City of Springfield
Development and Public Works Department

Authorized by: [signature]
Title: Managing Civil Engineer
Date: 6/6/2015

June 16, 2015

Addendum Number 1 to the Contract Documents for the Invitation to Bid for P21052; Springfield Mill Race Stormwater Facility, Booth Kelly Trailhead and Mill Race Path

The City of Springfield is amending the above mentioned Invitation to Bid issued on June 10, 2015. This Addendum is hereby made a part of the original contract documents to the same extent as though it were originally included therein.

1.) The Bid Submittal document is deleted in its entirety and replaced with a revised version of the Bid Submittal with a Revision date of 06/16/15. See Attachment 1 to this Addendum.

2.) The Contaminated Media Management Plan is added. See Attachment 2 to this Addendum.

3.) The Army Corp of Engineers Permit is added. See Attachment 3 to this Addendum.

4.) The Department of State Lands Permit is added. See Attachment 4 to this Addendum.

5.) The Geotechnical Report for the Pedestrian Bridge and Mill Race Path is added. See Attachment 5 to this Addendum.

6.) The Geotechnical Engineering Report for the Springfield Mill Race Stormwater Facility is added. See Attachment 6 to this Addendum.

In the event that it is necessary to further amend, revise or supplement any part this Invitation to Bid additional addenda will be posted on the City's website at http://www.springfield-or.gov/dpw/P21052MillRaceTrailHead.htm.

The City shall make a reasonable effort to notify all individuals, firms, and corporations that have purchased a Bid Book and those individuals that attended a Pre-Bid meeting and provided a valid e-mail address on the sign-in sheet when addenda are issued. Failure of the Contractor to receive or obtain such addenda shall not excuse them from compliance, if they are awarded the Contract. The City is not responsible for any explanation, clarification, interpretation or approval made or given in any manner except by written addenda issued by City.

All Addenda issued are considered to be part of the specifications of the Invitation to Bid and, as such, are incorporated into the Contract as specified in Section 104.02 of the Standard Construction Specifications.

By signing below, I acknowledge the receipt of the following Addenda documents and certify that the specifications contained have been considered and incorporated into the bid as presented. No other terms or conditions of the Invitation to Bid are changed as a result of this addendum.

ALL BIDDERS MUST ACKNOWLEDGE THIS ADDENDUM BY SIGNING AND DATING THIS DOCUMENT AND INCLUDING IT AS PART OF THEIR SUBMITTAL PACKAGE.

_____ _____

Signature Date

City of Springfield
225 Fifth Street
Springfield, OR 97477

Bid Submittal Revised 06/16/15

Project No. P21052
Project Title: Springfield Mill Race Stormwater Facility, Booth Kelly Trailhead and Mill Race Path

The lowest responsive bidder shall be determined based on the combined totals of Schedules A and B. However, should the City determine it is not in the best interest of the City to award Schedule B, the lowest responsive bidder shall be determined based on the total of Schedule A.

Bid Items:

Item No.	Description	Specification Number	Approx. Quantity	Per	Unit Price	Total Price Extension
Schedule A						
Site Set-up and Demolition						
1	Mobilization/Demobilization	00210.90	1	LS		
2	Surveying as Specified	00330.95	1	LS		
3	Traffic Control Measures	00225.90	1	LS		
4	Construction Entrance/Tire Wash/Concrete Wash	00280.90	1	LS		
5	Staked Turbidity Barrier	00280.90	250	LF		
6	Compost Filter Berm	00280.90	4,800	LF		
7	Clearing and Grubbing	00320.90	1	LS		
8	Temporary Control and Diversion of Water	00290.90	1	LS		
9	Fence Removal and Relocation	00310.91	1	LS		
10	Demolition, Pipe Removal and Disposal	00310.91	1	LS		
Stormwater Facility						
11	General Excavation	00330.93	250,000	BCY		
12	Transportation and Disposal	00290.90	368,200	CY		
13	Contaminated Media Disposal	00290.90	150	TON		
14	Dewatering	00405.90	1	LS		
15	48-inch Stormwater HDPE Pipe	00445.91	120	LF		
16	10-inch Sanitary Sewer PVC Pipe	00445.91	340	LF		
17	Sanitary Sewer Manholes	00470.90	2	EA		
18	Stormwater Facility Control Structures	00470.90	1	LS		
19	RipRap Protection	00390.90	1	LS		
20	Grass Pavers	00760.90	35,000	SF		
21	Aggregate Base	00641.90	3,800	CY		
22	Asphalt Transitions – 4-inch thick	00745.90	65	TON		
Site Restoration and Plantings						
23	Permanent Seeding	01030.90	12.1	ACRE		
24	Plugs	01040.90	9,650	EA		
25	Trees	01040.90	119	E		
26	Shrubs - 1 gallon	01040.90	105	EA		
27	Imported Topsoil - 6 inch	01040.90	7,900	CY		

28	Organic Mulch: 2 inch compost	01040.90	3,200	CY		
29	Irrigation System	01120.90	1	LS		
30	Wattles	00280.90	7,000	LF		
31	Erosion Control Matting	00280.90	50,000	SY		
				Total Schedule A Bid Items		**$**
Schedule B						
Site Set-up and Demolition						
32	Mobilization/Demobilization	00210.90	1	LS		
33	Surveying as Specified	00330.95	1	LS		
34	Compost Filter Berm	00280.90	850	LF		
Trailhead and Path						
35	General Excavation	00330.93	1,800	BCY		
36	Transportation and Disposal	00290.90	2,340	CY		
37	Keystone Wall	00511.90	1	LS		
38	ConSpan Bridge and Foundations	00551.90	1	LS		
39	Railing	00587.90	1	LS		
40	Aggregate Base	00641.90	2,300	CY		
41	Asphalt Parking Lot and Path	00745.90	1,000	TON		
42	Concrete Flat Work	00756.90	1	LS		
43	Concrete Low Wall and In-Lay	00540.90	1	LS		
44	4-inch Sanitary Sewer PVC Pipe	00445.91	45	LF		
45	8-inch Stormwater PVC Pipe	00445.91	100	LF		
46	Stormwater Manhole	00470.90	1	EA		
47	Water Utility	01140.90	1	LS		
48	Telecom Utility	00960.90	1	LS		
49	Electrical and Lighting	00960.90	1	LS		
50	Bollard	00815.90	2	EA		
51	Bollard Boulders and Boulders	00815.90	1	LS		
52	Pavement Markings	00860.90	1	LS		
53	Signs	00940.90	1	LS		
Furnishings and Amenities						
54	Restroom	01095.90	1	LS		
55	Kiosk	01095.90	1	LS		
56	Bench	01095.90	4	EA		
57	Picnic Table	01095.90	2	EA		
58	Bike Rack	01095.90	4	EA		
59	Receptacles	01095.90	2	EA		
60	Security Camera	01095.90	2	EA		
Site Restoration and Plantings						
61	Permanent Seeding	01030.90	0.36	ACRE		
62	Rain Garden	01040.90	1	LS		
63	Rain Garden Planting	01040.90	1	LS		
64	Perennials	01040.90	203	EA		
65	Trees	01040.90	18	EA		
66	Shrubs - 1 gallon	01040.90	59	EA		
67	Shrubs - 2 gallon	01040.90	40	EA		

68	Shrubs - 3 gallon	01040.90	28	EA		
69	Imported Topsoil - 6 inch	01040.90	450	CY		
70	Organic Mulch: 2 inch compost	01040.90	150	CY		
71	Irrigation System	01120.90	1	LS		
					Total Schedule B Bid Items	**$**
					Total of Schedule A and Schedule B Combined:	**$**

Terms, Declarations and Bid Submittal

Bidder's Understanding

Bidders shall determine for themselves all the conditions and circumstances affecting the projected cost of the proposed work by personal examination of the site, Contract documents, and by such other means they may deem to be necessary. It is understood and agreed that in the event the City has obtained information from data at hand regarding underground or other conditions or obstructions depicted in the Contract documents, there is no expressed or implied agreement that such conditions are fully or correctly shown, and the Bidder must take into consideration the possibility that conditions affecting the cost or quantity of work may differ from those indicated.

The Bidder is familiar with and is satisfied as to all federal, state and local laws and regulations that may affect cost, progress, and performance of the work.

Bid

The undersigned Bidder having examined the Specifications and Contractual Documents and having satisfied themselves as to all conditions to be encountered, hereby proposes to furnish all labor, material and equipment and perform all work necessary to complete Project No P21052 in accordance with this bid, the Contract Plans, City of Springfield Standard Construction Specifications, 1994 Edition, and all subsequent modifications, the 2015 Oregon Standard Specifications for Construction, the Special Provisions, and all other Contractual Documents at the prices and on the terms herein contained.

The unit price bids are submitted with the understanding that the quantities stated are approximate and are given only as the basis of calculation for comparison of bids and determining that the unit prices are balanced and that final payment for all unit price bid items will be based on actual quantities.

It is understood that in the instance of a discrepancy between the unit price and the extension (total price extension) the unit price shall govern. The extension shall be determined by multiplying the unit price by the number of units (approximate quantity).

Bid Guarantee

As required by ORS 279C.365(4) each bid shall be accompanied by a Bid Bond, cash, or a certified or cashier's check written upon a bank in good standing and in a form acceptable to the City, payable to the Finance Director of the City of Springfield, Oregon, in an amount equal to at least 10 percent of the total amount of the Bid. Bid Bonds shall be issued by a surety company registered to issue bonds in the State of Oregon, and utilizing a bond form acceptable to the City. The City will accept AIA Document A310-2010. The Bid Bond may not be altered.

Such Bid Guarantee shall be forfeited and become the property of the City in case the Bidder shall fail or neglect to furnish a satisfactory Performance and/or Payment Bond issued by a viable bond company acceptable to the City as required by ORS 279C.380 and to execute the Contract within ten (10) days (Saturday, Sunday, and holidays excepted) after receiving Contract from the City for execution. For information regarding Performance and Payment Bond requirements see City of Springfield Contract document, Section 5. City Bonding.

Bid Acceptance Period

This bid will remain subject to acceptance for a period of 60 days after the bid opening, or for such longer period of time that the Bidder may agree to in writing upon request of the City.

Liquidated Damages
The City of Springfield and the Contractor agree that; (a) the amounts so fixed are reasonable forecasts of just compensation for the harm that is caused by the breach; (b) the harm that is caused by the breach is one that is incapable of or very difficult of accurate estimation; and, (c) the amount so fixed is not fixed as a penalty to coerce performance of the Contract but is rather intended to be a genuine pre-estimation of injury to the City of Springfield in lieu of performance within the contract time by the Contractor.

a. Delay
It is agreed by the City of Springfield and by the Contractor that the need exists for a damage provision in the event the Contractor fails to complete the work within the Contract time specified, or any extension thereof, by the City of Springfield. The City of Springfield and the Contractor further agree that the Contractor shall be liable to the City of Springfield for fixed, agreed and liquidated damages for each and every calendar day of delay in the amount of $1,000.00 per day in accordance with Subsection 108.07 of the Standard Construction Specifications.

b. Failure to Report Spills
The Contractor also agrees to liquidated damages in the amount of $500.00 per incident for failure to report sewage spills plus an amount sufficient to reimburse the City for any civil and administrative penalties paid by the City as a result of the Contractor's failure to report. Failure to report sewage spills may subject the City to (1) civil penalties of up to $32,500.00 per day of violation pursuant to Section 309(d) of the Clean Water Act, 33 U.S.C. § 1319(d); (2) administrative penalties of up to $11,000.00 per day for each violation, pursuant to Section 309(g) of the Clean Water Act, 33 U.S.C. § 1319(g); or (3) civil action in federal court for injunctive relief pursuant to Section 309(b) of the Clean Water Act, 33 U.S.C. § 1319(b).

Contract Time of Completion
The Contractor shall not begin work under this bid until written Notice to Proceed has been received. The Contractor shall complete all sanitary sewer modification work to be done under this contract, including the tie to the restroom facility, no later than September 30, 2015. The Contractor shall complete all work under this contract, including seeding and plant establishment, no later than December 31, 2016.

The Contractor shall apply for any extensions of time as specified in Subsection 108.06 of the Standard Construction Specifications.

Certifications
The undersigned hereby certifies that:

1.) If awarded the Contract, that they shall fully comply with all provisions regarding the prevailing wage rates as required by ORS 279C.800 to 279C.870 and/or 40 U.S.C. 2762 as applicable.

2.) The Contractor, Subcontractor, suppliers of materials or services, and others engaged by the contractors, shall comply at all times with and observe all such laws, ordinances, regulations, orders, and decrees; and shall hold harmless and indemnify the City of Springfield and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree.

