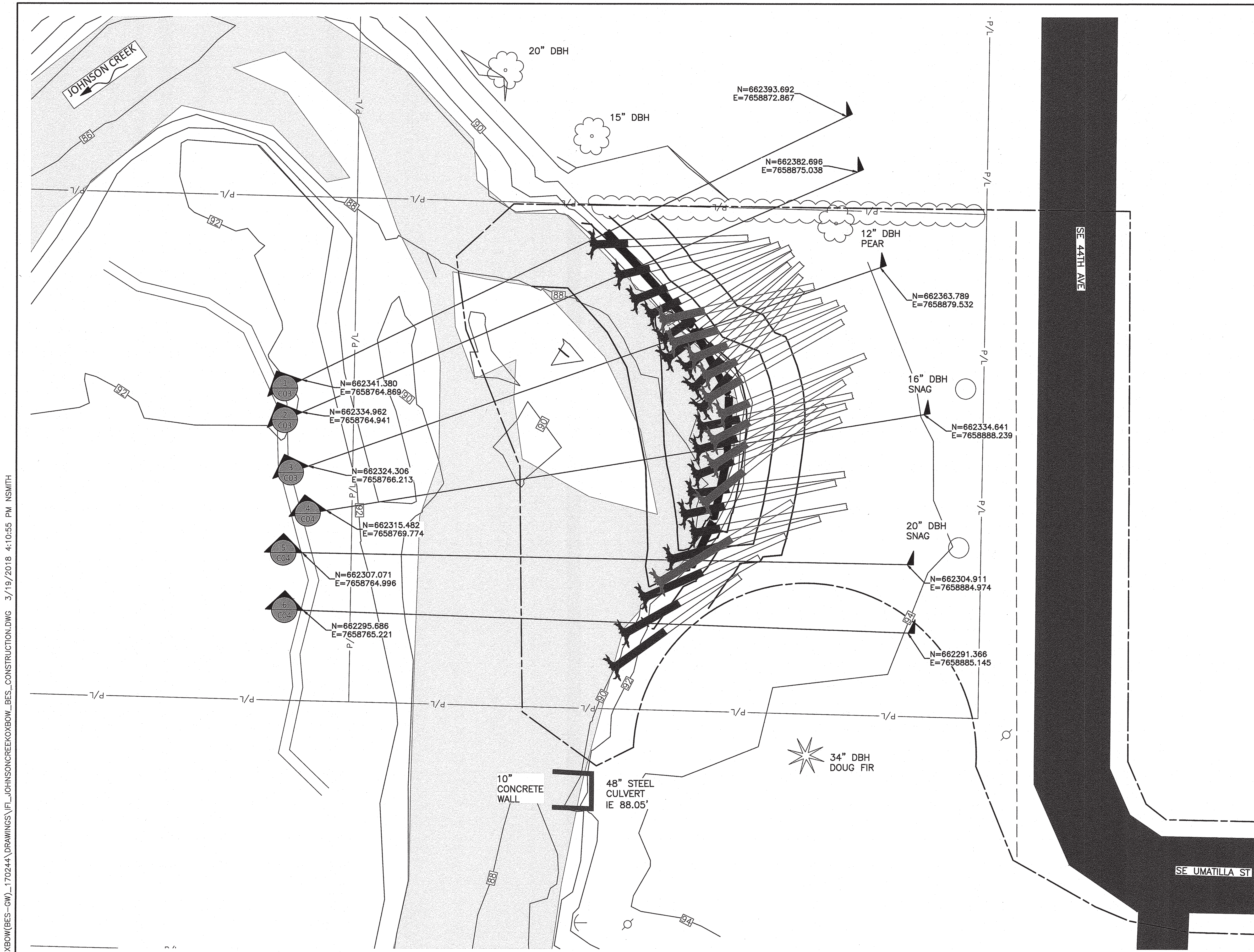
JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
EXISTING CONDITIONS

1/4 SECTION
JOB NO. E10996
SHEET NO. C01
3 OF 14



SCALE

10 0 10 20

SCALE FEET

LEGEND:

- POLE ANCHOR
- POWER POLE
- EXISTING FENCE
- PROPERTY LINE
- DECIDUOUS TREE TO REMAIN
- EVERGREEN TREE TO REMAIN
- EXISTING SNAG
- EXISTING HEDGE
- EXISTING CHANNEL
- WORK LIMITS
- EXISTING CONTOUR (2FT)
- PROPOSED CONTOUR (2FT)
- PROPOSED LOG WITH ROOTWAD PLACMENT
- PROPOSED LOG PLACEMENT

NOTES:

1. SEE CROSS–SECTIONS SHEETS C03 & C04.
2. SEE LOG STRUCTURE SEQUENCING SHEETS CD05 & CD06.

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Expires: 12-31-18

JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT

PROPOSED SITE PLAN

1/4 SECTION
JOB NO. E10996
SHEET NO. C02
4 OF 14

SCALE
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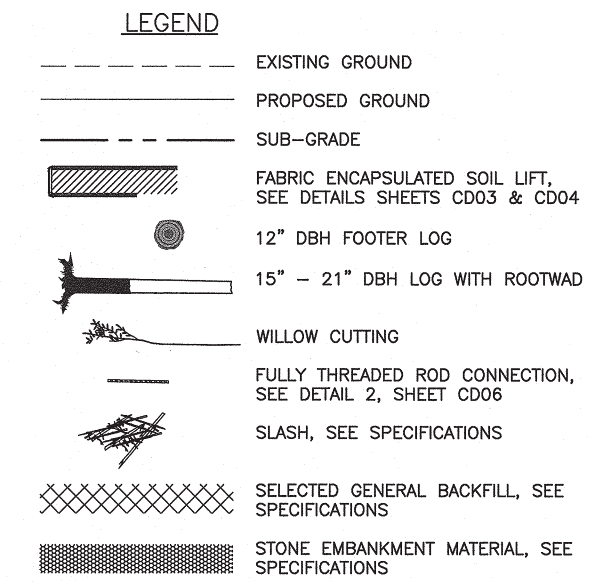
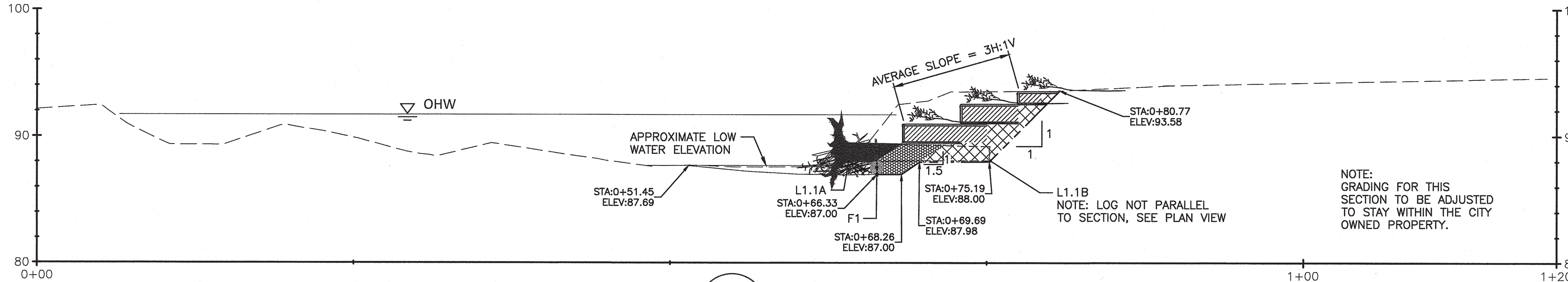
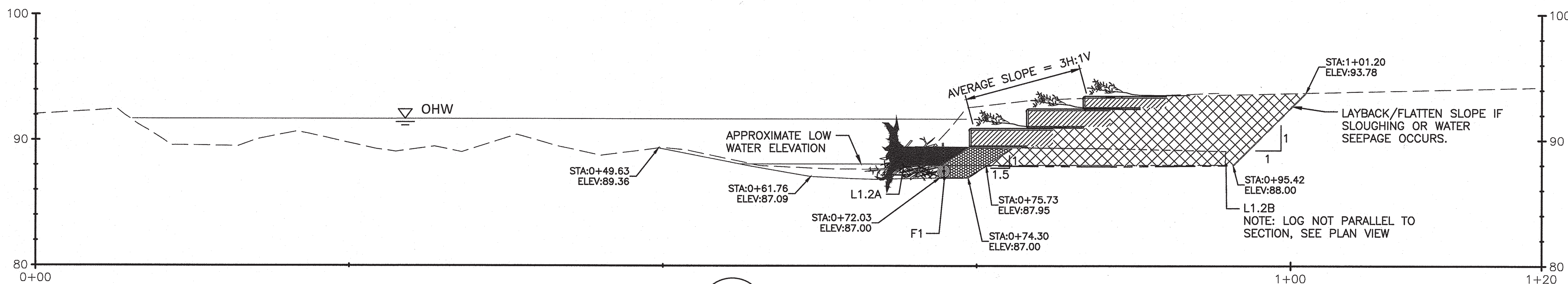
SCALE FEET

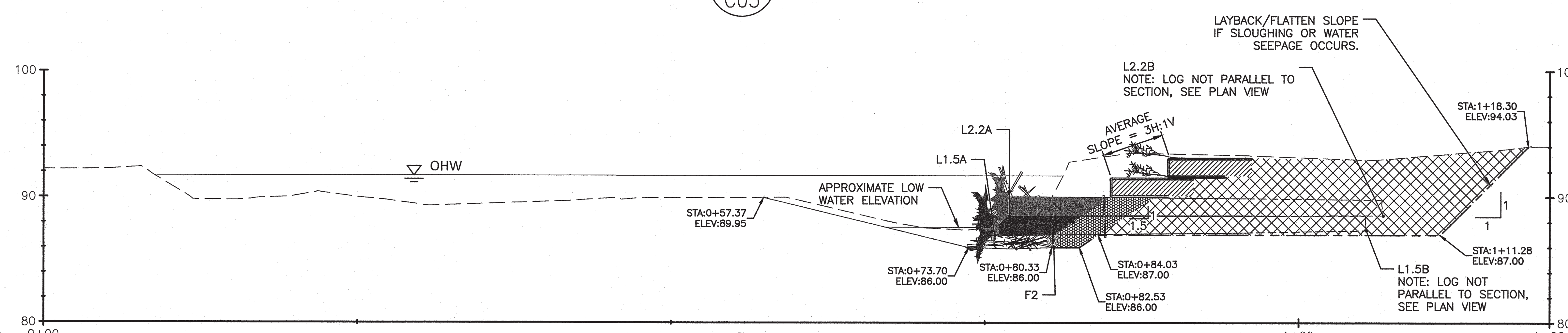




1 CROSS-SECTION VIEW
C03 1" = 5'



2 CROSS-SECTION VIEW
C03 1" = 5'



3 CROSS-SECTION VIEW
C03 1" = 5'

NOTE:

1. NOT ALL FULLY THREADED ROD CONNECTIONS ARE SHOWN ON CROSS-SECTIONS.

	LOG ID	NORTHING	EASTING	ELEVATION*
CROSS-SECTION 1	F1A	662370.77	7658825.19	87
	F1B	662352.03	7658842.44	86
	L1.1A	662368.49	7658823.36	88
	L1.1B	662369.69	7658853.31	88
CROSS-SECTION 2	F1A	662370.77	7658825.19	87
	F1B	662352.03	7658842.44	86
	L1.2A	662362.14	7658828.49	88
	L1.2B	662369.23	7658857.41	87.8
CROSS SECTION 3	F2A	662351.55	7658842.56	86
	F2B	662338.56	7658849.59	84.3
	L1.5A	662350.04	7658837.17	87
	L1.5B	662366.49	7658862.15	87.5
	L2.2A	662349.15	7658839.24	88.5
	L2.2B	662357.3	7658867.91	87.9

*ELEVATION REFERS TO BOTTOM OF LOG

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JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
CROSS-SECTIONS FOR PROPOSED CONDITIONS