3.) In accordance with ORS 279C.505, the Contractor will;

   a) Make payment promptly, as due, to all persons supplying to the Contractor labor or material for the performance of the work provided for in the Contract.

   b) Promptly pay all contributions or amounts due the State Industrial Accident Fund, or private carrier of accident insurance, from such Contractor or Subcontractor incurred in the performance of the Contract. If a private carrier is used, the Contractor shall notify the Engineer as to the carrier's name and address before commencement of work.

c) Not permit any lien or claim to be filed or prosecuted against the state or a county, school district, municipality, municipal corporation or subdivision thereof, on account of any labor or material furnished.

d) Pay to the Department of Revenue all sums withheld from employees under ORS 316.167.

e) Have an employee drug testing program in place at the time of signing the contract and will maintain such drug testing program in place over the life of the Contract.

4.) In accordance with ORS 279C.530, the Contractor will;

a) Promptly, as due, make payments to any person, co-partnership, association or corporation, furnishing medical, surgical, and hospital care or other needed care and attention, incidental to sickness or injury, to the employees of such Contractor, of all sums which the Contractor agrees to pay for such services and all monies and sums which the Contractor:

1. May or shall have deducted from the wages of his employees for such services pursuant to the terms of Oregon Revised Statutes and any contract entered in pursuant thereto; or
2. Collected or deducted from the wages of his employees pursuant to any law, contract, or agreement for the purpose of providing or paying for such service; and
3. All employers working under the Contract are either employers that will comply with ORS 656.017 or employers that are exempt under ORS 656.126.

5.) They have not, and will not, discriminate against a Subcontractor in the awarding of a subcontract because the Subcontractor is a minority, women or emerging small business enterprise certified under ORS 200.055 as required by ORS 279A.110.

6.) No Contractor, Subcontractor or any firm, corporation, partnership or association in which the Contractor or Subcontractor has a financial interest who appears on the *List of Contractors Ineligible to Receive Public Works Contracts*, as established by the Bureau of Labor and Industries, will perform work under this Contract, as specified in ORS 279C.860.

7.) No Contractor, Subcontractor or any firm, corporation, partnership or association in which the Contractor or Subcontractor has a financial interest who appears on the Construction Contractor's Board *Not Qualified to Hold Public Contracts* list, will perform work under this Contract, as specified in ORS 701.227(4).

8.) The Contractor shall have a current, valid certificate of registration issued by the Construction Contractor's Board as defined in ORS 701.005(2) and/or a valid landscape contractor's license as defined in ORS 671.520(2) by the State Landscape Contractor's Board, as applicable, in place at the time the bid is presented.

9.) All Subcontractors shall have a current, valid certificate of registration issued by the Construction Contractor's Board as defined in ORS 701.005(2) and/or a valid landscape contractors license as defined in ORS 671.520(2) by the State Landscape Contractor's Board, as applicable in place prior to performing any work under the Contract.

10.)The Contractor shall function as an independent contractor for the purposes of this Contract and shall not be considered an employee of the City of Springfield for any purpose. The Contractor shall assume sole responsibility for any debts or liabilities that may be incurred by the Contractor in fulfilling the terms of this Contract and shall be solely responsible for the payment of all federal, state, and local taxes which may accrue because of this Contract.

Bid Addenda

All Addenda issued are considered to be part of the specifications of the Invitation to Bid and, as such, are as incorporated into the Contract as specified in Section 104.02 of the Standard Construction Specifications.

By signing below, I acknowledge the receipt of the following Addenda documents and certify that the specifications contained in each have been considered and incorporated into the bid as presented. All Addenda must be included with the bid submitted.

Addenda Number	Addenda Date

Declarations

The undersigned Bidder declares that the only persons or parties interested in the bid are those named herein, that this bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the City, and that the bid is made without any connection or collusion with any person submitting another bid on this project.

I have read, fully understand, and agree that as Bidder I, and all Subcontractors, will comply with all of the terms and conditions of the contract for which this bid is presented. By signing below I attest that I am an officer or a duly authorized representative of the business listed below and that I possess the legal authority to submit this bid for consideration.

Bidder's Signature _____

Bidder's Name *(Please Print)* _____

Title _____

Business Name _____

Business Address _____

City _____ State _____ Zip _____

Phone Number _____ Cell Phone _____

E-mail Address _____ Fax Number _____

Date _____

The award of this Contract shall be made to the responsible Bidder with the lowest responsive bid.

CONTAMINATED MEDIA MANAGEMENT PLAN

Mill Race Stormwater Facility, Booth Kelly Trailhead, and Path Property

Springfield, Oregon

Prepared for:

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon 97224
(503) 639-3400

May 22, 2015

Project No. 4-61M-17901

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CONTAMINATED MEDIA MANAGEMENT PLAN
Mill Race Stormwater Facility, Booth Kelly Trailhead, and Path Property
Springfield, Oregon

1.0 INTRODUCTION

This Contaminated Media Management Plan (CMMP) has been prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), on behalf of the City of Springfield (City), for the Mill Race Stormwater Facility, Booth Kelly Trailhead, and Path Property located in Springfield, Oregon (Site) (Figure 1).

The intent of the project is to intercept and treat stormwater from the 117-acre industrial and commercial sub-basin located east and southeast of downtown Springfield. The proposed project would include public open space with natural, recreational, and historical attributes for both community education and recreation. The proposed stormwater treatment facility will involve daylighting an existing stormwater pipe and constructing a pond and swale for water quality treatment. This work will involve excavation and off-site disposal of soil.

1.1 OBJECTIVES

The purpose of this CMMP is to provide site-specific information and guidance to construction contractors that may encounter contaminated media during Site construction activities. Specifically, this document includes:

- A description of the type and magnitude of contaminants of concern detected in soil and groundwater samples previously collected at the Site (Appendix A);
- Procedures for the management of “known contaminated” or “managed as contaminated” soil;
- Procedures for the management of groundwater that may be encountered during construction activities;
- Procedures for the management of unanticipated and unknown soil contamination, should any be encountered during construction activities;
- Measures to control the Site during construction activities; and
- Measures to control the off-Site migration of contaminated soil via erosion and/or track off.

1.2 SITE LOCATION

Springfield, Oregon, is located in the southern Willamette Valley and nearby the western slopes of the Cascade Mountains. Springfield is situated in an alluvial valley created by the McKenzie River, which flows along its northern boundary before joining with the Willamette River a few miles to the northwest. The Middle Fork of the Willamette River flows to its confluence with the Coast Fork along Springfield's southern boundary. The combined forks become the main stem of the Willamette River at Springfield's southwest boundary before flowing north, defining the western city limits. The City comprises the eastern portion of the Eugene-Springfield Metropolitan Area.

The Springfield Mill Race channel intake is on the north bank of the Middle Fork of the Willamette River in Clearwater Park. From there it follows a meandering northwesterly course of approximately 3.5 miles, through natural and agricultural lands, past rural residential, urban, and industrial areas into what was once a 30-acre millpond. As it leaves the former millpond area *en route* to the main stem of the Willamette River, the Mill Race passes through the southern part of Springfield (the Booth Kelly site), only two blocks from downtown. The east-west primary arterial of State Highway 126 (Main and South A Streets) and the mainline of the Union Pacific Railroad separates the Mill Race area from the City street grid to the north (City RFP #918).

The Site comprises 14.3 acres in Sections 25 and 36 of Township 17 South, Range 3 West. The latitude and longitude of the Site are 44.04 degrees and -123.01 degrees, respectively. The Site is bordered by Union Pacific Railroad tracks on the north, Springfield Utility Board property to the west, the former Booth-Kelly log pond and Springfield Mill Race to the south, and former McKenzie Forest Products plywood mill facility to the east. The Site location is shown on Figure 1.

1.3 SITE DESCRIPTION AND HISTORY

The Springfield Mill Race waterway is part natural and part man-made, and, for over a century, the Mill Race waterway functioned as a municipal, agricultural, and industrial resource for the community. The City recognized the potential of this waterway as a community asset offering a host of economic, recreational, educational, and environmental opportunities (City RFP #918). As a result, the City has been working towards enhancement of this resource for several decades.

The Mill Race Aquatic Ecosystem Restoration project that the City implemented with the Army Corps of Engineers (USACE) was completed in spring 2013. Phase I included construction of a new Mill Race inlet from the Middle Fork of the Willamette River at Clearwater Park and riparian enhancement along the upper reach of the Mill Race. Phase II involved restoration of the former Millpond area including dam removal, re-channelizing the Mill Race, and riparian enhancement

(City RFP #918). As part of the Cooperation Agreement with the USACE, the City is obligated to ensure that clean water enters the restored Mill Race.

1.4 PREVIOUS INVESTIGATIONS AND CURRENT PROJECT STATUS

Amec Foster Wheeler reviewed two environmental reports prepared in 2003 by Omnicon Environmental Management, Elmira, Oregon. The subject property for these two reports included four tracts of land. Tract 1 consisted of a portion of the Site (Omnicon 2003a). Findings contained within the reports for the Site are summarized below. The scope and results of test pit samples from 2003 through 2014 are summarized on Tables 1 and 2 in Appendix A.

1.4.1 Environmental Review Report

The Environmental Review Report, dated June 27, 2003 (Omnicon 2003a), identified the following potential environmental concerns for the Site.

1. An electric powerhouse facility associated with the Mill Race dam was located near the western boundary of the Site. Electrical equipment associated with the powerhouse likely contained polychlorinated biphenyl (PCB) dielectric fluids. In addition, electrical transformers belonging to the Springfield Utility Board were stored on property adjacent and west of the Site. (The Springfield Utility Board storage area is now part of the current Site for construction of the Mill Race Stormwater Facility.)
2. A wood waste/refuse “wigwam” burner was formerly located in the western portion of the Site adjacent to the Springfield Utility Board storage area. Elevated concentrations of combustion related organic chemicals and metals may have impacted soil in the burner vicinity.
3. A shingle mill and oil house were formerly located in the western portion of the Site. Milling equipment and oil storage associated with these features represent a high risk for petroleum contamination.
4. Booth-Kelly and Georgia Pacific log ponds were formerly located in the southern portion of the Site. Pond sediments reportedly were tested for metals, and no elevated metals were detected. It is possible that PCBs and petroleum hydrocarbons are present in the log pond sediments. The origin of material used to fill the former pond also is unknown. If filled with material other than “clean” soil, this could be an environmental concern.

1.4.2 Phase 2 Environmental Site Assessment Report

Phase 2 Environmental Site Assessment findings, described in a December 10, 2003, report (Omnicon 2003b), are summarized below.

- Two test pits (TP-1 and TP-2) were located in the former wigwam burner area. A black soil layer noted in TP-1 in the depth interval 1.5 to 2.5 feet below ground surface (bgs) was tested for petroleum and metals. Elevated concentrations of lead (189 milligrams per kilogram [mg/kg]) and arsenic (24.8 mg/kg) were detected in the soil sample. No petroleum hydrocarbons were detected in the black soil layer sample. As no indications of adverse impact were noted in TP 2, no soil sample collection or analysis was performed.
- Test pit TP-3 was located near the former oil house. A single soil sample collected at a depth of 2.5 feet bgs was analyzed for petroleum hydrocarbons. None were detected in the sample.
- Two test pits (TP-4 and TP-5) were located in the former shingle mill area. As no indications of adverse impact were noted in TP-4, no soil sample collection or analysis was performed. In TP-5, a single composite soil sample was collected and analyzed for metals and petroleum hydrocarbons. No elevated concentrations of metals, and no detectable levels of petroleum hydrocarbons, were detected in the soil sample.
- Two test pits (TP-6 and TP-7) were located in the former log pond area. As no indications of adverse impact were noted in either test pit, no soil sample collection or analysis was performed.

Approximate test pit locations are illustrated on Figure 2.

1.4.3 2013 Supplemental Assessment Activities

To supplement environmental assessment data collected by Omnicon, Amec Foster Wheeler excavated four test pits at the Site in April 2013. Test pit locations TP-2 and TP-4 are shown on Figure 2. Test pits were located in areas where it is anticipated that grading will be required during stormwater facility construction, and in areas not previously assessed by Omnicon. Test pits TP-1 and TP-3 were utilized to conduct infiltration tests, and test pits TP-2 and TP-4 were utilized to conduct soil and groundwater sampling and testing.

Soil type was logged in each test pit. Soil generally consisted of 4 feet (in TP-4) to 17 feet (in TP-2) of fill consisting primarily of gravel and cobbles, with assorted debris including logs and other wood debris, underlain by grey clayey silt. Soils were screened at 2- to 5-foot intervals in TP-2 and TP-4 for volatile organic compounds (VOCs) using a photoionization detector. No elevated VOC concentrations were detected in either TP-2 or TP-4. No evidence of environmental impact (such as staining or odors) was noted in any of the test pits excavated. A single soil sample and a groundwater sample were collected for laboratory analysis from test pits TP-2 and TP-4.

1.4.4 2014 Supplemental Assessment Activities

An additional nine test pits were excavated in January and June 2014 to help evaluate areas not investigated previously. Four test pits were advanced along the length of the Site, designated TP-2, TP-3, TP-5, and TP-8 on Figure 2. Five test pits were advanced on the western end of the Site in

the former Springfield Utility Board storage yard, designated SUB-1 through SUB-4 and TP-9. Discrete soil samples were collected for analysis from TP-9 at 1 to 3 feet bgs and from 8 to 9 feet bgs. In addition, a composite sample was collected from soil in test pits SUB-1 through SUB-4. These samples were analyzed for total petroleum hydrocarbons-hydrocarbon identification (TPH-HCID), VOCs, PCBs, polynuclear aromatic hydrocarbons (PAHs), and metals.

1.5 TYPE AND MAGNITUDE OF CONTAMINANTS OF CONCERN

There are no known on-going sources of contamination present at the Site. Environmental investigations were conducted as a precautionary measure to evaluate risks to human health and the environment that could have been caused by previous Site activities, and to help determine appropriate disposal options for material excavated during construction.

Results from the 2013 and 2014 test pit soil samples are summarized and compared to risk-based concentrations (RBCs), background concentrations, and Oregon Department of Environmental Quality (DEQ) Clean Fill Standards on Table 2 in Appendix A. Only one constituent, arsenic, exceeded its RBC and background concentration. This exceedance was found at TP-2 (2014). Arsenic is the only contaminant of concern (COC) identified at the Site.

Clean Fill Standards were exceeded for benzo(a)pyrene, naphthalene, arsenic, and lead. These exceedances were found at TP-1 (2003) and TP-2 (2014).

It is anticipated that the exceedances of the arsenic RBC and clean fill standards are limited in extent near the test pit locations. For planning purposes, the anticipated extent of soil exceeding these criteria at each test pit location is shown on Figure 2. Soil at these locations will require special handling as discussed in Sections 2.1.2.

Based on Site history, test pit observations, and soil analysis, it is not anticipated that Site groundwater contains contamination at concentrations above risk levels. The contractor will be required to submit a dewatering plan, including identification of the disposal facility. The contractor will be required to characterize water for disposal in accordance with the disposal facility requirements.

2.0 SOIL MANAGEMENT

To achieve the project design objectives, excavation and removal of approximately 200,000 cubic yards (CY) of soil will be required. Management of excavated soil will be based on anticipated or known degree of contamination relative to human health risk and disposal location criteria. The approach to soil management is discussed in the following sections.

Based on historical Site use, it is likely that non-soil debris will be encountered during excavation. Non-soil materials (debris, such as wood waste, logs, discarded metal, piping, concrete foundations, trash, and used tires) recovered during excavation activities will be segregated from soil suitable for fill. The debris will require disposal at a landfill or will be recycled if an appropriate and nearby facility can be identified. The City and its consultant will discuss options with the construction contractor when debris is identified and removed from the subsurface. The contractor should not dispose or transport debris without direction from the City or its consultant. Debris should be handled with safety in mind. **Should debris appear to be contaminated or to contain hazardous materials, the contractor will stop work immediately and contact the City and its consultant for further direction.**

2.1 SOIL CLASSES

This section presents a soil classification system that can be used in the field during construction excavation activities at the Site. Classification of soil into one of the three soil classes will be based on previous sampling results and field data. Soil at the Site will fall into one of the following three classes: 1) clean fill; 2) known or managed as contaminated soil; or 3) unanticipated and unknown contaminated soil.

The construction contractor performing the excavation work will conduct the initial disposal classification of soils during construction activities at the Site. The City's consultant field personnel will provide guidance on classification when questions arise and will assist the City with determining final classification, if necessary, based on analytical testing of soil samples. The City or its consultant also will be available to assist the construction contractor in determining final disposition of soil generated during construction activities.

2.1.1 Clean Fill

It is anticipated that most soil excavated during construction will be disposed as clean fill at one of two locations: 1) Delta Sand & Gravel in Eugene; and 2) Nature Conservancy site along the Middle Fork of the Willamette. The contractor will need to obtain authorization from DEQ to dispose soil at the Nature Conservancy site. Handling and disposal of this soil is discussed in Sections 2.3, 2.7, and 2.8.

Soil will be assumed clean for disposal purposes unless previously classified as known or managed as contaminated soil, or if field observations indicate classification as unanticipated and unknown contaminated soil, as specified in Sections 2.1.2 and 2.1.3.

2.1.2 Known or Managed as Contaminated Soil

Soil that has been sampled previously and is known to exceed acceptable risk levels is referred to as “known or managed as contaminated soil” throughout this document. Based on results from previous investigations, soil from 2003 TP-1 and 2014 TP-2 will require special handling. These areas have been designated on Figure 2.

2.1.3 Unanticipated and Unknown Contaminated Soil

Site soil will be classified as “unanticipated and unknown contaminated soil” if it exhibits one or more of the following characteristics: 1) an odor characteristic of light fraction petroleum hydrocarbons such as gasoline; 2) a color suggesting contamination (as opposed to natural variation in fill materials); and/or 3) a VOC vapor concentration in excess of 50 parts per million (ppm), as measured with a photoionization detector (PID) using soil sample head space. The following procedure will be utilized in taking a PID measurement of soil:

1. Place 1 to 2 cubic inches of soil in a quart-sized air-tight plastic bag;
2. Seal the bag;
3. Knead the soil for approximately 10 seconds;
4. Poke the probe end of the PID into the bag;
5. Continue to knead the soil while observing the PID readout for a period of approximately 10 seconds; and
6. Record the highest measurement observed during the 10-second period.

As discussed in Section 2.0, unanticipated and unknown contaminated soil is soil that exhibits a light petroleum fraction odor, visible discoloration, and/or a VOC vapor concentration in excess of 50 ppm measured with a PID. Any soil distinctly different in its physical characteristics also may be classified as unanticipated and unknown contaminated soil.

2.2 EXCLUSION ZONE AND DECONTAMINATION – CONTAMINATED SOIL

Before beginning excavation or grading of known or managed as contaminated soil, or if unanticipated and unknown contaminated soil is encountered, the construction contractor must establish an exclusion zone around the excavation area. Demarcation of the exclusion zone is required during the entire duration of the project to minimize access to the exclusion zone by unauthorized persons. Entrance/exit locations to the exclusion zone must be limited. The boundaries of the exclusion zone must be located wholly within the boundaries of the Site.

Equipment may move freely within the exclusion zone. Loose soil will be removed from equipment using a broom, and significant quantities of soil that adhere to equipment will be removed with hand tools between excavation areas. Washing of equipment is not required for movement of equipment within the exclusion zone. Truck loading areas should be located at the boundary of the exclusion zone, if practicable, so that trucks will not enter the exclusion zone and require decontamination. Trucks must be broom cleaned before leaving the loading area. Decontamination procedures for personnel and equipment exiting the exclusion zone must be described in the site-specific Health and Safety Plan (HASP) prepared by the construction contractor.

2.3 CONTROL OF SOIL

The construction contractor must use means and methods to prevent off-Site migration of visible or measurable soils as airborne dust, track out, or stormwater runoff. Example means and methods include:

- A water truck to wet dry soils to suppress airborne dust.
- Broom cleaning of soil from exterior of vehicles before they leave soil loading areas or the Site.
- Graveled aprons and/or a wheel wash at Site exit point(s).
- Catch basin sediment filters installed in catch basins located in streets near the Site to prevent Site soils from entering the City stormwater management system or the Mill Race.
- Silt fences or other erosion control devices to prevent Site soils suspended in stormwater from migrating off-Site.

2.4 SOIL EXCAVATION OBSERVATION AND MONITORING

The City or its consultant will provide oversight of soil excavation and grading activities on behalf of the City. Primary responsibility for soil classification lies with the construction contractor; however, the City or its consultant will assist the construction contractor should classification questions arise. Criteria to be used in evaluating soils, and the procedures to be followed based on the evaluation, are described below.

1. Criterion: Observation of unusual soil staining, odors, or oily liquids.
   Procedure: The soil will be segregated from clean fill soil and stockpiled on-Site so that it can be profiled for disposal/treatment.
2. Criterion: VOC vapor concentration in excess of 50 ppm as measured with a PID using soil sample head space. All potential unanticipated and unknown contaminated soil will be

screened using a PID. PID readings will be collected at a frequency of one reading for each of the following:

a. If visual evidence of impacted soil is noted;
b. For each change in soil type;
c. Daily during soil removal activities;
d. For every 200 linear feet of a trench line excavated; and
e. For every 250 tons of soil removed.

Procedure: If a VOC vapor concentration in excess of 50 ppm is measured, the City or its consultant will direct the construction contractor to stockpile the soil on-Site so that it can be profiled for disposal/treatment.

Any soil that meets one of the above criteria will be considered potential unanticipated and unknown contaminated soil and will be handled in accordance with the procedures described above and in Section 2.9 of this CMMP.

2.5 KNOWN OR MANAGED AS CONTAMINATED SOIL MANAGEMENT

Excavation areas with known or managed as contaminated soil are shown on Figure 2. These areas will be excavated to an approximate depth of 4 feet bgs (a minimum of 2 feet below the sample location exceeding screening values) or to groundwater (whichever is shallower), and to an approximate area 10 feet by 10 feet square around the previous test pit location. Soil from these excavations will be handled according to the following procedures.

1. Stockpile soil in areas designated by the City or its consultant.
2. Stockpile soil on plastic sheeting or tarps. Stockpiles must be covered with tarps during periods of rain, wind, or inactivity to prevent transport of soil. The edges of the tarps must be weighted down. Stockpiles must be kept neat at all times.
3. Collect soil samples for analysis required by the disposal site. Contractor should determine requirements and obtain approval for disposal prior to beginning Site construction work. Samples should be collected at a frequency specified by the disposal Site; if not specified, collect discrete samples from 5 locations for each approximately 150 CY of stockpiled soil and compile the samples for laboratory analysis. Samples should be collected from approximately 5 feet above the ground surface and a minimum of 12 inches below the stockpile surface.

2.6 UNANTICIPATED AND UNKNOWN CONTAMINATED SOIL MANAGEMENT

The contractor will follow the procedure below in response to encountering suspected unanticipated and unknown contaminated soil (as identified using the monitoring procedures described in Section 2.1.3 and Section 2.5).

1. Upon discovery of suspected unanticipated and unknown contaminated soil, immediately suspend all activities in the vicinity and notify the City and its consultant.
2. Within 4 hours of notification, the City or its consultant will evaluate whether potential unanticipated and unknown contaminated soil has been encountered. The City or its consultant may collect and analyze samples or may direct the collection and analysis of samples to complete this evaluation. The City or its consultant also may direct continued excavation and placement of excavated soil in temporary stockpiles. If it is determined, based on analytical results, that unanticipated and unknown contaminated soils have been encountered, the City will notify DEQ within 24 hours of the determination.
3. Suspect unanticipated and unknown contaminated soils must be stockpiled separately from excess known or managed as contaminated soils. Suspect unanticipated and unknown contaminated soil must be placed atop plastic sheeting (6-mil minimum) and surrounded by a berm. The stockpile must also be covered with tarps during periods of rain, wind, or inactivity to prevent soil transport. The edges of the tarps must be weighted down.
4. The stockpile must be kept neat at all times.
5. Under the direction of the City or its consultant, collect soil samples for analysis required by the disposal site. Contractor should determine requirements for disposal prior to beginning Site construction work. Samples should be collected at a frequency specified by the disposal Site; if not specified, collect discrete samples from five locations for each approximately 150 CY of stockpiled soil and compile the samples for laboratory analysis. Samples should be collected from approximately 5 feet above the ground surface and a minimum of 12 inches below the stockpile surface.

The City must approve the location of any and all suspected unanticipated and unknown contaminated soil stockpiles.

In the event that the City determines that unanticipated and unknown contaminated soil has been encountered, the construction contractor will comply with the following requirements:

1. Secure the area as necessary to restrict and protect workers and the public from exposure.

2. Modify the HASP, as necessary, to address new contaminated media concerns associated with the soil. The City or its consultant will provide unanticipated and unknown contaminated soil sampling and analysis results to assist in making appropriate document modifications. The City will approve all document modifications.
3. Do not excavate, temporarily store, manage, load, haul, or dispose of unanticipated and unknown contaminated soil until directed by the City. Once directed, perform all excavation, temporary storage, management, loading, hauling, and disposal of unanticipated and unknown contaminated soil in accordance with Sections 2.7 through 2.9 of this CMMP.
4. Until authorized by the City, do not transport unanticipated and unknown contaminated soil off-Site. The City will direct the disposal of the unanticipated and unknown contaminated soil. If the contaminated soil is a federal or state hazardous waste, the contractor will properly remove and dispose of the soil within 30 days of being directed by the City.

If underground storage tanks (USTs) are encountered, immediately inform the City, and manage according to Oregon Administrative Rules (OAR) 340-122. The construction contractor must provide complete written documentation to the City of full compliance with all applicable UST regulatory requirements.