1/4 SECTION
JOB NO. E10996
SHEET NO. C03
5 OF 14

SCALE

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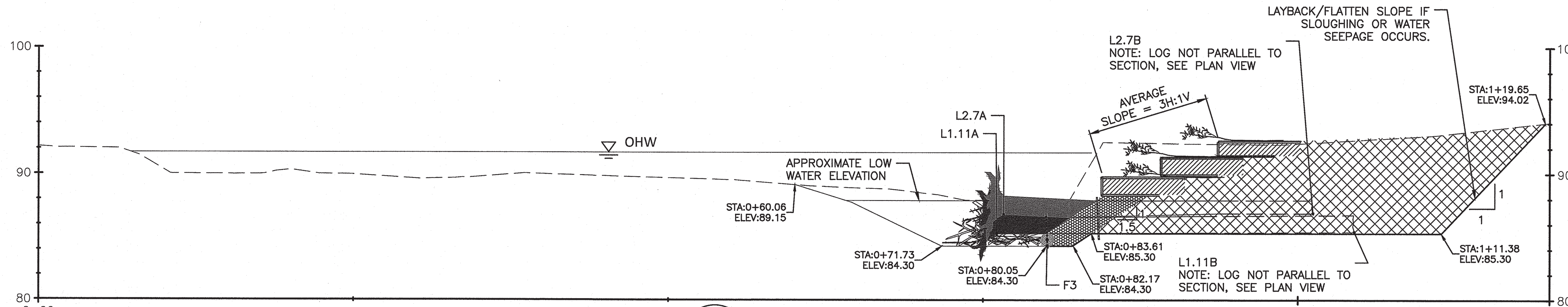
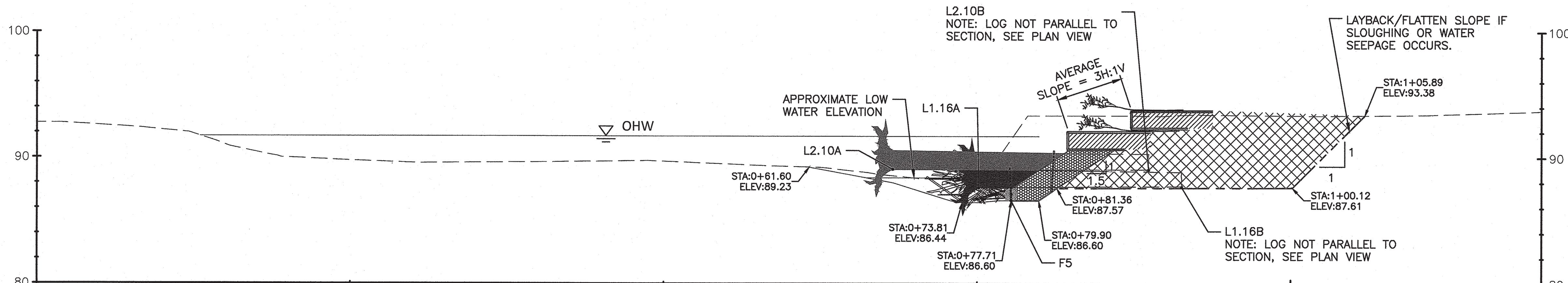
SCALE FEET



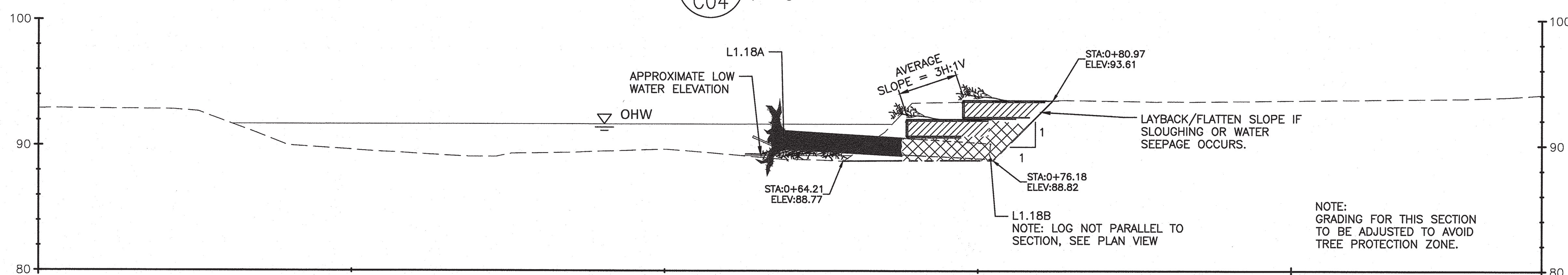
4 CROSS–SECTION VIEW

C04 1" = 5'



5 CROSS–SECTION VIEW

C04 1" = 5'



6 CROSS–SECTION VIEW

C04 1" = 5'

LEGEND

- EXISTING GROUND
- PROPOSED GROUND
- SUB–GRADE
- FABRIC ENCAPSULATED SOIL LIFT, SEE DETAILS SHEETS CD03 & CD04
- 12" DBH FOOTER LOG
- 15"–21" DBH LOG WITH ROOTWAD
- WILLOW CUTTING
- FULLY THREADED ROD CONNECTION, SEE DETAIL 2, SHEET CD06
- SLASH, SEE SPECIFICATIONS
- SELECTED GENERAL BACKFILL, SEE SPECIFICATIONS
- STONE EMBANKMENT MATERIAL, SEE SPECIFICATIONS

NOTE:

1. NOT ALL FULLY THREADED ROD CONNECTIONS ARE SHOWN ON CROSS–SECTIONS.

	LOG ID	NORTHING	EASTING	ELEVATION*
CROSS-SECTION 4	F3A	662338.19	7658849.57	84.3
	F3B	662327.35	7658849.36	84.3
	L1.11A	662327.85	7658844.09	85.3
	L1.11B	662336.36	7658872.79	85.3
	L2.7A	662329.73	7658847.27	86.8
	L2.7B	662343.59	7658873.86	86.8
CROSS-SECTION 5	F5A	662313.43	7658846.43	85.8
	F5B	662304.23	7658842.18	86.6
	L1.16A	662306.11	7658838.79	87.6
	L1.16B	662313.91	7658867.78	87
	L2.10A	662301.86	7658836.46	89.9
	L2.10B	662317.23	7658862.22	87.4
CROSS-SECTION 3	L1.18A	662291.45	7658829.5	88.7
	L1.18B	662306.16	7658855.7	87.3

*ELEVATION REFERS TO BOTTOM OF LOG

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DESIGNED BY WPN BN DATE APPD. 3-22-18
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OREGON
FEB. 3, 1987
WILLIAM P. NORRIS
Expires: 12-31

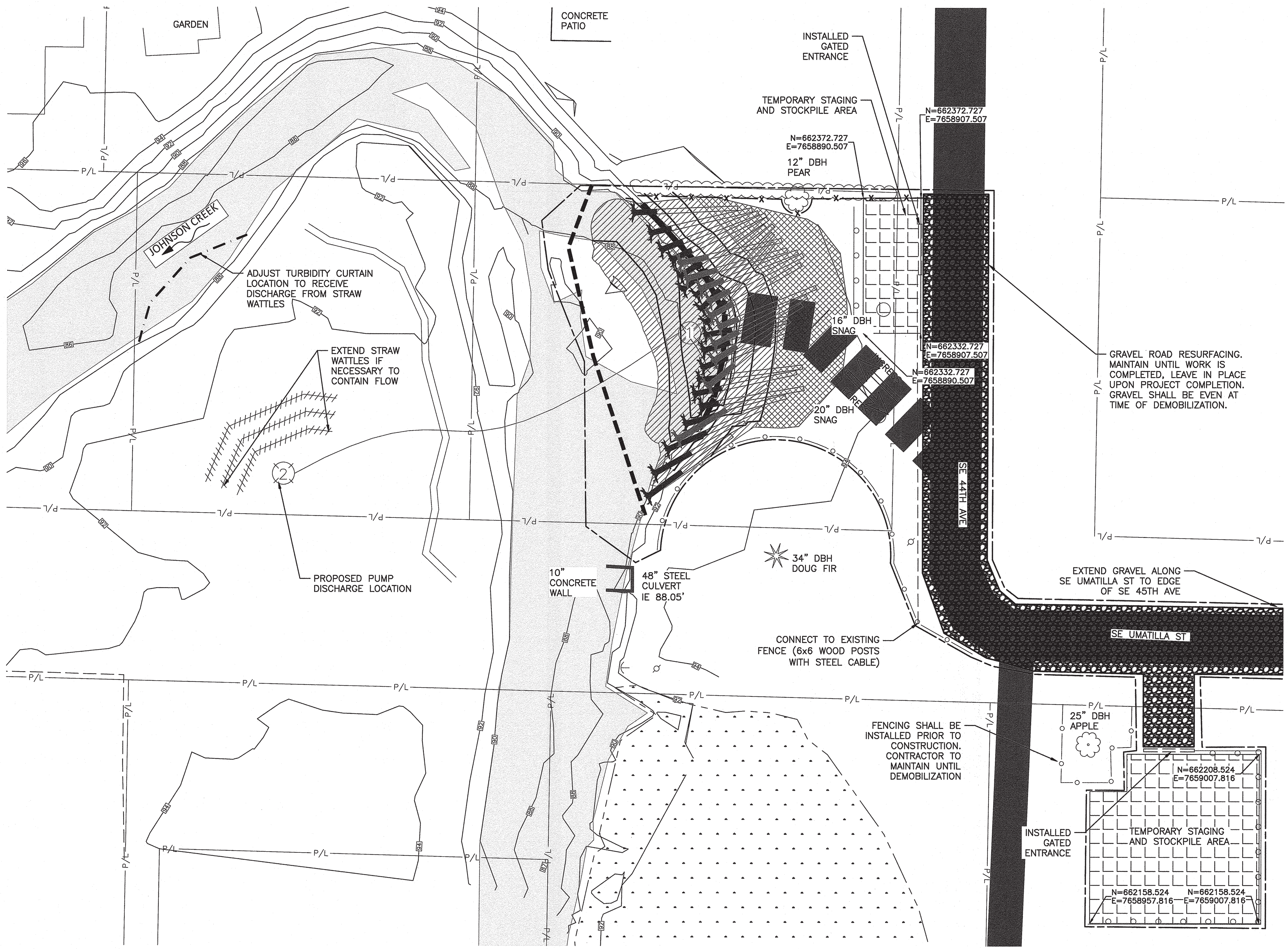
JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
CROSS–SECTIONS FOR PROPOSED CONDITIONS

1/4 SECTION

JOB NO. E10996

SHEET NO. C04

6 OF 14



LEGEND:

- POLE ANCHOR
- POWER POLE
- EXISTING FENCE
- PROPERTY LINE
- TEMPORARY ACCESS
- TEMPORARY BULK BAG COFFERDAM, SEE DETAIL 2, SHEET CD01
- TEMPORARY SEDIMENT FENCE, SEE DETAIL 1, SHEET CD02
- STRAW WATTLES, SEE DETAIL 1, SHEET CD01
- TEMPORARY TURBIDITY CURTAIN, SEE DETAIL 2, SHEET CD02
- DEWATERING LOCATION
- GRAVEL ROAD RESURFACING
- DECIDUOUS TREE
- EVERGREEN TREE
- SNAG
- EXISTING HEDGE
- TEMPORARY CL-6 CHAIN-LINK FENCE
- TEMPORARY ORANGE PLASTIC MESH FENCE
- TEMPORARY STAGING AREA
- EXISTING CHANNEL
- EXISTING WETLAND
- WORK LIMITS
- EXISTING CONTOURS (2FT)
- PROPOSED CONTOURS (2FT)
- EXCAVATION
- BACKFILL
- PROPOSED LOG WITH ROOTWAD PLACEMENT
- PROPOSED LOG PLACEMENT

EXISTING TREES TO PROTECT

TAG	SPECIES	DBH
144355	DOUGLAS FIR	34
144359	PEAR	12
NA	APPLE	25

NOTES:

1. FOLLOWING CONSTRUCTION AND PRIOR TO SEED APPLICATION, CONTRACTOR SHALL DECOMPACT SOILS IN ACCESS AND STAGING AREAS. NO VEHICLE OR EQUIPMENT TRAFFIC SHALL OCCUR AFTER DECOMPACTION/ SEEDING.
2. CONTRACTOR MAY REMOVE SNAGS IF NECESSARY FOR OPERATION. COORDINATE WITH OWNER'S REPRESENTATIVE.
3. NO CONSTRUCTION EQUIPMENT OR HAULING SHALL BE ALLOWED ON SE TENINO STREET OR BEYOND CITY PROPERTY.