Upon receipt of analytical results, the City or its consultant will provide direction to the construction contractor as to how-to dispose of the stockpiled soil. So as to minimize the need for disposal, such soils shall remain on-Site when doing so is consistent with DEQ regulations and when such soils can be used as part of the development of the Site.

2.7 EXCAVATION AND LOADING OF SOIL

The construction contractor must load all clean fill soil using the following procedures:

1. Notify the City or its consultant no less than 24 hours prior to beginning excavation of Site soil.
2. Use water as necessary to prevent the generation of visible dust during excavation and loading activities.
3. Maintain excavation equipment in good working order. The construction contractor must immediately clean up any contaminated soil resulting from spilled hydraulic oils or other hazardous materials.
4. Wet soils with free water will not be loaded into trucks.
5. Cover all loads prior to exiting the Site.

6. Remove soil from the exterior of each truck before the truck leaves the loading area.
7. Establish specific truck haul routes before beginning off-Site soil transport. Use on-site truck routes that minimize or prevent movement of trucks over known or managed as contaminated soils.
8. Keep loaded truck weights within acceptable limits.

The construction contractor must load all known or managed as contaminated soil, and unanticipated or unknown soil once a disposal determination has been made, using the following procedures:

1. Notify the City or its consultant no less than 24 hours prior to beginning excavation of Site soil.
2. Use water as necessary to prevent the generation of visible dust during excavation and loading activities.
3. Maintain excavation equipment in good working order. The construction contractor must immediately clean up any contaminated soil resulting from spilled hydraulic oils or other hazardous materials.
4. Locate loading areas for contaminated soil in, or at the edge of, the exclusion zone.
5. Wet soils with free water will not be loaded into trucks.
6. Load trucks in a manner that prevents the spilling, tracking, or dispersal of contaminated soils. Cover all loads prior to exiting the Site.
7. Remove soil from the exterior of each truck before the truck leaves the loading area. Place any soil collected in the loading area back into the truck.
8. Establish specific truck haul routes before beginning off-Site soil transport. Use on-site truck routes that minimize or prevent movement of trucks over known or managed as contaminated soils.
9. Keep loaded truck weights within acceptable limits.

2.8 TRANSPORTATION OF CONTAMINATED SOIL

The construction contractor must comply with any and all applicable federal, state, or local laws, codes, and ordinances that govern or regulate contaminated soil transportation. Prior to transportation, obtain all required permits and furnish all labor, materials, equipment, and incidentals required for soil transport. Ensure that all drivers hauling contaminated soil have in their

possession during hauling all applicable state and local vehicle insurance requirements, valid driver's license, and vehicle registration and license. Inform all drivers of haul vehicles of the nature of the material being hauled; the route to and from the disposal site and/or disposal staging area; applicable city street regulations and requirements; State of Oregon Department of Transportation (ODOT) codes, regulations, and requirements; and the legal maximum load limits per vehicle.

The construction contractor will ensure that the following requirements are met:

- Contaminated soil will not be spilled or tracked off Site.
- No visible or measurable airborne soil (i.e., dust) will leave the Site.
- Each truck load of contaminated soil will be covered with a well-secured tarp prior to the truck leaving the Site.
- Soil on the exterior of trucks and other equipment will be removed prior to the vehicle leaving the Site.
- Trucks will not exit the Site if liquids are draining from the load.
- The contractor must be prepared to install a liner in the trucks upon request by the City or its consultant.
- Trucks used for transportation of contaminated soil will be substance-compatible, licensed, insured, and permitted pursuant to federal, state, and local statutes, rules, regulations, and ordinances.
- Provide to the City all weigh tickets from any local scale and disposal facility within two days of disposal of contaminated soil. See Section 2.9 for more information on disposal requirements.

2.9 DISPOSAL OF SOIL AND OTHER SOLID WASTES

Prior to excavation, transportation, and disposal of contaminated soil, the construction contractor must obtain documentation from the landfill that it will accept the contaminated soil, and submit the documentation to the City or its consultant for review and approval. If necessary, and with assistance from the construction contractor, the City or its consultant will collect and test soil samples required as part of the disposal facility's approval process.

2.9.1 Clean Fill Disposal

Clean fill material excavated from the Site will be disposed at one or both of these two preferred facilities:

- Delta Sand & Gravel

- Nature Conservancy

These facilities should be able to accept soil suitable as clean fill at lower costs to the City. As discussed in Section 2.1.1, debris may also be encountered during excavation activities. Debris may not be acceptable as fill at the identified facilities and will be transported to a landfill or recycler as appropriate. Because the nature of the debris is unknown, disposal determinations will be made as needed during construction activities.

2.9.2 Contaminated Soil

Known contaminated soil will be transported to a landfill permitted to accept soil contaminated with metals and PAHs at the concentrations documented at this Site. Unanticipated and unknown contaminated soil will be characterized and an appropriate disposal facility permitted to accept the soil will be identified. Only landfills that take title to the material can be used.

The following two facilities have been identified for disposal of known contaminated soil:

- Short Mountain
- Coffin Butte

At least 14 days prior to transport of contaminated soil, the construction contractor must provide a contact name and solid waste permit number for each facility that will receive contaminated soil. The construction contractor must provide the City or its consultant at least 72 hour notice prior to initial transport of contaminated soil off the Site, and at least 48 hour notice for all subsequent soil transportation events. The City reserves the right to prohibit use of a particular disposal facility based on facility construction details and performance record.

The construction contractor must properly prepare bills of lading, or other related documents required by the solid waste disposal facility. All receipts for disposal must be submitted to the City within two days of receipt of the contaminated soil at the solid waste disposal facility.

3.0 CONTRACTOR HEALTH AND SAFETY PLAN

The contractor must develop and implement a Site-specific Worker HASP, designed to ensure compliance with all applicable worker protection regulatory requirements, including 29 Code of Federal Regulations (CFR) 1910.120, the Hazardous Waste Operations and Emergency Response (“HAZWOPER”) rule promulgated by the federal Occupational Safety and Health Administration (OSHA). The HASP must be submitted to the City at least 30 days prior to initiation of Site construction activities. The HASP will be reviewed by the City or its consultant. The City will

provide comments on the HASP within 10 working days. The contractor will then have 10 working days to revise the HASP and resubmit to the City for final review and approval.

During construction activities, the construction contractor will bear full responsibility for the implementation of its own Site-specific HASP. The City bears no responsibility whatsoever for implementation and/or monitoring compliance with the HASP.

4.0 PROJECT MANAGEMENT AND REMEDY IMPLEMENTATION OVERSIGHT

The City, or a qualified environmental consultant retained by the City, may oversee contractor construction activities at the Site that are subject to this CMMP for the purpose of monitoring contractor compliance with all CMMP requirements.

5.0 CONSTRUCTION SCHEDULE

Excavation related to Site construction is currently scheduled for August through October 2015. The remainder of the construction will resume in April or May 2016 and continue through October or November 2016.

This CMMP will be distributed to DEQ and other stakeholders prior to the start of work.

REFERENCES

AMEC Environment & Infrastructure, Inc., 2013. Springfield Mill Race Stormwater Facility Feasibility Study, Springfield, Oregon, Limited Environmental Investigation. Prepared for the City of Springfield. June 17, 2013.

AMEC Environment & Infrastructure, Inc., 2014. Soil Testing Summary, Mill Race Stormwater Facility Property. Prepared for the City of Springfield. July 10, 2014.

Omnicon, 2003a. Environmental Review, McKenzie Forest Products – Mill Race Frontage Site, Springfield, Oregon. June 27, 2003.

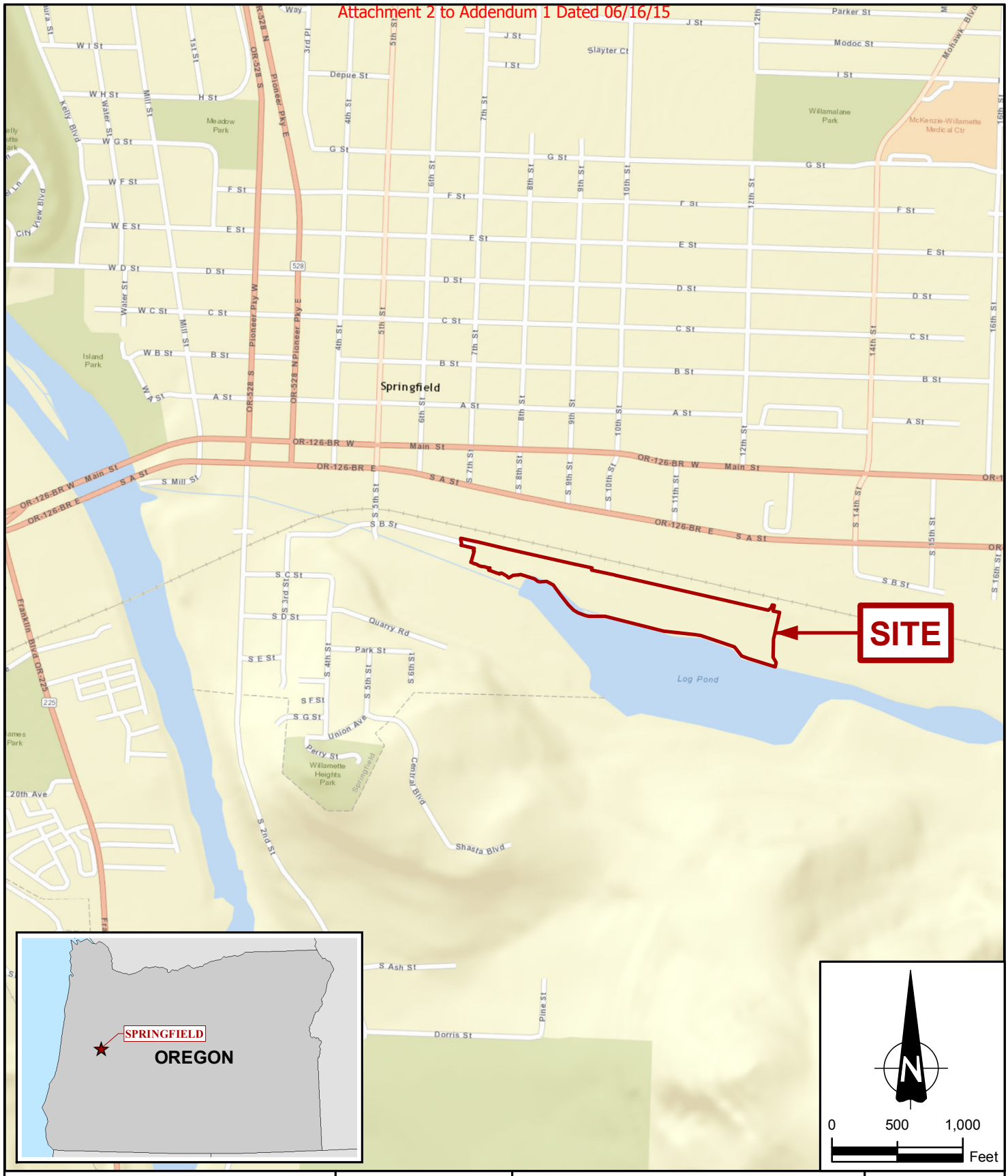
Omnicon, 2003b. Phase 2 Environmental Site Assessment, McKenzie Forest Products – Springfield Mill Race Frontage Site, Springfield, Oregon. December 10, 2003, plus Supplement to Phase 2 Environmental Site Assessment, Springfield Mill Race Frontage Parcels, dated March 1, 2004.