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CHECKED BY; CONST. MGR.: LM
DESIGN MGR.: SMB

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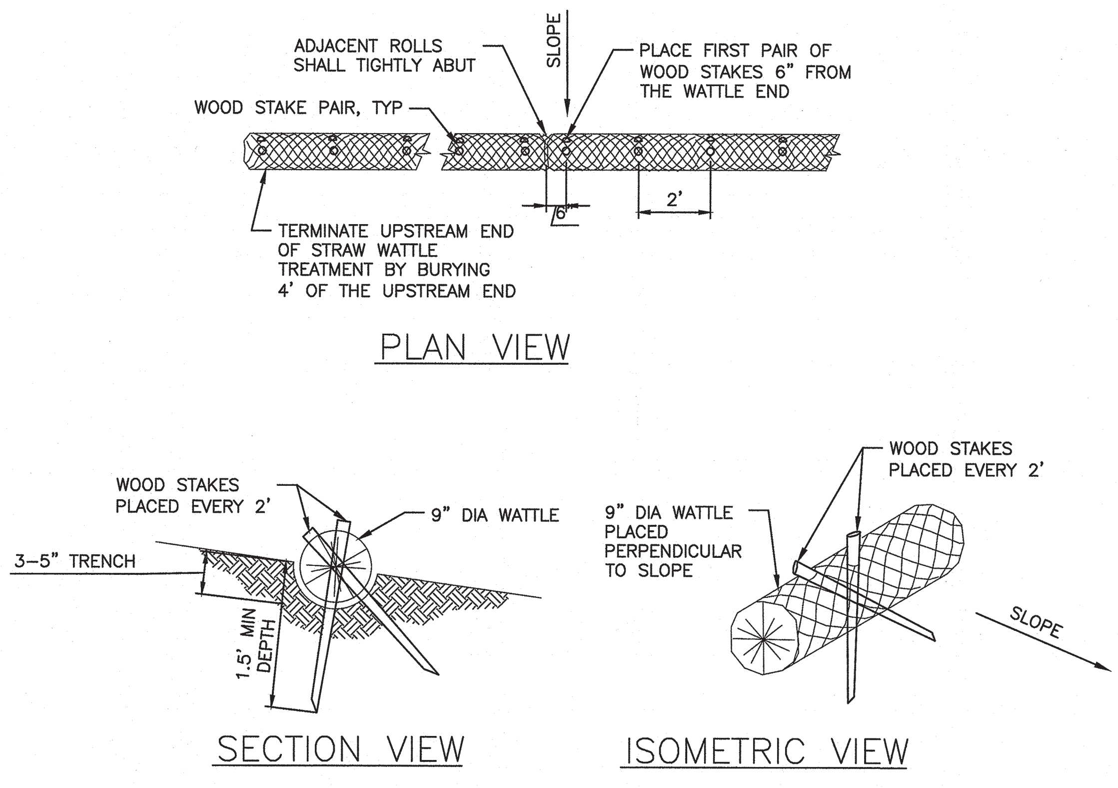
REGISTERED PROFESSIONAL ENGINEER 59275PE OREGON FEB. 3, 1997 WILLIAM P. NORRIS
Expires: 12-31-18

JOHNSON CREEK OXBOW SCOUR REPAIR PROJECT

PROPOSED SITE ACCESS AND TEMPORARY SOIL EROSION CONTROL SITE PLAN

1/4 SECTION
JOB NO. E10996
SHEET NO. CE01
7 OF 14

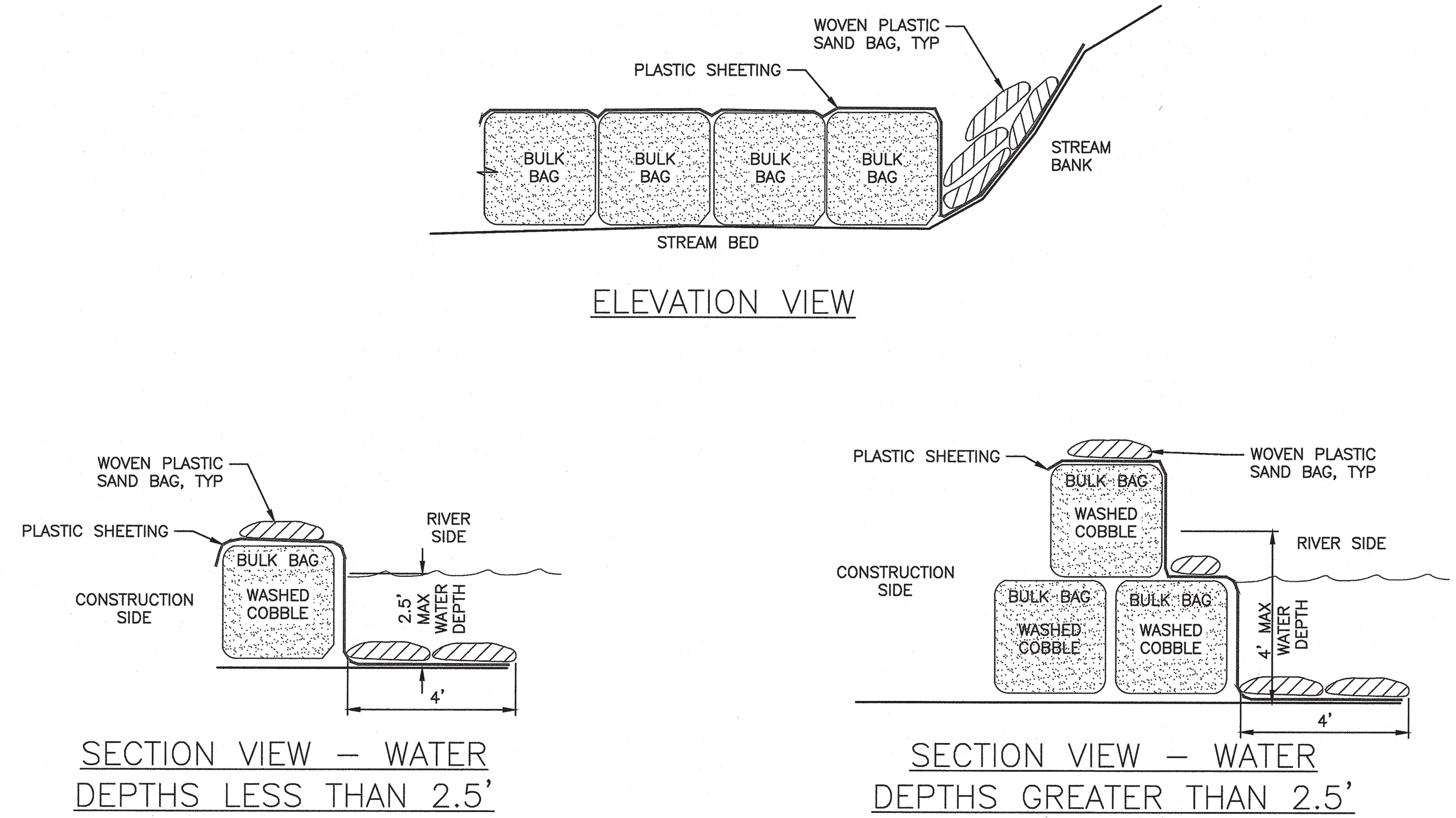


1 / CD01 TYPICAL DETAIL – STRAW WATTLES
NOT TO SCALE

NOTES:

1. INSTALL WATTLES WITHIN TRENCH, SO THAT NO GAPS EXIST BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHALL TIGHTLY ABUT SO THAT NO OPENING EXISTS FOR WATER OR SEDIMENT TO PASS THROUGH.
2. WOOD STAKES SHALL BE USED TO FASTEN THE WATTLES TO THE SOIL. WHEN CONDITIONS WARRANT, A STRAIGHT METAL BAR CAN BE USED TO DRIVE A "PILOT HOLE" THROUGH THE WATTLE AND INTO THE SOIL.
3. PAIRS OF WOOD STAKES SHALL BE PLACED 6" FROM THE WATTLE END, ANGLED SUCH THAT ONE STAKE IS PERPENDICULAR TO GRADE AND ONE IS AT A 45° ANGLE TO GRADE. WOOD STAKE PAIRS SHALL BE SPACED AT 2-FT CENTERS LEAVING LESS THAN 1-2 INCHES OF STAKE EXPOSED ABOVE THE WATTLE.
4. AT TERMINAL ENDS OF WATTLES, EXCAVATE MIN 2' DEEP KEY TRENCH AND BURY A MIN 4' OF WATTLE END.
5. CARE SHALL BE TAKEN DURING INSTALLATION SO AS TO AVOID DAMAGE OCCURRING TO THE WATTLE AS A RESULT OF THE INSTALLATION PROCESS. SHOULD THE WATTLE BE DAMAGED DURING INSTALLATION, A WOODEN STAKE SHALL BE PLACED EITHER SIDE OF THE DAMAGED AREA TERMINATING THE WATTLE SEGMENT.
6. ANY WATTLE DAMAGED DURING PLACEMENT SHALL BE REPLACED AS DIRECTED BY AGENCY STAFF, AT THE CONTRACTOR'S EXPENSE.
7. INSTALL WATTLES IN FILL LOCATIONS ACCORDING TO THE FOLLOWING GUIDELINES:

STRAW WATTLE: VERTICAL SPACING	
SLOPE	SPACING
2:1	10'
2:1 - 5:1	25'
<5:1	50'



NOTES:

1. BULK BAG COFFERDAM SHALL BE CONSTRUCTED OF SEVERAL UNITS OF BULK BAGS FILLED WITH WASHED COBBLE (TO BE PROVIDED BY CONTRACTOR, AT CONTRACTOR'S EXPENSE), AND ABUTTED SIDE BY SIDE TO CREATE A ROW THAT ISOLATES THE CONSTRUCTION SITE.
2. IF WATER DEPTH EXCEEDS 85% OF THE BULK BAG HEIGHT, AN ADDITIONAL TOP ROW OF BULK BAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULK BAGS. BULK BAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM. SANDBAGS SHALL BE WOVEN PLASTIC.
3. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON THE RIVER SIDE OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4-FEET FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF STANDARD WOVEN PLASTIC SANDBAGS. ALL SANDBAGS SHALL BE FILLED WITH WASHED PEA GRAVEL.
4. THE TERMINAL ENDS OF BULK BAG COFFERDAM, WHERE IT CONNECTS TO CHANNEL BANK OR HIGH GROUND, SHALL BE SEALED WITH PLASTIC SHEETING AND STANDARD WOVEN PLASTIC SANDBAGS.
5. BULK BAGS SHALL BE CUBE-SHAPED POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
6. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL BE LONG ENOUGH TO ENSURE THAT ENTIRE LENGTH OF COFFERDAM WILL BE COVERED WITHOUT A SEAM. MINIMUM 12-FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16-FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULK BAG COFFERDAM.
7. BULK BAG COFFERDAM SHALL BE COMPLETELY REMOVED AND LEGALLY DISPOSED OF OFF-SITE AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED. BULK BAG FILL (WASHED COBBLE) AND SANDBAG FILL (WASHED PEA GRAVEL) SHALL BE DISPOSED OF. BAGS SHALL BE REMOVED FROM THE SITE ONCE CONSTRUCTION IS COMPLETED.
8. MEASUREMENT AND PAYMENT FOR BULK BAG COFFERDAM, SAND BAGS, PLASTIC SHEETING, WASHED COBBLE PLACEMENT, AND MAINTENANCE AND REMOVAL OF ALL MATERIALS, SHALL BE INCIDENTAL TO THE LUMP SUM ALL INCLUSIVE COST FOR DIVERSION AND DEWATERING.
9. ALTERNATE COFFERDAM MATERIALS AND CONFIGURATIONS MAY BE ALLOWED BUT SHALL NOT BE IMPLEMENTED WITHOUT REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR VENDOR CUT SHEETS FOR SUBSTITUTIONS.
10. IF NECESSARY, GAPS BETWEEN BULK BAGS SHALL BE FILLED WITH WASHED STREAM GRAVEL TO IMPROVE COFFERDAM SEAL.