LIMITATIONS

This report was prepared exclusively for the City of Springfield by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Amec Foster Wheeler services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Contaminated Media Management Plan is intended to be used by the City of Springfield for the Site located at 510 NW 3rd Avenue in Springfield Oregon, only, subject to the terms and conditions of its contract with Amec Foster Wheeler. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

FIGURES

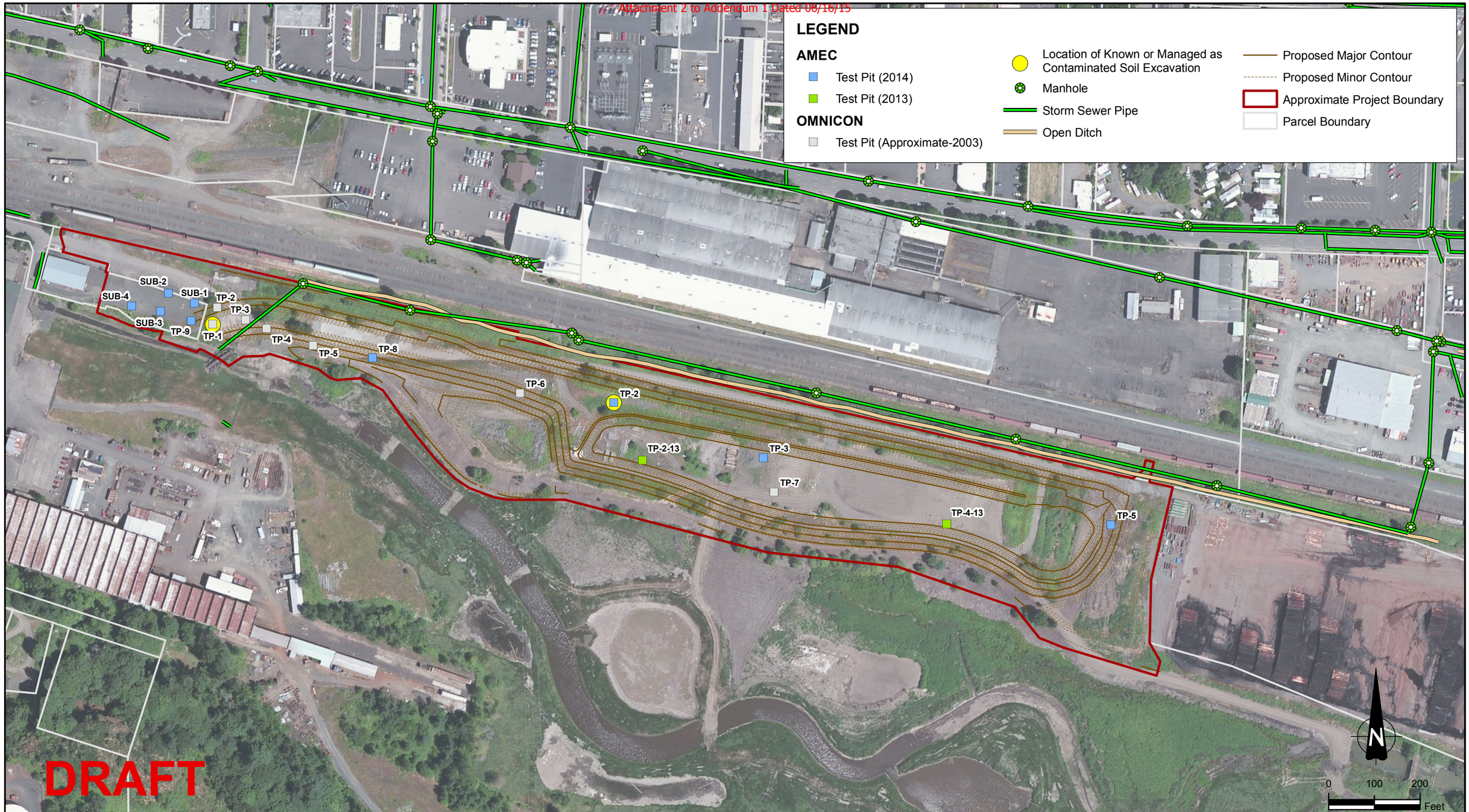
Attachment 2 to Addendum 1 Dated 06/16/15



CITY OF SPRINGFIELD	amec foster wheeler	SPRINGFIELD MILL RACE STORMWATER FACILITY, BOOTH KELLY TRAILHEAD & PATH	DATE MAY 2015
			SCALE 1 " = 1,000 '
Amec Foster Wheeler Environment & Infrastructure, Inc. 7376 S.W. Durham Road Portland, OR 97224		SITE LOCATION MAP	PROJECT NO. 461M127901
			FIGURE 1

DRAWN BY: PM CHECKED BY: TW

K:\12000\12700\12790\127901\dwg_CMMP\Figure 1 - Site Location Map.mxd - patrick.mccarthy - 5/14/2015 - 10:52:58 AM



NOTE:
1) Known or Managed as Contaminated Soil excavation extents will be as described in Section 2.5 of the Contaminated Media Management Plan.

CITY OF SPRINGFIELD

Amec Foster Wheeler
Environment & Infrastructure, Inc.
7376 S.W. Durham Road
Portland, OR 97224

amec foster wheeler

SPRINGFIELD MILL RACE
STORMWATER FACILITY, BOOTH
KELLY TRAILHEAD & PATH

CONTAMINATED MEDIA MANAGEMENT PLAN
SOIL TEST PIT LOCATIONS

DATE	MAY 2015
SCALE	1 " = 200 '
PROJECT NO.	461M127901
FIGURE	2

DRAWN BY: PM CHECKED BY: JKH

K:\12000\12700\12790\127901\dwg_CMMP\Figure 2 - CMMP Soil Test Pit Locations.mxd - patrick.mccarthy - 5/14/2015 - 11:46:04 AM

APPENDIX A

Soil Testing Summary

Technical Memorandum

To	City of Springfield	File no	4-61M-127901
Attention	Molly Markarian Jesse Jones, PE		
From	Leonard Farr Jr., RG Dan Schall, PE AMEC Environment & Infrastructure, Inc.		
Date	July 10, 2014		

Subject	**Soil Testing Summary** **Mill Race Stormwater Facility Property**
Attachments	**Figure 1: Test Pit Locations Map** **Analytical Results**

The purpose of this technical memorandum is to provide a brief summary of soil testing results conducted at the Mill Race Stormwater Facility Property (Site) located in Springfield, Oregon. Soil samples were collected by Omnicon Environmental Management in 2003 and by AMEC Environment & Infrastructure, Inc. (AMEC) in 2013 and 2014.

Table 1 below summarizes the soil samples collected and indicates the methods used in testing soil samples.

AMEC Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel+1 (503) 639-3400
Fax+1 (503) 620-7892
www.amec.com

Table 1. Soil Sampling and Testing Summary

Sample Name	NWTPH-HCID	NWTPH-Dx	EPA Method 8260B VOCs	EPA Method 8082A PCBs	EPA Method 8270D SIM PAHs	EPA Method 6020 Metals
June 2003: Omnicon Environmental Management						
TP-1	X					X
TP-2	No soil samples collected					
TP-3	X					
TP-4	No soil samples collected					
TP-5	X					
TP-6	No soil samples collected					
TP-7	No soil samples collected					
April 22, 2013: Apex Labs Report #A3D0558						
TP-2_13 at 16 ft	X	X	X	X	X	X
TP-4_13 at 18 ft	X	X	X	X	X	X
January 16, 2014: Apex Labs Report #A4A0401						
TP-2_15	X	X	X		X	X
TP-3_11-12	X	X	X		X	X
TP-5_10	X	X	X		X	X
TP-8_4	X		X		X	X
June 19, 2014: Apex Labs Report #A4F0509						
TP-9-1-3	X		X	X	X	X
TP-9-8-9	X		X	X	X	X
Sub-1	X		X	X	X	X

Notes:

EPA = United States Environmental Protection Agency

NWTPH-HCID = Northwest Total Petroleum Hydrocarbons-Hydrocarbon Identification Method

NWTPH-Dx = Diesel & Heavy Oil

PAHs = polynuclear aromatic hydrocarbons

PCBs = polychlorinated biphenyls

Table 2 includes a data summary of all analytes detected in soil samples collected by Omnicon or AMEC at the Site and includes a direct comparison to risk-based concentration (RBC) values as well as clean fill screening values for soil disposal considerations.

Table 2. Detection and Screening Summary

Detected Analyte Name	Number of Detections	Maximum Detected Concentration (mg/kg)	Lowest Applicable RBC Value[1] (mg/kg)	Number of RBC and Background Exceedances	DEQ Clean Fill Standard[2]	Number of Clean Fill Screening Value Exceedances
Diesel	1	139	4,600	0	1,100	0
Heavy Oil	4	1,930	11,000	--	NA	--
4-Isopropyltoluene	1	0.195	NA	--	NA	--
Toluene	1	0.257	>Csat	0	200	0
Acenaphthene	3	0.163	>Csat	0	29	0
Acenaphthylene	3	0.616	NA	--	NA	--
Anthracene	1	0.053	>Csat	0	29	0
Benz(a)anthracene	2	0.029	2.7	0	0.15	0
Benzo(a)pyrene	2	0.044	0.27	0	0.015	1
Benzo(b+k)fluoranthene	2	0.052	2.7	0	0.15	0
Benzo(g,h,i)perylene	3	0.090	NA	--	NA	--
Chrysene	2	0.042	>Csat	0	14	0
Fluoranthene	6	0.290	>Csat	0	29	0
Fluorene	2	0.068	>Csat	0	29	0
Indeno(1,2,3-cd)pyrene	2	0.037	>Csat	0	0.15	0
Naphthalene	5	2.22	23	0	1.09	1
Phenanthrene	5	0.482	NA	--	NA	--
Pyrene	5	0.389	>Csat	0	1,700	0
Arsenic	8	24.8	1.7	1	17.65	1
Beryllium	5	0.861	610	0	2.587	0
Cadmium	3	0.656	150	0	1.588	0
Chromium	9	41.3	460,000	0	103.3	0
Copper	9	72.0	12,000	0	141.3	0
Lead	11	189	800	0	28.03	1
Nickel	9	38.7	6,100	0	50.08	0
Zinc	9	119	NA	--	200.3	0

Notes:
[1] = Either the occupational or construction worker RBC for soil ingestion, dermal contact and inhalation, whichever is lower. Updated June 7, 2012.
[2] = Clean Fill Values from DEQ Clean Fill Table, April 17, 2013.
>Csat = The soil RBC exceeds the limit of three phase equilibrium partitioning.
mg/kg = milligrams per kilogram
NA = No applicable standard.

As indicated in Table 2 above, only four analytes were detected at concentrations exceeding either a clean fill screening value and/or an occupational or construction work (whichever is lower) RBC. These exceedances included the following.

- Naphthalene was detected in soil sample TP-2_15, collected at a depth of 15 feet in test pit TP-2 excavated on January 16, 2014 by AMEC, at a concentration of 2.22 mg/kg. This concentration exceeds the clean fill screening value for naphthalene of 1.09 mg/kg, but does not exceed the most conservative potentially applicable RBC for naphthalene of 23 mg/kg. The soil horizon from which this sample was collected is suspected to be former log pond sediment.
- Benzo(a)pyrene was detected in soil sample TP-2_15, collected at a depth of 15 feet in test pit TP-2 excavated on January 16, 2014 by AMEC, at a concentration of 0.0441 mg/kg. This concentration exceeds the clean fill screening value for benzo(a)pyrene of 0.015 mg/kg, but does not exceed the most conservative potentially applicable RBC for benzo(a)pyrene of 0.27 mg/kg. The soil horizon from which this sample was collected is suspected to be former log pond sediment.
- Lead was detected in a soil sample collected at a depth of 1.5 feet in test pit TP-1 excavated in June 2003 by Omnicon at a concentration of 189 mg/kg. This concentration exceeds the clean fill screening value for lead of 28 mg/kg, but does not exceed the most conservative potentially applicable RBC for lead of 800 mg/kg. The soil from which this sample was collected was black in color, and is suspected to be ash from a former wigwam burner.
- Arsenic was detected in a soil sample collected at a depth of 1.5 feet in test pit TP-1 excavated in June 2003 by Omnicon at a concentration of 24.8 mg/kg. This concentration exceeds the clean fill screening value for arsenic of 18 mg/kg, and the most conservative potentially applicable RBC for arsenic of 1.7 mg/kg. The soil from which this sample was collected was black in color, and is suspected to be ash from a former wigwam burner.

Based upon the results of soil testing conducted at the Site to date, it appears that soil excavated from the areas of Omnicon test pit TP-1 and AMEC test pit TP-2 (2014) require special handling. A contaminated media management plan (CMMP) should be prepared to guide the construction contractor during Site grading activities. The CMMP should delineate the areas where special handling of soils is necessary and describe management procedures for those soils. The CMMP also should outline procedures for management of any soils discovered during grading operations that exhibit characteristics that may indicate that they contain contaminants, such as odors or staining.

One option for the disposal of soil containing contaminant concentrations exceeding clean fill screening criteria is the Short Mountain or Coffin Butte landfills. Soil testing data recently collected by AMEC should be sufficient to obtain a permit for the disposal of Omnicon TP-1 and AMEC TP-2 (2014) area soils at either of these landfills. Another disposal option for low level contaminated soil may be to obtain a solid waste letter of authorization from the DEQ for disposal of the soil at the

Nature Conservancy site. Soil testing data indicates that soil located outside the Omnicon TP-1 and AMEC TP-2 (2014) areas should be suitable as clean fill, and can be disposed at the Nature Conservancy site, or other similar sites that accept “clean” soil and or construction debris.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
EUGENE FIELD OFFICE
211 E 7TH AVENUE, SUITE 105
EUGENE, OREGON 97401-2156

REPLY TO
ATTENTION OF:

June 5, 2015

Operations Division
Regulatory Branch
Corps No.: NWP-2013-438/1

Molly Markarian
City of Springfield
225 Fifth Street
Springfield, OR 97477

Dear Ms. Markarian:

The U.S. Army Corps of Engineers (Corps) has received the City of Springfield's (City) permit application requesting Department of the Army authorization to construct a stormwater pond along the Mill Race near Main Street and OR 528 South, in Springfield, Lane County, Oregon. The site is in Section 35 of Township 17 South, Range 3 West.