2 / CD01 TYPICAL DETAIL – TEMPORARY COFFERDAM
NOT TO SCALE

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JOHNSON CREEK OXBOW
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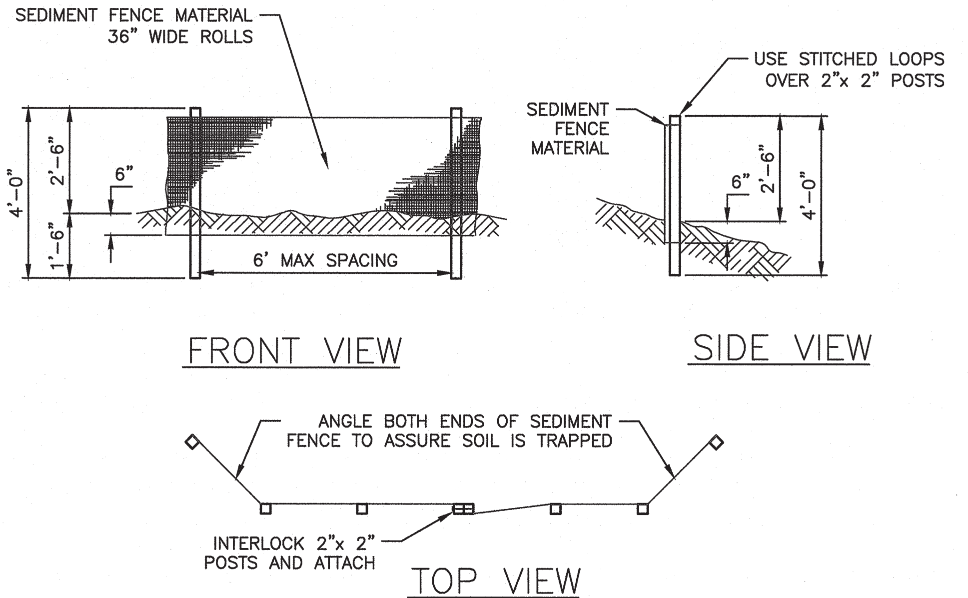
DETAILS FOR EROSION CONTROL AND COFFERDAM

1/4 SECTION
JOB NO. E10996
SHEET NO. CD01
8 OF 14



1 / CD02 TYPICAL DETAIL – SEDIMENT FENCE

NOTES:

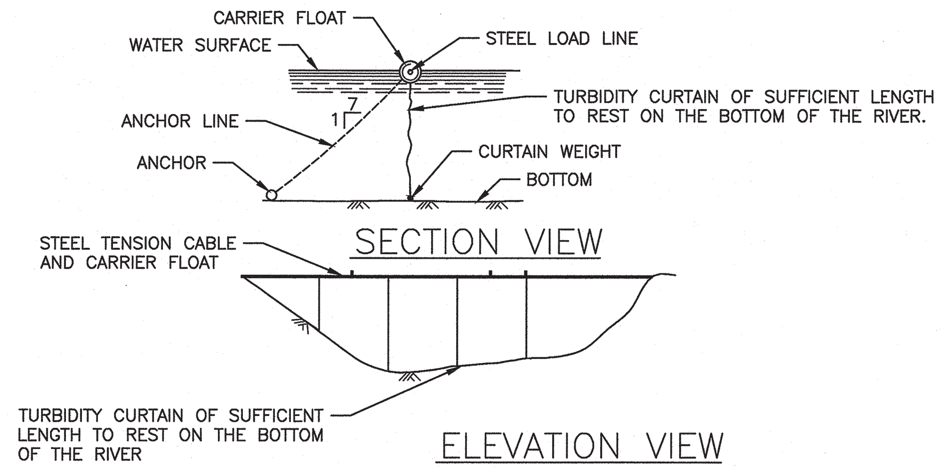
1. THE SEDIMENT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST. ALTERNATIVELY, OVERLAP AND INTERLOCK TWO POSTS WITH ATTACHED FABRIC AS REQUIRED TO MEET APPLICABLE REGULATIONS.

2. THE SEDIMENT FENCE IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLAN ALONG THE DOWNHILL PERIMETER OF CONSTRUCTION AREAS. THE FENCE POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 24 INCHES.

3. THE SEDIMENT FENCE SHALL HAVE A MINIMUM VERTICAL BURIAL OF 6 INCHES. ALL EXCAVATED MATERIAL FROM SILT FENCE INSTALLATION SHALL BE BACK–FILLED AND COMPACTED ALONG THE ENTIRE DISTURBED AREA.

4. STANDARD OR HEAVY DUTY SEDIMENT FENCE SHALL HAVE MANUFACTURED STITCHED LOOPS FOR 2 INCHES X 2 INCHES POST INSTALLATION.

5. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE AND MET APPLICABLE PERMIT CONDITIONS, AT NO ADDITIONAL COST TO OWNER, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY PROTECTED AND STABILIZED, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.



2 / CD02 TYPICAL DETAIL – TURBIDITY CURTAIN
NOT TO SCALE

NOTES:

1. ONLY TURBIDITY CURTAINS OF TYPE II OR GREATER STRENGTH SHALL BE ACCEPTED. THE TURBIDITY CURTAIN IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS. FISH SHALL BE SALVAGED FROM THE ENCLOSED AREA.

2. THE TURBIDITY CURTAIN SHALL BE OF SUFFICIENT LENGTH TO REST ON THE BOTTOM OF THE RIVER.

3. THE TURBIDITY CURTAIN SHALL BE A CONTINUOUS ROLL OF CURTAIN MATERIAL SUFFICIENT TO ENCLOSE THE ENTIRE WORK AREA AND PREVENT A VISUALLY DETECTABLE DIFFERENCE IN TURBIDITY BETWEEN THE BACKGROUND AND COMPLIANCE TURBIDITY MONITORING SITES. IF ADDITIONAL FABRIC IS NEEDED TO ENCLOSE WORK AREA, SEE "PANEL CONNECTORS".

4. CURTAIN MATERIAL – WITHIN NAVIGABLE WATERS, THE CURTAIN MATERIAL SHALL BE A BRIGHT COLOR (YELLOW OR ORANGE) TO ATTRACT THE ATTENTION OF ANY BOATERS OR SWIMMERS. THE CURTAIN MATERIAL SELECTION SHALL TAKE INTO ACCOUNT THE EXPECTED POLLUTANT PARTICLE SIZE BASED ON THE PRIMARY SEDIMENT IDENTIFIED.

5. PANEL CONNECTORS – IF ADDITIONAL FABRIC PANELS ARE NEEDED THE SEAMS OF THE FABRIC SHALL BE GLUED, WELDED, OR SEWN AND SHALL HAVE 90% OF THE STRENGTH CHARACTERISTICS OF THE FABRIC. IF ADJACENT PANELS ARE NECESSARY, THEY SHALL BE CONNECTED USING ONE OF THE FOLLOWING METHODS: A) SEW THE PANELS TOGETHER USING TWO STITCH LINES PER SEAM AND A STITCH DENSITY OF SIX TO TEN STITCHES PER INCH, B) JOIN THE PANELS OF FABRIC USING GROMMETED HOLES AND ROPE LACING. THE HOLES SHALL BE ONLY SLIGHTLY LARGER THAN THE ROPE TO MINIMIZE LEAKAGE. C) USE COMMERCIALLY AVAILABLE ALUMINUM SLIDE–CONNECTORS.

6. FLOTATION – FLOTATION SEGMENTS SHALL BE RETAINED INTO A SEWN OR HEAT WELDED SEAM ALONG THE ENTIRE TOP OF THE TURBIDITY CURTAIN TO FORM A CONTINUOUS FLOAT. POSSIBLE FLOATATION MATERIAL INCLUDES EXPANDED POLYSTYRENE FLOATS OR CLOSED CELL SOLID PLASTIC FOAM FLOATS.

7. LOAD LINE – TURBIDITY CURTAINS SHALL REQUIRE A LOAD LINE. THE LOAD LINE SHALL BE A MINIMUM 5/16" STEEL CABLE INSTALLED IN THE SLEEVE WITH THE FLOATATION SEGMENTS OR JUST BELOW THE FLOATS IF IN ITS OWN SLEEVE.

8. CURTAIN WEIGHT – TURBIDITY CURTAINS SHALL REQUIRE A CURTAIN WEIGHT. THE CURTAIN WEIGHT SHALL BE A MINIMUM 5/16 CHAIN BALLAST INSTALLED IN THE BOTTOM SLEEVE.

9. MOORING – THE TURBIDITY CURTAIN SHALL BE PROPERLY ANCHORED BOTH ONSHORE AND IN THE WATER. THE TURBIDITY CURTAIN SHALL EXTEND ONTO SHORE AND BE TIED TO A POST OR STABLE, LARGE DIAMETER TREE (8" DBH OR GREATER). THE ANCHORING SYSTEM SHALL BE DESIGNED BASED ON THE ANTICIPATED CONDITIONS. THE IN–WATER ANCHOR SYSTEM SHALL CONSIST OF AN ANCHOR, ANCHOR LINE, BUOY, CROWN BUOY, AND MOORING CABLE, AS NEEDED. THE TURBIDITY CURTAIN SHALL BE ANCHORED EVERY 100 FEET AT A MINIMUM. FOR HIGHER FLOW SITUATIONS, WHERE THE CURRENT APPROACHES 5 FPS AND/OR WAVES OVER 1 FT ARE ANTICIPATED, THE TURBIDITY CURTAIN SHALL BE ANCHORED EVERY 50 FT. TURBIDITY CURTAINS SUBJECT TO REVERSING CURRENTS, WAVES , OR FLOW FROM BOTH SIDES SHALL BE ANCHORED ON BOTH SIDES. THE ANCHORS SHALL BE PLACED SUCH THAT THE SLOPE OF THE ANCHOR LINE IS 7H:1V. THIS WILL MINIMIZE THE STRESS ON THE TURBIDITY CURTAIN AND INCREASE THE HOLDING POWER OF THE ANCHOR. A MINIMUM 1/2" DIA ROPE OR 1/4" DIA CABLE SHALL BE USED FOR THE ANCHOR LINE.

10. REMOVAL – THE TURBIDITY CURTAIN SHALL ONLY BE REMOVED WHEN THERE IS NO VISUALLY DETECTABLE DIFFERENCE IN TURBIDITY BETWEEN THE BACKGROUND AND COMPLIANCE TURBIDITY MONITORING SITES.

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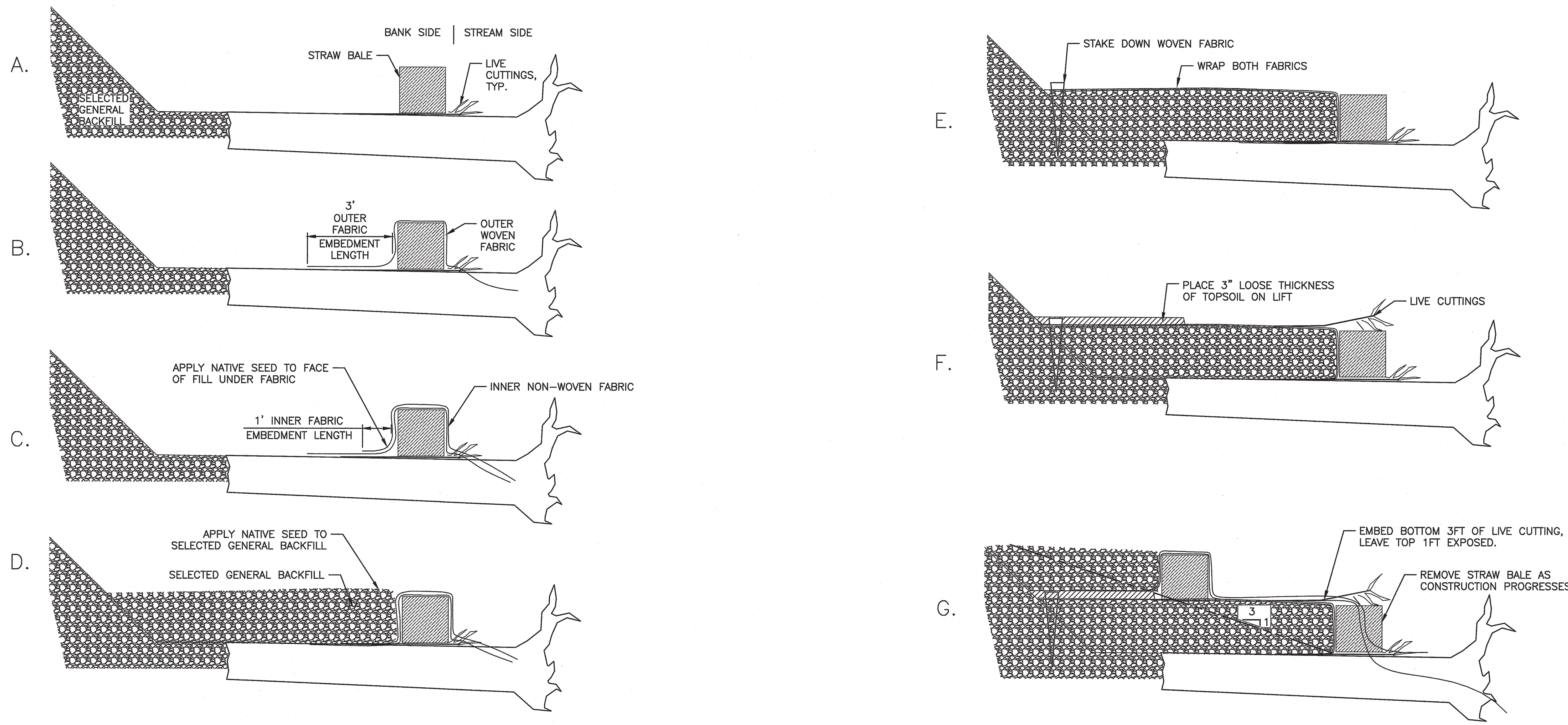
OREGON
FEB. 3, 1997
WILLIAM P. NORRIS
Expires: 12-31-18

JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
DETAILS FOR EROSION CONTROL

1/4 SECTION
JOB NO. E10996
SHEET NO. CD02
9 OF 14



GENERAL INSTRUCTIONS FOR CONSTRUCTING FABRIC ENCAPSULATED SOIL LIFTS

1. PLACE LIVE CUTTINGS ON LAYER 1 OF LOGS OR EQUIVALENT ELEVATION OF SELECTED GENERAL BACKFILL. LIVE CUTTING TO BE EMBEDDED 3FT INTO/UNDER FIRST FABRIC ENCAPSULATED SOIL LIFT.
2. UNROLL THE OUTER FABRIC (WOVEN COIR) PARALLEL TO THE LONG AXIS OF THE CHANNEL AND POSITION IT SO THAT 3 FEET EXTENDS FOR EMBEDMENT ON THE BANK SIDE OF THE STRAW BALES (FIG B), AND A MINIMUM 3 FEET EXTENDS LENGTHWISE BEYOND THE LAST STRAW BALE FOR OVERLAP. DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE STRAW BALES ON THE STREAM SIDE (FIG B).
3. UNROLL THE INNER FABRIC (NON-WOVEN COIR) OVER THE TOP OF THE OUTER FABRIC AND POSITION IT SO THAT AT LEAST 1 FOOT OF THE INNER FABRIC EXTENDS AS AN EMBEDMENT LENGTH ON THE BANK SIDE OF THE STRAW BALES (FIG C). DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE BALES ON THE STREAM SIDE AND ALIGN THE LONG EDGES OF THE INNER AND OUTER FABRICS. STRETCH AND PULL THE FABRIC LAYERS TO REMOVE WRINKLES.
4. APPLY SEED TO VERTICAL FACE OF FABRIC ENCAPSULATED SOIL LIFT. PLACE SELECTED GENERAL BACKFILL OVER THE FABRIC ON THE BANK SIDE OF THE STRAW BALES TO A MAXIMUM COMPACTED DEPTH OF 18 INCHES. TAMP WITH BUCKET OF EXCAVATOR.
5. APPLY SEED MIX TO SELECTED GENERAL BACKFILL AND BENEATH ALL EXPOSED SURFACES.
6. FOLD THE LOOSE ENDS OF THE TWO FABRIC LAYERS BACK OVER THE COMPACTED FILL MATERIAL AND STRETCH TIGHTLY TO REMOVE WRINKLES (FIG E). SECURE WITH WOODEN STAKES.
7. REMOVE STRAW BALES. NOTE, STRAW BALES CAN BE REMOVED BY HAND, CONTRACTOR SHALL NOT USE EQUIPMENT TO REMOVE STRAW BALES.
8. PLACE LIVE CUTTINGS AND 3" OF TOPSOIL ON LIFT (FIG F). REPEAT STEPS 2–6 TO FULL BANK HEIGHT (FIG G) LAYING BACK LIFTS AT AN AVERAGE 3:1 SLOPE.
9. ON THE TOP LIFT, EXCAVATE A KEY TRENCH 1' WIDE AND 0.75' DEEP ALONG THE EDGE OF THE OUTER FABRIC LAYER, PARALLEL TO THE STRAW BALES. SECURE FABRIC IN THE KEY TRENCH WITH WOODEN STAKES.
10. BACKFILL & COMPACT THE KEY TRENCH WITH NATIVE FINES AND CONTINUE TO APPLY TOPSOIL TO SMOOTHLY MERGE WITH EXISTING CONTOURS.

1 / CD03 TYPICAL DETAIL – FABRIC ENCAPSULATED SOIL (FES) LIFT SEQUENCING

NOT TO SCALE

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DETAILS FOR FABRIC ENCAPSULATED SOIL LIFTS

1/4 SECTION
JOB NO. E10996
SHEET NO. CD03
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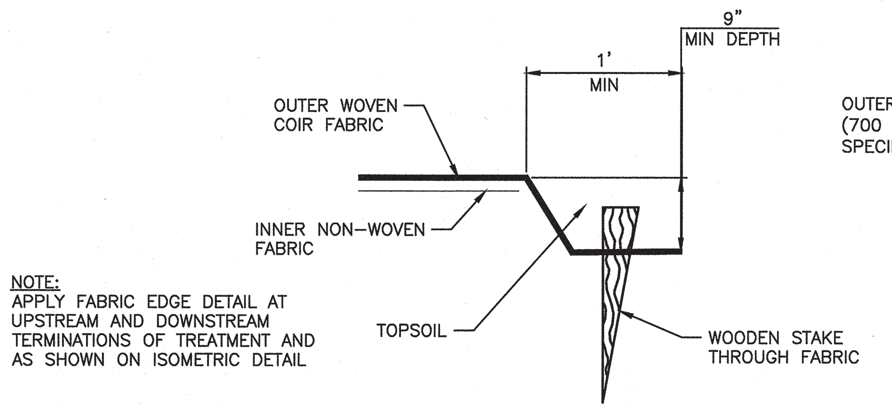
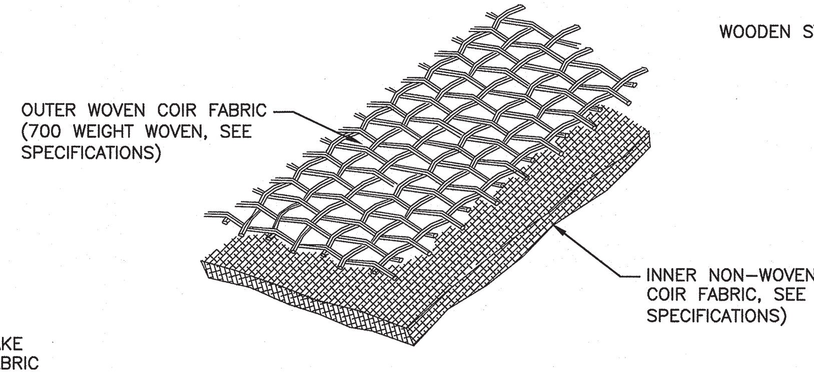
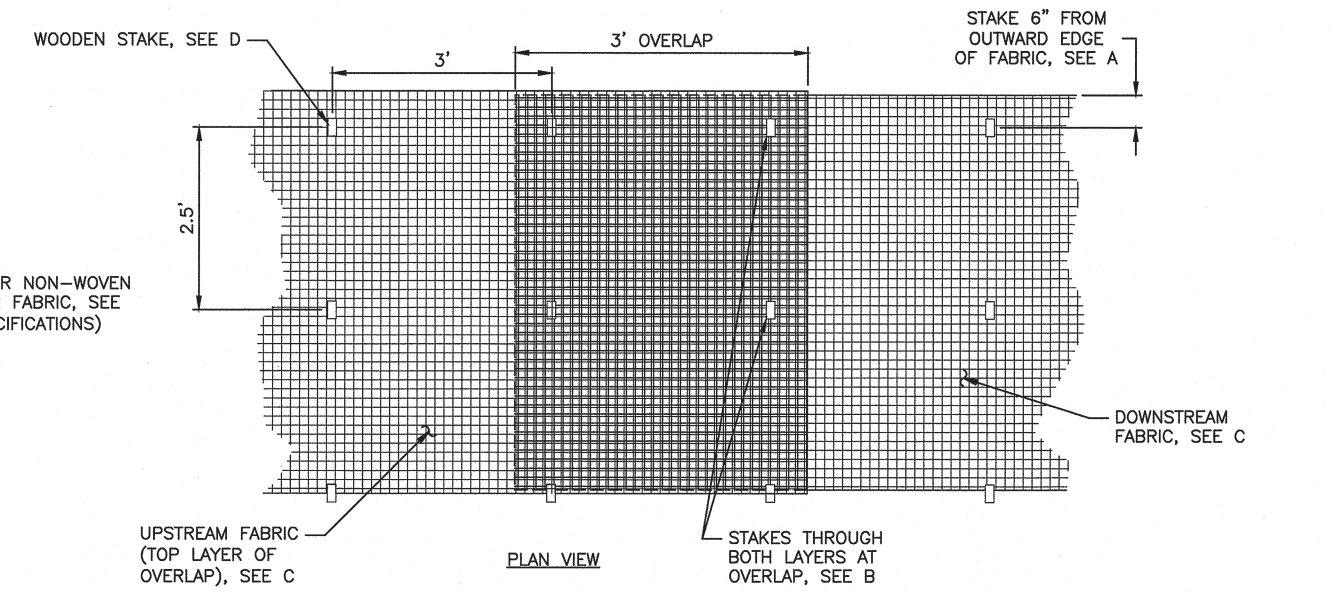