Up to 1,526 cubic yards of sediments would be excavated from 2,746 square feet of wetlands to accommodate the footprint of a 3.39 acre stormwater pond facility. Up to 61 cubic yards of material would be excavated from 656 square feet of the millrace to remove the existing outfall and construct a stormwater bioswale. Work within the Mill Race would include installation of erosion and sediment control measures, excavation to connect the stormwater bioswale to the Mill Race, and removal of the existing outfall. Water is anticipated to be present in the Mill Race during construction. Once grading/ excavation work is complete 6-12 inches of top soil will be amended into the soils to support vegetative plantings. The project is shown on the enclosed drawings (Enclosure 1).

This letter verifies the City's project is authorized under the terms and limitations of Nationwide Permit (NWP) No. 7 (Outfall Structures and Associated Intake Structures) & 43 (Stormwater Management Facilities). City's activities must be conducted in accordance with the conditions found in NWP Regional Conditions, Portland District (Enclosure 2), NWP General Conditions (Enclosure 3), Oregon Department of Environmental Quality (DEQ) 401 Water Quality Compliance Conditions (Enclosure 4), and the project specific conditions lettered (a) through (i) below. **Failure to comply with any of the listed conditions could result in the Corps initiating an enforcement action.**

The following special condition is a part of all Department of the Army permits that provide authorization under Section 10 of the Rivers and Harbors Act, regardless whether the permit provides such authorization under Section 10 alone, or in combination with authorization under other laws:

a. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the U.S Army Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

b. Permittee shall notify the Regulatory Branch with the date activities in waters of the United States are scheduled to begin. Notification shall be sent by e-mail to cenwp.notify@usace.army.mil or mailed to the following address:

U.S. Army Corps of Engineers
CENWP-OD-GC
Permit Compliance, Lane County
P. O. Box 2946
Portland, Oregon 97208-2946

The subject line of the message shall contain the name of the county in which the project is located followed by the Corps of Engineers permit number.

c. Prior to the first discharge of dredged or fill material into a jurisdictional water of the United States, permittee shall purchase 0.08 acre credits from the Muddy Creek Mitigation Bank. The permittee shall submit proof of this transaction to the U.S. Army Corps of Engineers prior to any discharge of dredged or fill material into a jurisdictional water of the United States.

d. Permittee shall immediately notify the Corps at the letterhead address if at any time during the authorized work, human remains and/or cultural resources are discovered within the permit area. We also draw your attention to Regional Condition 2.

f. Permittee shall ensure all appropriate sediment and erosion control devices are installed and in proper working order prior to construction. Devices shall remain in place until the area is stabilized and construction is complete. If necessary, sediment and erosion control may be left in place after construction is complete to facilitate stabilization. However, upon stabilization all devices shall be removed from the area and disposed of in and upland location.

g. Permittee shall perform all in-water work, including temporary fills or structures, during the in-water work window of June 1 to October 31 to minimize impacts to aquatic species unless coordinated with and subsequently approved by the Corps. We also draw your attention to Regional Condition 3.

The Corps has determined the proposed project may affect Upper Willamette River Chinook Salmon, a species protected by the Endangered Species Act, and Essential Fish Habitat for salmon species as designated under the Magnuson-Stevens Fishery Conservation and Management Act. The Corps utilized a programmatic biological opinion to assess compliance with these laws and provide coverage for incidental take. The biological opinion is titled *Revisions to the Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Stormwater, Transportation or Utilities Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES V Stormwater, Transportation, Utilities)*, dated March 14, 2014. The Corps recommends that you review the SLOPES opinion in its entirety. Please contact us for a copy of the SLOPES opinion.

The programmatic consultation also requires that we provide you with the following notice:

> If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify NMFS' Office of Law Enforcement at 503-231-6240 or 206-526-6133. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by the Office of Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

h. Permittee shall fully implement all applicable nondiscretionary Terms and Conditions of the Reasonable and Prudent Measures of the SLOPES V Stormwater, Transportation and Utilities programmatic opinion. General Construction conditions applicable to the permitted activity are numbered 13, 14, 25, 26, 27, 30, 33, 34, 36, 43.d., and 43.e (Enclosure 5).

i. Permittee shall notify the Corps if the project changes in scope or is otherwise modified. The Corps is required to reinitiate consultation on this action where discretionary Federal involvement or control over the action has been retained or is authorized by law and (a) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (b) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (c) the identified action is subsequently modified in a manner that has an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

We direct your attention to NWP Regional Condition 16 (Enclosure 2) and General Condition 29 (Enclosure 3) that requires the transfer of this permit if the property is sold, and NWP General Condition 30 that requires you to submit a signed certificate when the work is completed. A "Compliance Certification" is provided (Enclosure 6).

This authorization does not obviate the need to obtain other permits where required. Permits, such as those required from the Oregon Department of State Lands (ODSL) under Oregon's Removal /Fill Law, must also be obtained before work begins.

The nationwide permits expire on March 18, 2017. This verification is valid until March 18, 2017 unless the NWP is modified or revoked prior to that date. If you commence or are under contract to commence this activity before the date the NWP expires, is modified, or revoked, you will have 12 months from the date of the expiration, modification, or revocation to complete the activity under the present terms and conditions of the current NWP.

We would like to hear about your experience working with the Portland District, Regulatory Branch. Please complete a customer service survey form at the following address: http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

If you have any questions regarding this NWP verification, please contact Mr. Benny A. Dean Jr. at the letterhead address, by telephone at (541) 465-6769, or via e-mail at Benny.A.Dean@usace.army.mil.

FOR THE COMMANDER, SHAWN M. PATRICK, LIEUTENANT COLONEL, CORPS OF ENGINEERS, DISTRICT COMMANDER:

FOR Shawn H. Zinszer
Chief, Regulatory Branch

Enclosures

Copy Furnished:

Oregon Department of State Lands (Redon, 57082-RF)
Oregon Department of Environmental Quality (English)
Amec Environmental & Infrastructure (Erin Hale)

Corps ID No: NWP-2013-438/1 .

REQUEST FOR PERMIT TRANSFER PER GENERAL CONDITION 29

When the structures or work verified by this nationwide are still in existence at the time the property is transferred, and/or a new party obtains this permit verification, the terms and conditions of this permit will continue to be binding on the new permittee. The new permittee should sign and date below to accept the liabilities associated with complying with the terms and conditions of this permit verification, and to validate its transfer.

PERMIT TRANSFEREE:

_____ _____
Signature DATE

_____
Name (Please print)

_____
Street Address

_____
City, State, and Zip Code

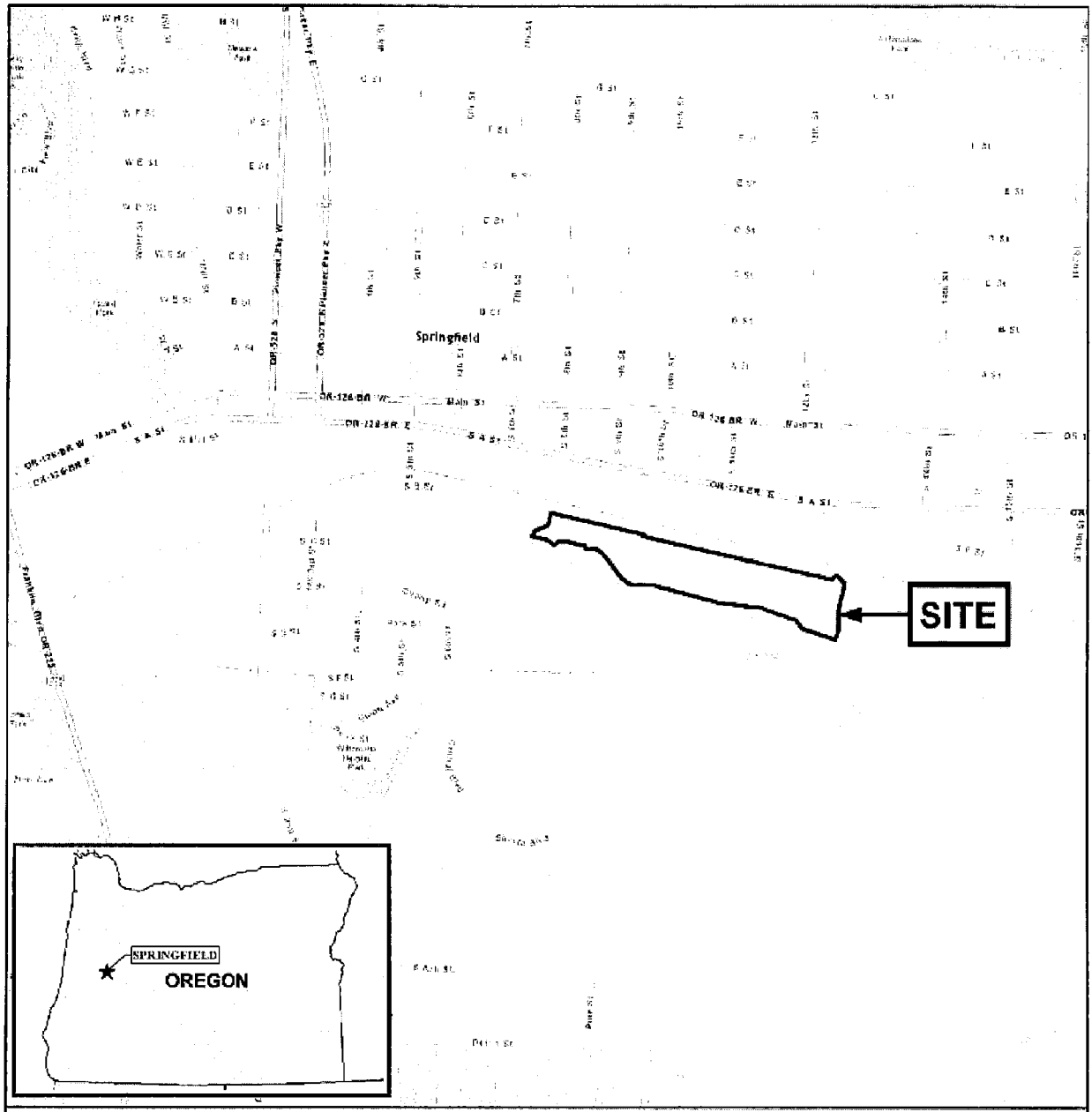
NEW OWNER (if applicable):

_____ _____
Signature DATE

_____
Name (Please print)

_____
Street Address

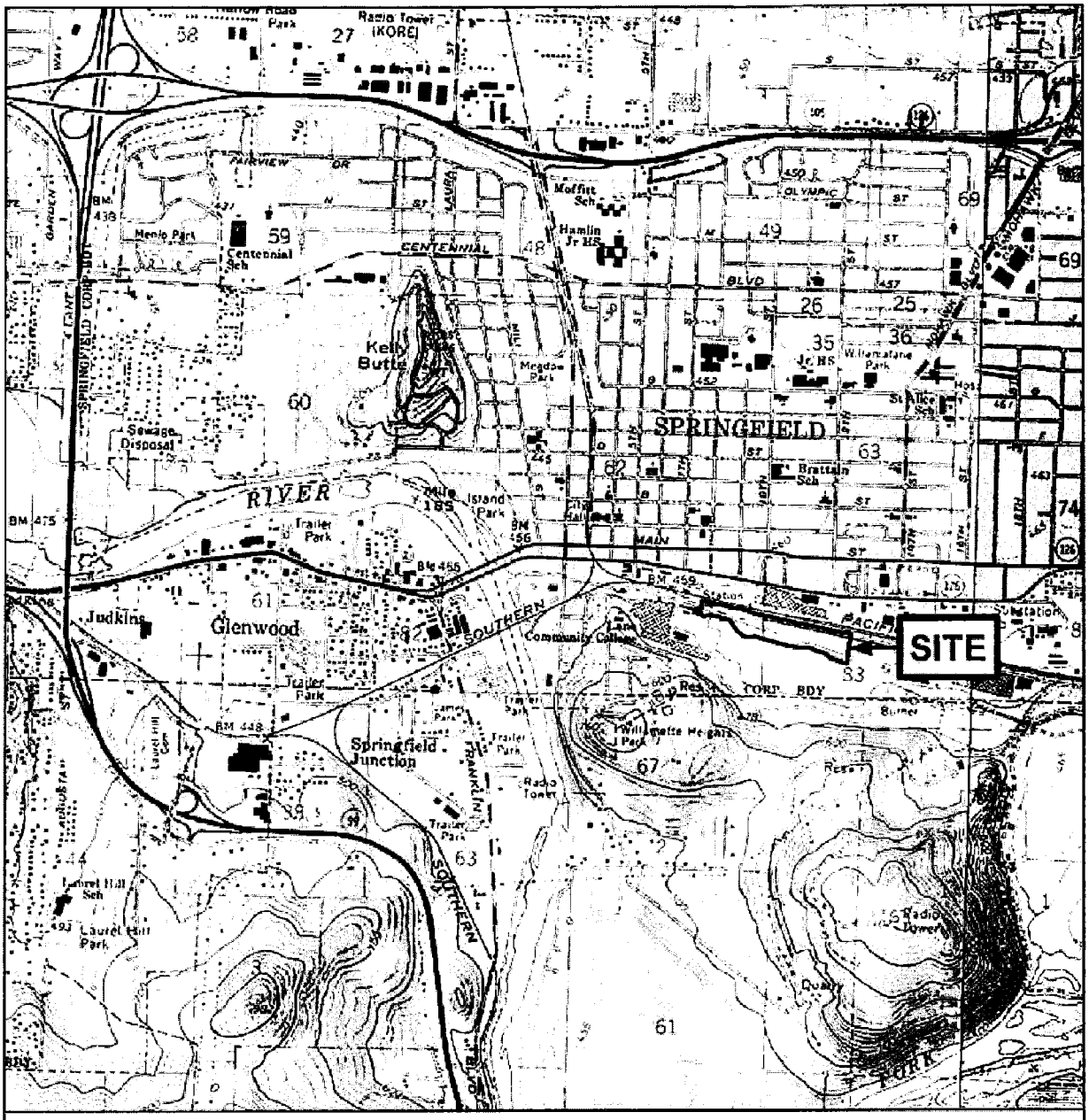
_____
City, State, and Zip Code



AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD

TITLE: SITE LOCATION MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 451M12790
	PROJECTION: OR SP S. FL.	SCALE: 1 inch = 1,000 feet	FIGURE No.: 1