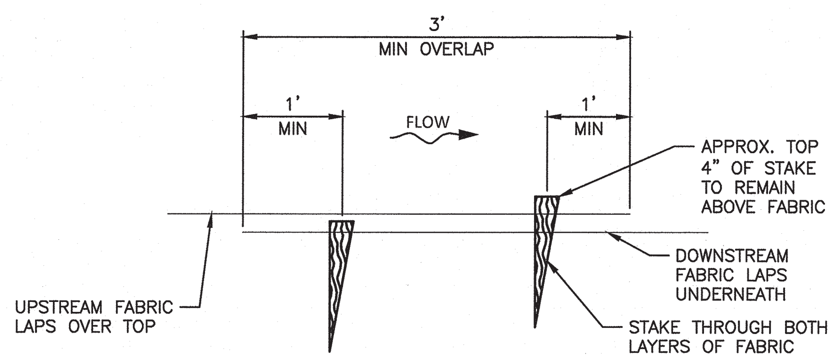
A. FABRIC EDGE



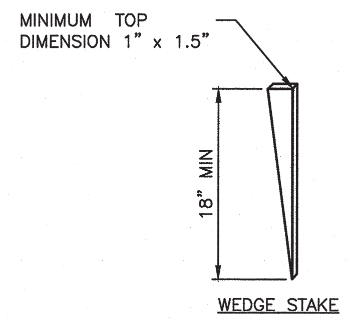
C. FABRIC LAYERING



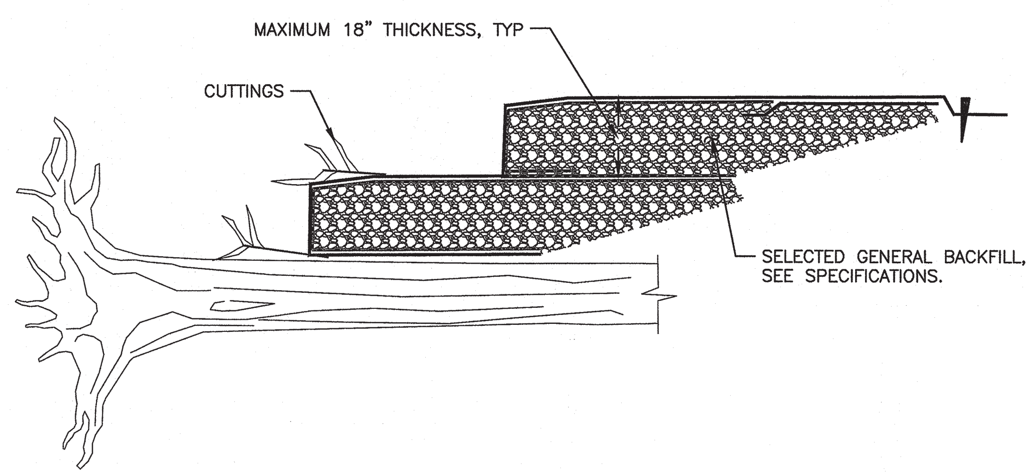
E. STREAMBANK CONSTRUCTION FABRIC



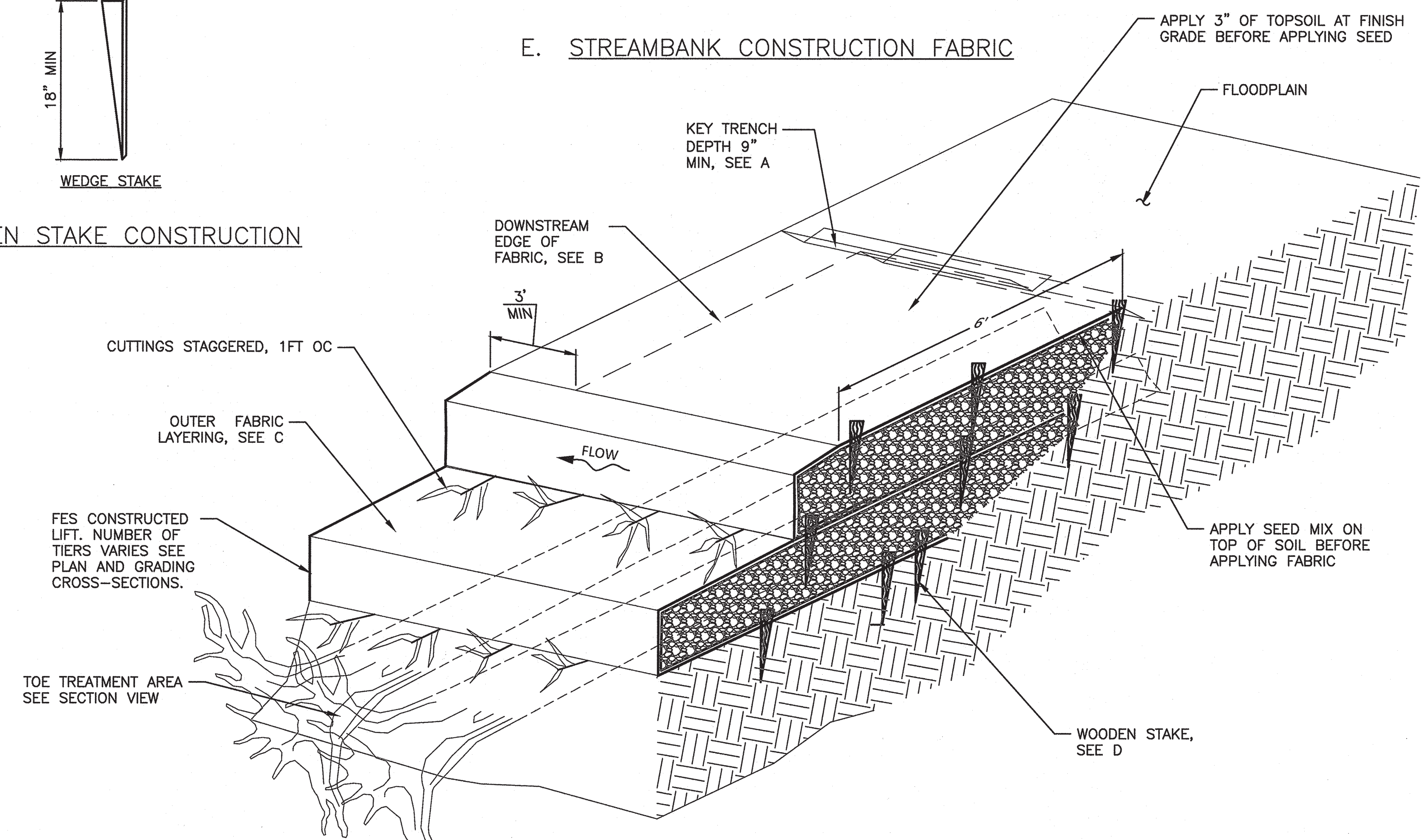
B. FABRIC OVERLAP



D. WOODEN STAKE CONSTRUCTION



SECTION: FES CONSTRUCTED LIFT



ISOMETRIC: FES CONSTRUCTED LIFT

1/CD04 TYPICAL DETAIL – FABRIC ENCAPSULATED SOIL (FES) LIFT

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DETAILS FOR FABRIC ENCAPSULATED SOIL LIFTS

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SHEET NO. CD04
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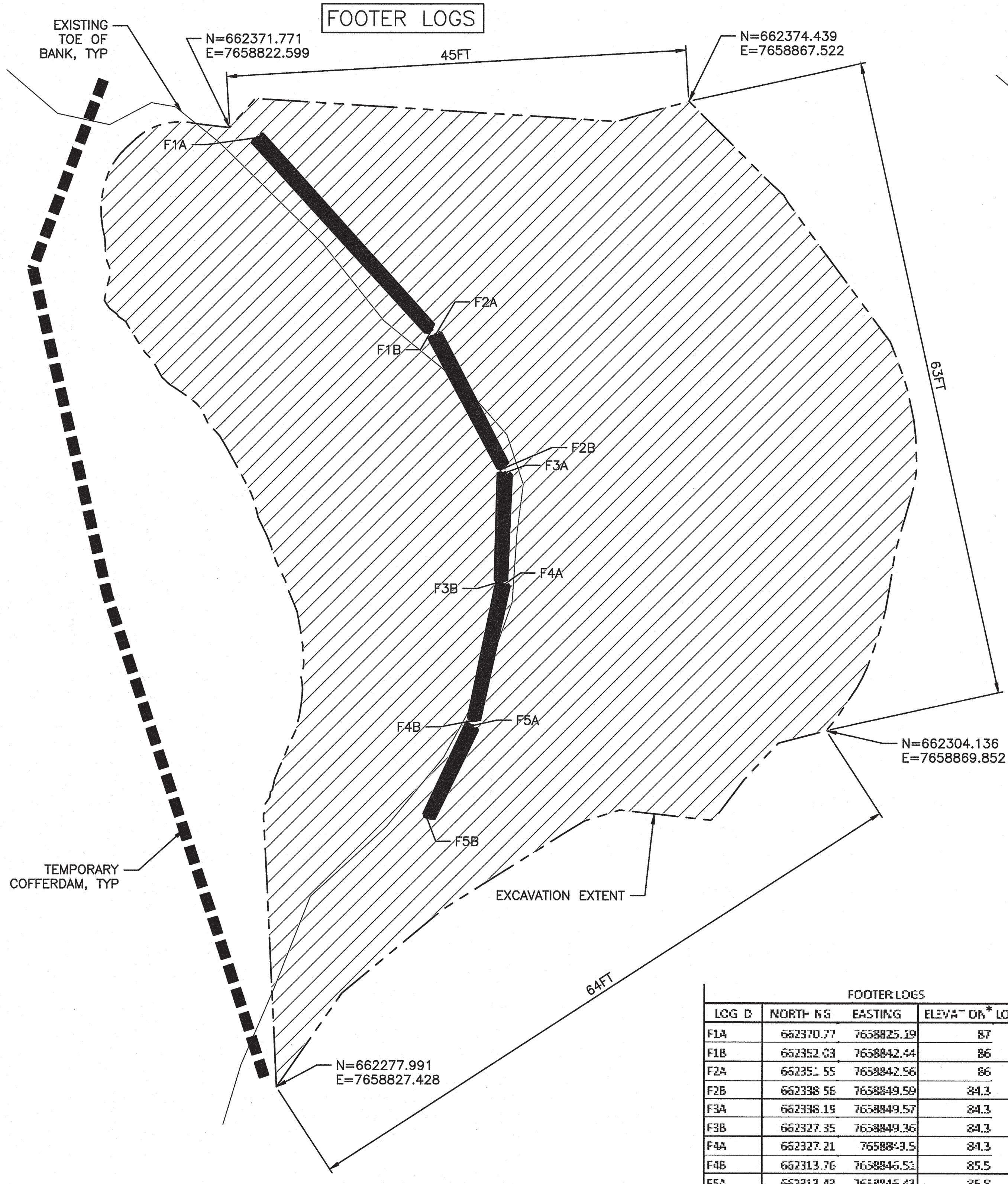
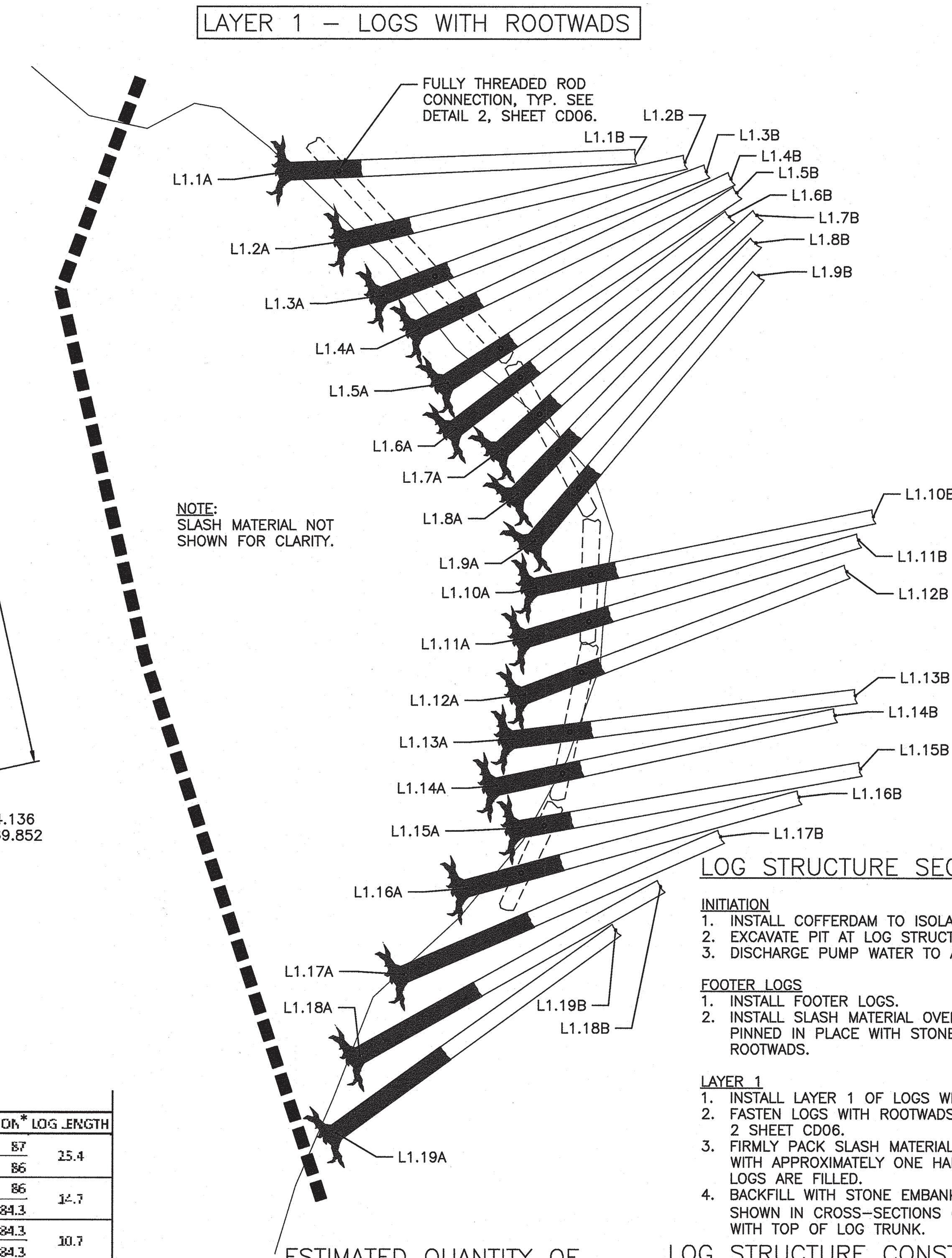


FOOTER LOGS				
LOG ID	NORTHING	EASTING	ELEVATION*	LOG LENGTH
F1A	662370.77	7658825.19	87	25.4
F1B	662352.03	7658842.44	86	
F2A	662351.55	7658842.56	86	14.7
F2B	662338.56	7658849.59	84.3	
F3A	662338.19	7658849.57	84.3	10.7
F3B	662327.35	7658849.36	84.3	
F4A	662327.21	7658843.5	84.3	13.8
F4B	662313.76	7658846.51	85.5	
F5A	662313.43	7658846.43	85.8	
F5B	662304.23	7658842.18	85.6	10

*ELEVATION REFERS TO BOTTOM OF LOG

(1/CD05) LOG STRUCTURE SEQUENCING (1 OF 2)
NOT TO SCALE



LAYER 1 LARGE WOOD				
LOG ID	FOOTER LOG ID	NORTHING	EASTING	ELEVATION*
L1.1A	F1	662368.49	7658823.36	88
L1.1B	NA	662369.69	7658853.31	88
L1.2A	F1	662362.14	7658828.49	88
L1.2B	NA	662369.23	7658857.41	87.8
L1.3A	F1	662357.57	7658831.47	87.9
L1.3B	NA	662368.37	7658859.5	87.9
L1.4A	F1	662354.77	7658834.72	87.2
L1.4B	NA	662367.74	7658861.67	87.9
L1.5A	F1	662350.04	7658837.17	87
L1.5B	NA	662366.49	7658862.15	87.5
L1.6A	F2	662345.92	7658837.82	87
L1.6B	NA	662364.38	7658861.52	87
L1.7A	F2	662344.17	7658841.9	86.4
L1.7B	NA	662364.51	7658863.95	87
L1.8A	F2	662340.41	7658843.27	85.3
L1.8B	NA	662362.15	7658863.81	87
L1.9A	F2	662336.31	7658844.61	85.3
L1.9B	NA	662359.28	7658863.97	87
L1.10A	F3	662332.26	7658844.86	85.3
L1.10B	NA	662338.39	7658874.09	85.3
L1.11A	F3	662327.85	7658844.09	85.3
L1.11B	NA	662336.36	7658872.79	85.3
L1.12A	F4	662322.95	7658843.87	85.3
L1.12B	NA	662333.59	7658871.74	85.3
L1.13A	F4	662318.61	7658842.89	85.3
L1.13B	NA	662322.79	7658872.57	85.3
L1.14A	F4	662314.99	7658841.46	85.3
L1.14B	NA	662321.15	7658870.8	85.3
L1.15A	F5	662311.25	7658843.66	87.6
L1.15B	NA	662316.48	7658872.96	87
L1.16A	F5	662306.11	7658838.79	87.6
L1.16B	NA	662313.91	7658867.78	87
L1.17A	NA	662298.57	7658833.43	88.4
L1.17B	NA	662310.58	7658860.91	87
L1.18A	NA	662291.45	7658829.5	88.7
L1.18B	NA	662306.16	7658855.7	87.3
L1.19A	NA	662284.79	7658827.56	88.8
L1.19B	NA	662302.42	7658851.81	87.7

*ELEVATION REFERS TO BOTTOM OF LOG

LOG STRUCTURE SEQUENCING

INITIATION
1. INSTALL COFFERDAM TO ISOLATE SITE, SEE DETAIL 2 SHEET CD01.
2. EXCAVATE PIT AT LOG STRUCTURE EXTENTS, AND POOL IN CHANNEL, AS PER PLANS.
3. DISCHARGE PUMP WATER TO APPROVED LOCATION.

FOOTER LOGS
1. INSTALL FOOTER LOGS.
2. INSTALL SLASH MATERIAL OVER FOOTER LOG, EXTENDING OUT INTO THE CHANNEL, TO BE PINNED IN PLACE WITH STONE EMBANKMENT MATERIAL AND LAYER 1 LOGS WITH ROOTWADS.

LAYER 1
1. INSTALL LAYER 1 OF LOGS WITH ROOTWADS.
2. FASTEN LOGS WITH ROOTWADS TO FOOTER LOGS WITH FULLY THREADED RODS, SEE DETAIL 2 SHEET CD06.
3. FIRMLY PACK SLASH MATERIAL BETWEEN EACH LOG, DISTRIBUTED EVENLY ACROSS THE PIT, WITH APPROXIMATELY ONE HALF OF SLASH EXPOSED. ENSURE VOID SPACES BETWEEN LOGS ARE FILLED.
4. BACKFILL WITH STONE EMBANKMENT MATERIAL AND SELECTED GENERAL BACKFILL AS SHOWN IN CROSS-SECTIONS (SEE SHEETS C03 & C04) UNTIL TOP OF FILL IS LEVEL WITH TOP OF LOG TRUNK.

ESTIMATED QUANTITY OF INSTALLED SLASH PER LAYER

SLASH	QUANTITY	UNITS
LAYER 1	20	CY
LAYER 2	10	CY

NOTE:
1. SEE SPECIFICATIONS FOR SLASH REQUIREMENTS

LOG STRUCTURE CONSTRUCTION GUIDANCE

1. ALL LAYER 1 & 2 LOGS TO BE BURIED BACK INTO BANK A MINIMUM OF 20 FEET OF LOG LENGTH, UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
2. CONTINUE PLACING LOGS AS SHOWN OR UNTIL THE LATERAL EXTENT OF THE PIT IS FULL.
3. CONTINUE PLACING LOGS VERTICALLY AS SHOW, UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE. TOP LAYER OF LOGS TO HAVE A MINIMUM OF 3 FEET OF FABRIC ENCAPSULATED SOILS LIFTS AND/OR BACKFILL OVERBURDEN.
4. ALL LOGS MUST HAVE 2 FULLY THREADED ROD CONNECTIONS TO SEPARATE LOGS. UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
5. CONNECTIONS ARE EXPECTED TO BE VERTICAL CONNECTIONS TO PRECEDING LAYERS. UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.

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NO.	DATE	DESCRIPTION	APPD.
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FINAL MAP DATA
DRAWING NAME: IFI_JohnsonCreekOxbow_BES_Construction.dwg

DESIGNED BY / DATE APPD. 3-22-18 / DRAWN BY NS / PROGRAM MGR. / CHECKED BY / CONST. MGR. / DESIGN MGR.

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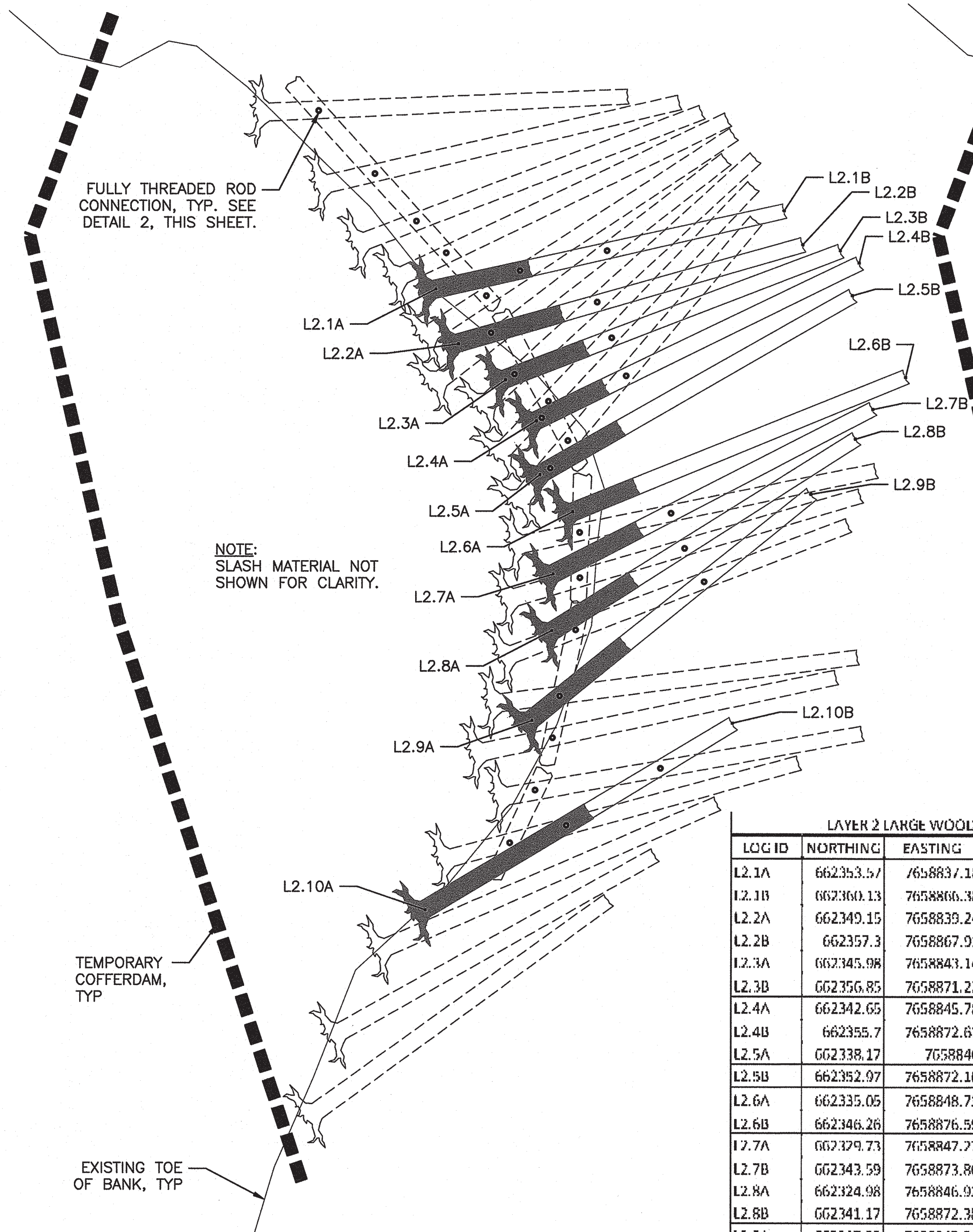
REGISTERED PROFESSIONAL ENGINEER
OREGON
FEB 3, 1997
WILLIAM P. NORRIS
Expires: 12-31-18

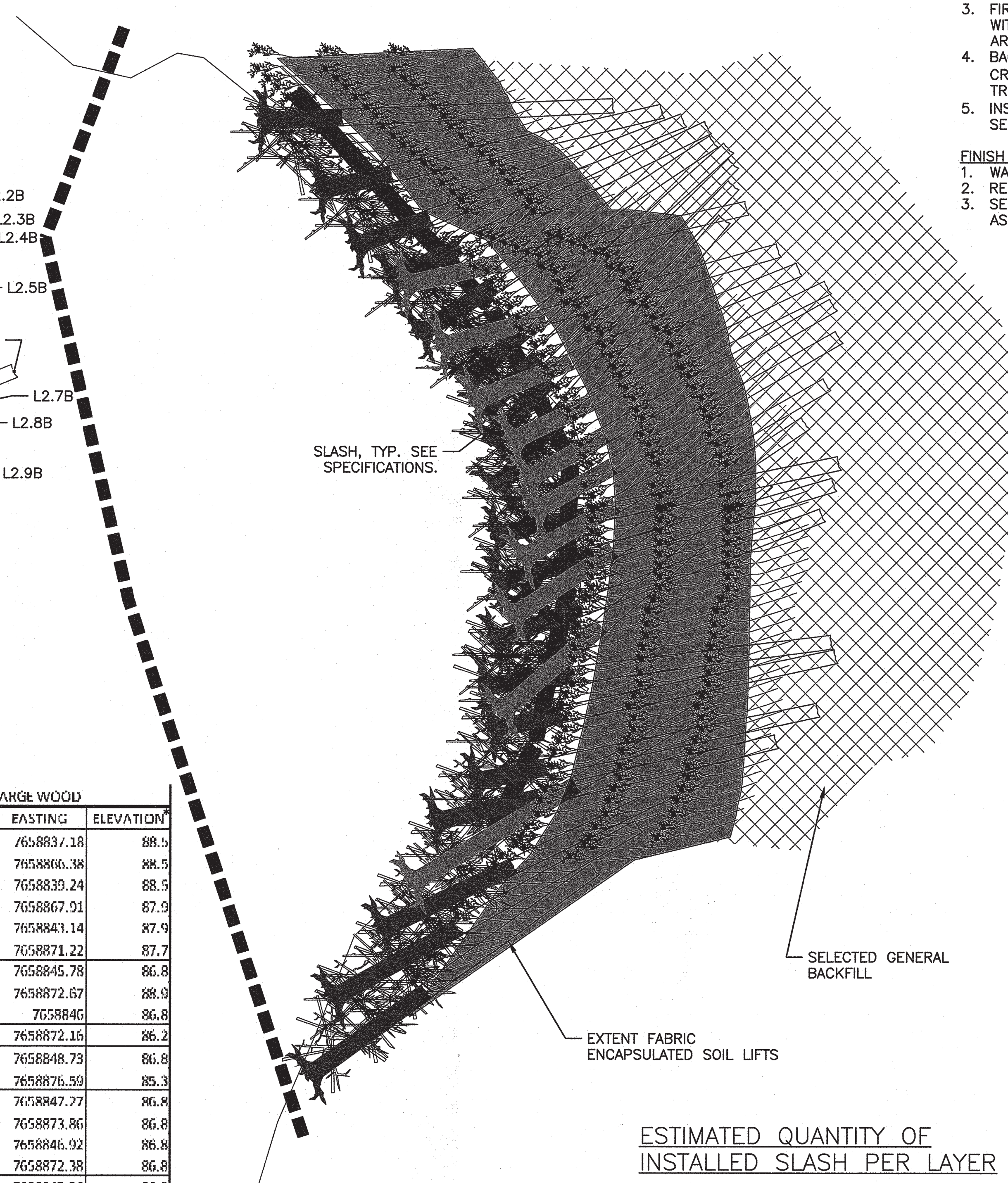
JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
LOG STRUCTURE SEQUENCING