K:\12000\12700\12790\12790\1\dwg_JPA\Figure 1 - Site Location Map.mxd - patrick.mccarthy - 12/8/2014 - 9:22:52 AM



AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: U.S.G.S. TOPOGRPAHIC MAP		DWN BY: PM	DATUM: NAD83 / DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH		CHKD BY: EH / REV. NO.: 1	PROJECT NO.: 461M12790
		PROJECTION: OR SP S. FL	SCALE: 1 inch = 2,000 feet / FIGURE No.: 2

K:\12000\12700\12780\127801\dwg_JPA\Figure 2 - Topographic Map.mxd - patrick.mccarthy - 12/3/2014 - 9:23:03 AM

0 300 600 1,200 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: TAX LOT MAP		DWN BY: PM	DATUM: NAD83 / DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH		CHKD BY: EH	REV. NO.: - / PROJECT NO.: 3-61M-127900
		PROJECTION: OR SP S. Ft	SCALE: 1 inch = 500 feet / FIGURE No.: FIGURE 3

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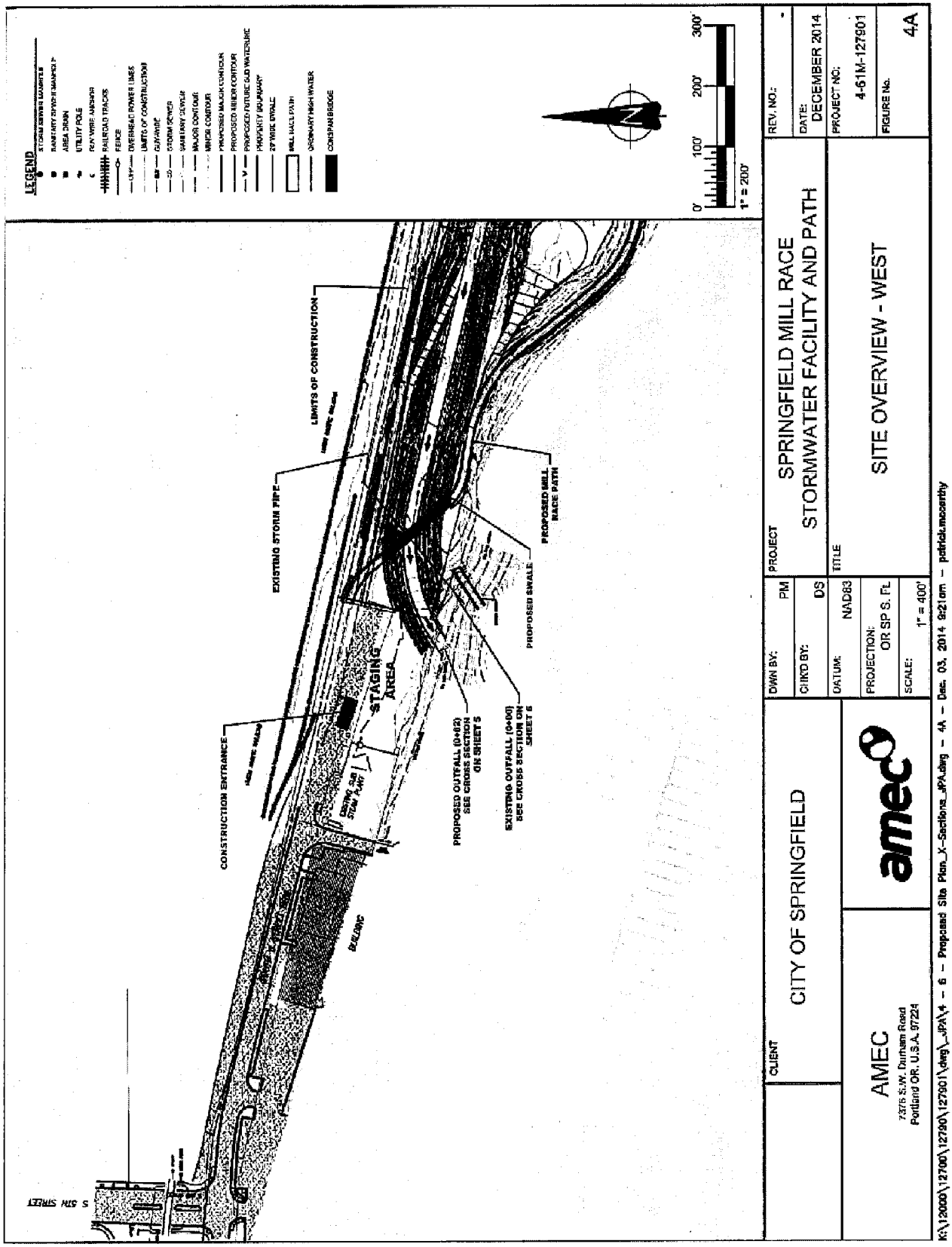
LEGEND
STORM SEWER MANHOLE
SANITARY SEWER MANHOLE
AREA DRAIN
UTILITY POLE
POWER MANHOLE
RAILROAD TRACKS
FENCE
OVERHEAD POWER LINES
LIMITS OF CONSTRUCTION
GUYWIRE
STORM SEWER
SANITARY SEWER
MAJOR CONTOUR
MINOR CONTOUR
PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED FUTURE SLD WATERLINE
PROPERTY BOUNDARY
20' WIDE EVSALE
MILL RACE PATH
ORDINARY HIGH WATER
CONSPAN BRIDGE
0' 100' 200' 300'
1" = 200'
LIMITS OF CONSTRUCTION
EXISTING STORM PIPE
PROPOSED MILL RACE PATH
PROPOSED SWALE
STAGING AREA
CONSTRUCTION ENTRANCE
PROPOSED OUTFALL (0+62) SEE CROSS SECTION ON SHEET 5
EXISTING OUTFALL (0+00) SEE CROSS SECTION ON SHEET 6
BUILDING
S 5TH STREET
REV. NO.: -
DATE: DECEMBER 2014
PROJECT NO: 4-61M-127901
FIGURE No. 4A
PROJECT
SPRINGFIELD MILL RACE
STORMWATER FACILITY AND PATH
TITLE
SITE OVERVIEW - WEST
DWN BY: PM
CHKD BY: DS
DATUM: NAD83
PROJECTION: OR SP S. FL
SCALE: 1" = 400'
CLIENT
CITY OF SPRINGFIELD
AMEC
7376 S.W. Durham Road
Portland OR, U.S.A. 97224
amec
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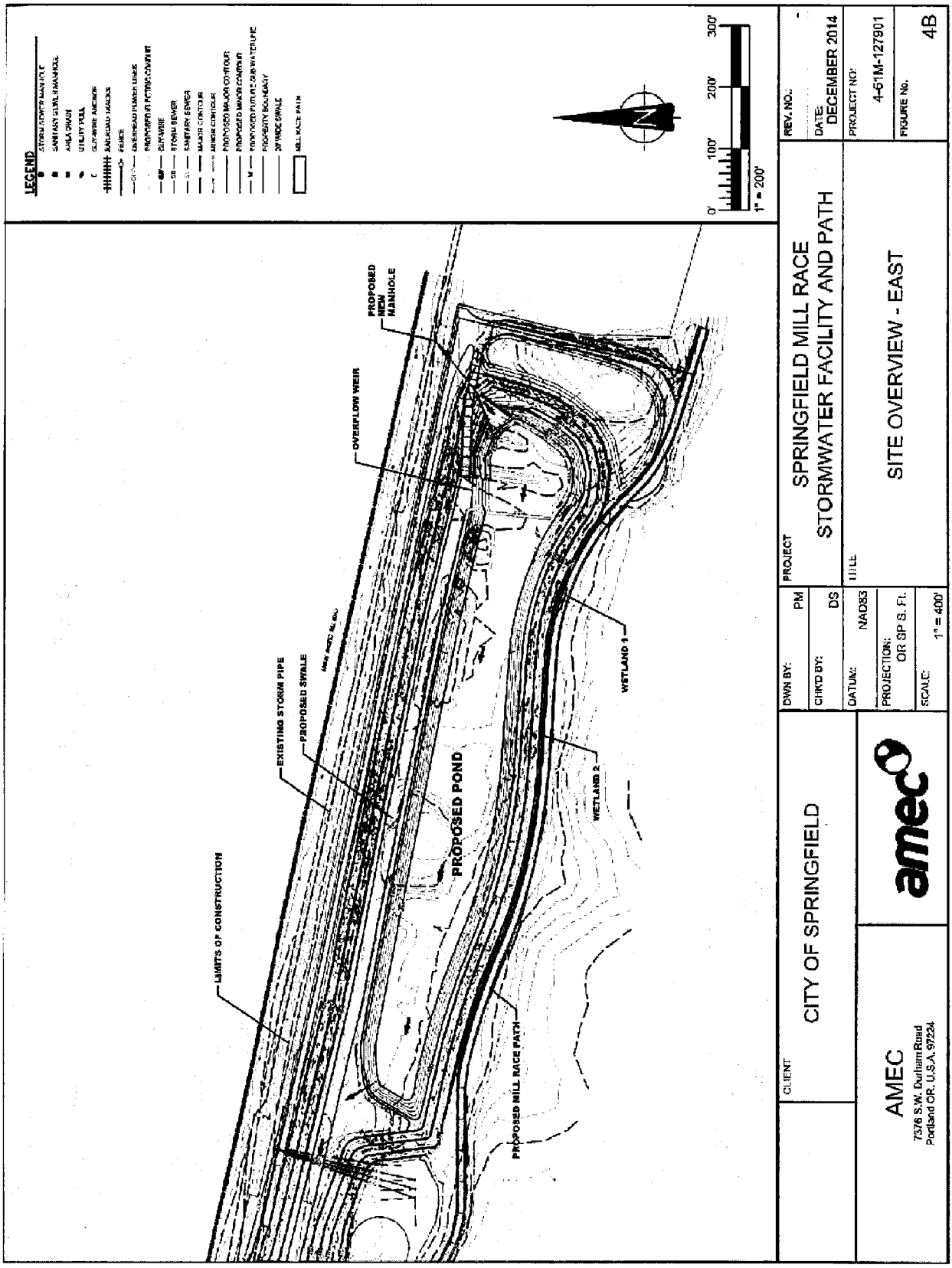
LEGEND
LIMITS OF CONSTRUCTION
EXISTING STORM PIPE
PROPOSED SWALE
PROPOSED POND
PROPOSED MILL RACE PATH
WETLAND 1
WETLAND 2
OVERFLOW WEIR
PROPOSED NEW MANHOLE
0'
100'
200'
300'
1" = 200'
CLIENT
CITY OF SPRINGFIELD
AMEC
7376 S.W. Durham Road
Portland OR, U.S.A. 97224
amec
DWN BY: PM
CHKD BY: DS
DATUM: NAD83
PROJECTION: OR SP S. Ft.
SCALE: 1" = 400'
PROJECT
SPRINGFIELD MILL RACE
STORMWATER FACILITY AND PATH
TITLE
SITE OVERVIEW - EAST
REV. NO.
DATE: DECEMBER 2014
PROJECT NO: 4-61M-127901
FIGURE No. 4B
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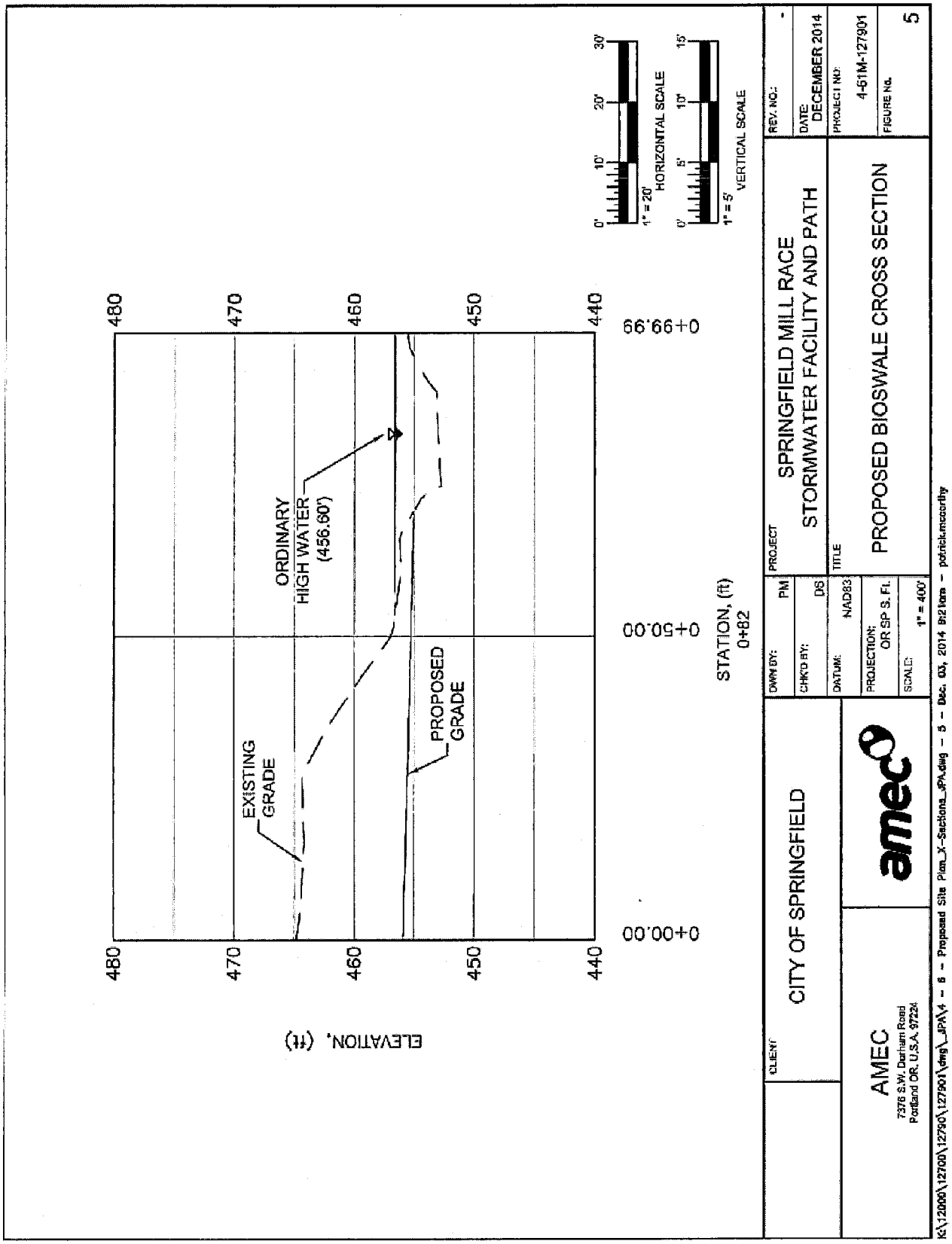
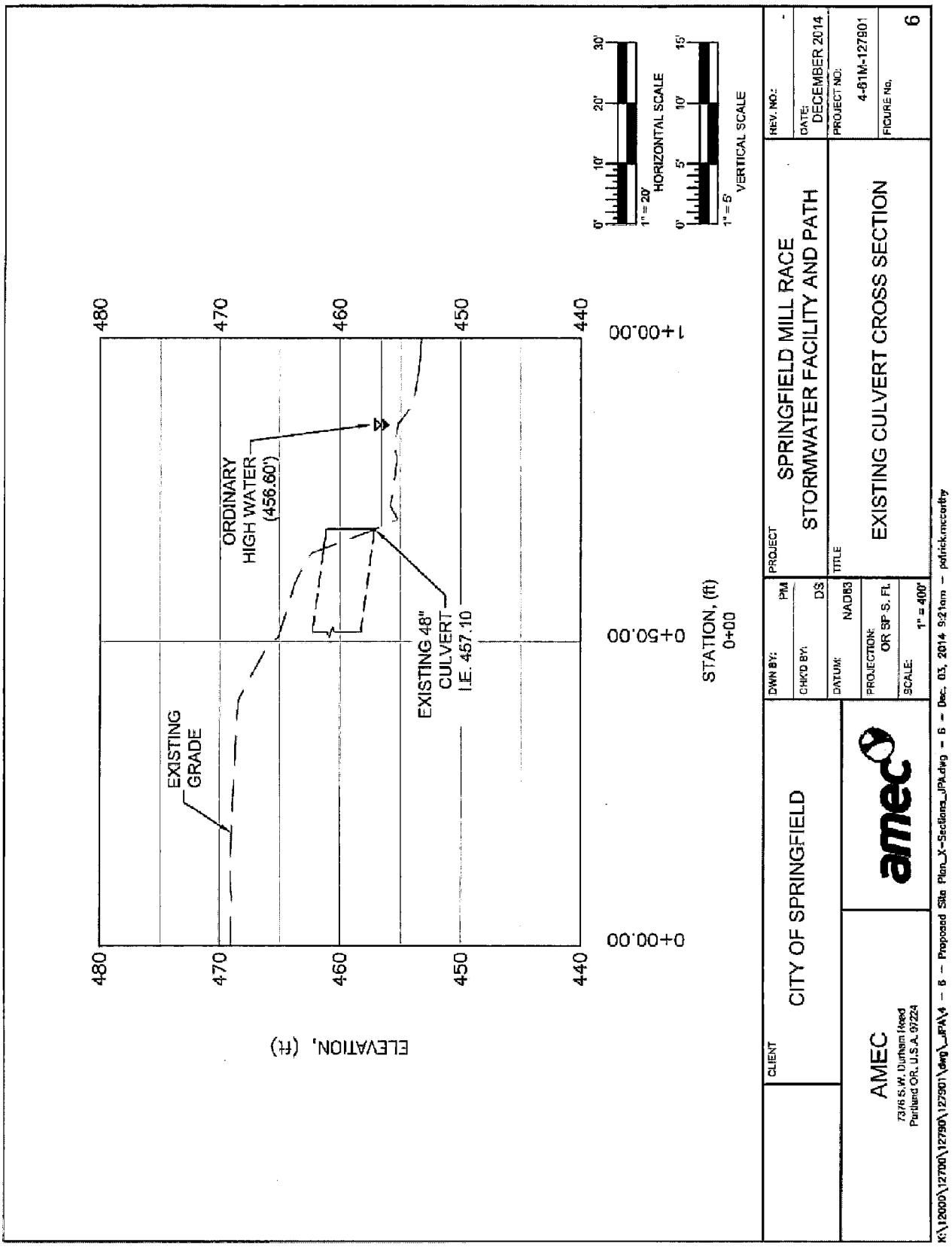