1/4 SECTION
JOB NO. E10996
SHEET NO. CD05
12 OF 14

LAYER 2 – LOGS WITH ROOTWADS



COMPLETED LOG STRUCTURE



LAYER 2 LARGE WOOD

LOG ID	NORTHING	EASTING	ELEVATION*
L2.1A	662353.57	7658837.18	88.5
L2.1B	662360.13	7658866.38	88.5
L2.2A	662349.15	7658839.24	88.5
L2.2B	662357.3	7658867.91	87.9
L2.3A	662345.98	7658843.14	87.9
L2.3B	662356.85	7658871.22	87.7
L2.4A	662342.65	7658845.78	86.8
L2.4B	662355.7	7658872.67	88.9
L2.5A	662338.17	7658846	86.8
L2.5B	662352.97	7658872.16	86.2
L2.6A	662335.05	7658848.73	86.8
L2.6B	662346.26	7658876.59	85.3
L2.7A	662329.73	7658847.27	86.8
L2.7B	662343.59	7658873.86	86.8
L2.8A	662324.98	7658846.92	86.8
L2.8B	662341.17	7658872.38	86.8
L2.9A	662317.55	7658845.36	86.8
L2.9B	662336.49	7658868.7	86.8
L2.10A	662301.86	7658836.46	89.9
L2.10B	662317.23	7658862.22	87.4

* ELEVATION REFERS TO BOTTOM OF LOG

1 / CD06 LOG STRUCTURE SEQUENCING (2 OF 2)
NOT TO SCALE

LOG STRUCTURE SEQUENCING

LAYER 2
1. INSTALL LAYER 2 OF LOGS WITH ROOTWADS.
2. FASTEN LOGS WITH FULLY THREADED RODS, SEE DETAIL 2 THIS SHEET.
3. FIRMLY PACK SLASH MATERIAL BETWEEN EACH LOG, DISTRIBUTED EVENLY ACROSS THE PIT WITH APPROXIMATELY ONE HALF OF SLASH EXPOSED. ENSURE VOID SPACES BETWEEN LOGS ARE FILLED.
4. BACKFILL WITH STONE EMBANKMENT MATERIAL AND SELECTED GENERAL BACKFILL AS SHOWN IN CROSS–SECTIONS (SEE SHEETS C03 & C04) UNTIL TOP OF FILL IS LEVEL WITH TOP OF LOG TRUNK.
5. INSTALL FABRIC ENCAPSULATED SOIL LIFTS (SEE SHEETS CD03 & CD04) AND/OR PLACE SELECTED GENERAL BACKFILL TO FINISH GRADE, AS PER SPECIFICATIONS AND SECTIONS.

FINISH WORK
1. WAIT UNTIL TURBIDITY LEVELS MATCH STREAM BACKGROUND PRIOR TO REMOVING COFFERDAM.
2. REMOVE COFFERDAM.
3. SEED AND MULCH. USE STRAW BALES FROM FABRIC ENCAPSULATED SOIL LIFT CONSTRUCTION AS MULCH.

LOG STRUCTURE CONSTRUCTION GUIDANCE

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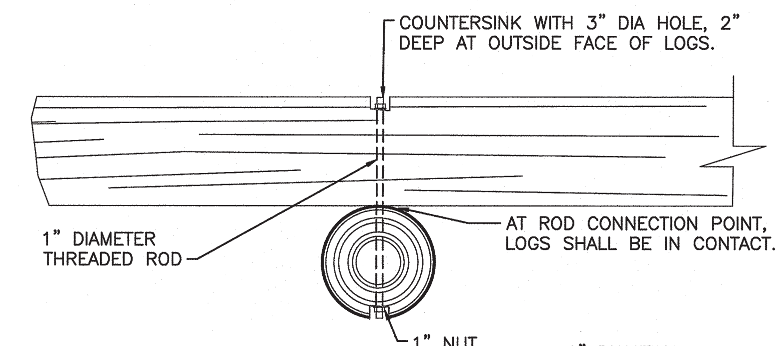
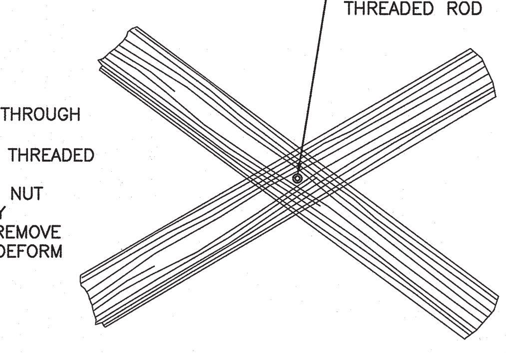
3. CONTINUE PLACING LOGS VERTICALLY AS SHOWN, UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE. TOP LAYER OF LOGS TO HAVE A MINIMUM OF 3 FEET OF FABRIC ENCAPSULATED SOILS LIFTS AND/OR BACKFILL OVERBURDEN.
4. ALL LOGS MUST HAVE 2 FULLY THREADED ROD CONNECTIONS TO SEPARATE LOGS UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
5. CONNECTIONS ARE EXPECTED TO BE VERTICAL CONNECTIONS TO PRECEDING LAYERS UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
6. IF ROOTWADS ARE TOUCHING OR KNOCKING, STAGGER LENGTH SO THAT THE FULL ROOTWAD FITS.

ESTIMATED QUANTITY OF INSTALLED SLASH PER LAYER

SLASH	QUANTITY	UNITS
LAYER 1	20	CY
LAYER 2	10	CY

NOTE:
1. SEE SPECIFICATIONS FOR SLASH REQUIREMENTS





NOTES:
1. INSTALL LOG LAYERS
2. DRILL 1–1/8" HOLE THROUGH LARGE WOOD
3. INSERT 1" DIA FULLY THREADED ROD
4. INSTALL WASHER AND NUT
5. PEEN ENDS OF FULLY THREADED ROD TO REMOVE SHARP EDGES AND DEFORM THREADS

2 / CD06 TYPICAL DETAIL – FULLY THREADED ROD ATTACHMENT
NOT TO SCALE

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FINAL MAP DATA
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DESIGNED BY: WPN DATE APPD.: 3-22-18
DRAWN BY: NS PROGRAM MGR.
CHECKED BY: EA CONST. MGR.: LM
DESIGN MGR.: SMB LWH

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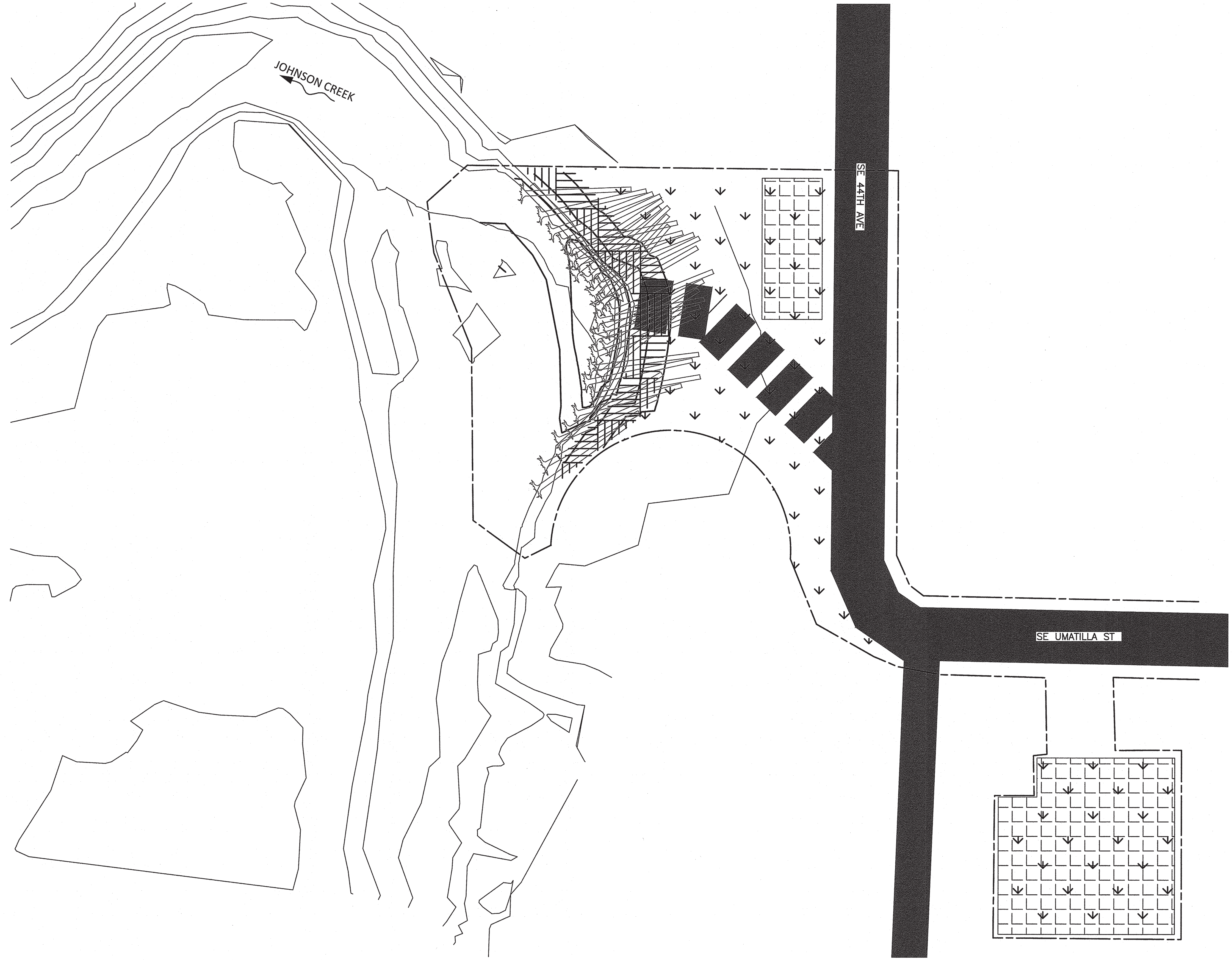
OREGON
FEB. 3, 1997
WILLIAM P. NORRIS
Expires: 12-31-18

JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT
LOG STRUCTURE SEQUENCING

1/4 SECTION
JOB NO. E10996
SHEET NO. CD06
13 OF 14



SCALE

15 0 15 30

SCALE FEET

LEGEND:

- TEMPORARY ACCESS
- TEMPORARY STAGING AREA
- FABRIC ENCAPSULATED SOIL LIFTS WITH NATIVE SEED
- TOPSOIL, NATIVE SEED, AND STRAW MULCH AREA
- WORK LIMITS
- EXISTING CONTOURS (2FT)
- PROPOSED CONTOURS (2FT)
- PROPOSED LOG WITH ROOTWAD PLACEMENT
- PROPOSED FOOTER LOG PLACEMENT

NOTE:
NATIVE HERBACEOUS SEED TO BE APPLIED TO ALL DISTURBED AREAS. (SEED IS OWNER–PROVIDED, CONTRACTOR APPLIED.)

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DATE APPD. 3-22-18
DRAWN BY NS
PROGRAM MGR.
CHECKED BY
CONST. MGR. LM
DESIGN MGR. SMB
LMA

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JOHNSON CREEK OXBOW
SCOUR REPAIR PROJECT

PERMANENT EROSION CONTROL PLAN

1/4 SECTION
JOB NO. E10996
SHEET NO. L01
14 OF 14

Appendix 2

Field Notes Logs

FIELD NOTES

Date:________________________________ Project Name:__________________________________
Weather:_____________________________ Project Number:________________________________

Location of Fieldwork:____
____

Field Staff:____
____

Sample Collection Start Time:_____________ Sample Collection Completion Time:________________

Sample Location 1: ____
Sample Location 1 Name: ____
Description of Sample:____
____
____

Sample Location 2: ____
Sample Location 2 Name: ____
Description of Sample:____
____
____

Sample Location 3: ____
Sample Location 3 Name: ____
Description of Sample:____
____
____

Sample Location 4: ____
Sample Location 4 Name:____
Description of Sample:____
____
____

Deviations from approved sampling plan, or other issues encountered:
____
____
____
____

Additional Notes:
____
____
____
____

DAILY FIELDWORK REPORT

Date: ____________ **Job No.**__________

Job Name:______________________________ **Prime Contractor:**____________________

Inspection Staff Assigned to Job:____

____

Summary of Work Completed:____

____

____

____

____

____

____

____

Schedule Issues:____

____

____

On-Site Problems:____

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Other Issues:

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