ELEVATION, (ft)
480
470
460
450
440
EXISTING GRADE
ORDINARY HIGH WATER (456.60')
PROPOSED GRADE
0+00.00
0+50.00
0+99.99
STATION, (ft)
0+82
0'
10'
20'
30'
1" = 20'
HORIZONTAL SCALE
0'
5'
10'
15'
1" = 5'
VERTICAL SCALE
CLIENT:
CITY OF SPRINGFIELD
AMEC
7376 S.W. Durham Road
Portland OR, U.S.A. 97224
amec
DWN BY: PM
CHK'D BY: DS
DATUM: NAD83
PROJECTION: OR SP S. FL
SCALE: 1" = 400'
PROJECT
SPRINGFIELD MILL RACE
STORMWATER FACILITY AND PATH
TITLE
PROPOSED BIOSWALE CROSS SECTION
REV. NO.: -
DATE: DECEMBER 2014
PROJECT NO: 4-51M-127901
FIGURE No. 5
K:\12000\12700\12790\127901\dwg_IPA\4 - 6 - Proposed Site Plan_X-Sections_IPA.dwg - 5 - Dec. 03, 2014 8:21am - patrick.mccarthy


ELEVATION, (ft)
480
470
460
450
440
EXISTING GRADE
ORDINARY HIGH WATER (456.60')
EXISTING 48" CULVERT I.E. 457.10
0+00.00
0+50.00
1+00.00
STATION, (ft) 0+00
0' 10' 20' 30'
1" = 20'
HORIZONTAL SCALE
0' 5' 10' 15'
1" = 5'
VERTICAL SCALE
CLIENT
CITY OF SPRINGFIELD
AMEC
7376 S.W. Durham Road
Portland OR, U.S.A. 97224
amec
DWN BY: PM
CHK'D BY: DS
DATUM: NAD83
PROJECTION: OR SP S. FL
SCALE: 1" = 400'
PROJECT
SPRINGFIELD MILL RACE
STORMWATER FACILITY AND PATH
TITLE
EXISTING CULVERT CROSS SECTION
REV. NO.: -
DATE: DECEMBER 2014
PROJECT NO: 4-81M-127901
FIGURE No. 6
K:\12000\12700\12790\127901\dwg\JPA\4 - 6 - Proposed Site Plan_X-Sections_JPA.dwg - 6 - Dec. 03, 2014 9:21am - patrick.mccarthy

US Army Corps of Engineers
Portland District

2012 Nationwide (NWP) Regional Permit Conditions Portland District

The following Nationwide Permit (NWP) regional conditions are for the Portland District Regulatory Branch boundary. Regional conditions are placed on NWPs to ensure projects result in less than minimal adverse impacts to the aquatic environment and to address local resource concerns.

ALL NWPs –

1. **High Value Aquatic Resources:** Except for NWPs 3, 20, 27, 32, 38, and 48, any activity that would result in a loss of waters of the United States (U.S.) in a high value aquatic resource is not authorized by NWP. High value aquatic resources in Oregon include bogs, fens, wetlands in dunal systems along the Oregon coast, native eel grass (*Zostera marina)* beds, kelp beds, rocky substrate in tidal waters, marine reserves, marine gardens, vernal pools, alkali wetlands, and Willamette Valley wet prairie wetlands.

   NOTE: There are other types of wetlands in Oregon, such as mature wooded wetlands and tidal swamps, which are also considered as providing high value and functions to the State's aquatic ecosystems. Impacts to these waters will be evaluated on a case-by-case basis for potential authorization under a Nationwide Permit. For more information about the State's Wetlands of Conservation Concern" please visit http://oregonstatelands.us/DSL/PERMITS/forms.shtml#Permit_Forms

2. **Cultural Resources and Human Burials-Inadvertent Discovery Plan**: In addition to the requirements in NWP General Conditions 20 and 21 permittee shall immediately notify the Portland District Engineer if at any time during the course of the work authorized, human burials, cultural items, or historic properties, as identified by the National Historic Preservation Act and Native American Graves and Repatriation Act, are discovered. The permittee shall implement the following procedures:

   a. Immediately cease all ground disturbing activities.

   b. Project Located in Oregon: Notify the Oregon State Historic Preservation Office (503-986-0674).

   c. Project Located in Washington: Notify the Washington Department of Archaeology and Historic Preservation (360-586-3077).

   d. Notify the Portland District Engineer. Notification shall be made by fax (503-808-4375) as soon as possible following discovery but in no case later than 24 hours. The fax shall clearly specify the purpose is to report a cultural resource discovery. Follow up the fax notification by contacting the Portland District Engineer representative (by email and telephone) identified in the verification letter.

   e. Failure to stop work immediately and until such time as the Portland District Engineer has coordinated with all appropriate agencies and Native American tribes, and complied with the provisions of 33 CFR 325 (Appendix C), the National Historic Preservation Act, Native American Graves and Repatriation Act, and other pertinent regulations could result in violation of state and federal laws. Violators are subject to civil and criminal penalties.

3. **In-water Work:** In order to minimize potential impacts to water quality, aquatic species and habitat, in-water work will be limited by the following timing considerations:

   a. Permittee shall complete all in-water work within the preferred work window specified in Oregon Department of Fish and Wildlife's (ODFW) "Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources," June 2008, or most current version, available at: http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_Work2008.pdf.

b. If work cannot be completed within the preferred timing window, despite every attempt to do so, permittee shall submit a request to work out side of the preferred window to the Portland District Engineer in writing. Permittee shall not begin any in-water work outside of the preferred window until they have received written approval from the District Engineer. The District Engineer will coordinate with the appropriate agencies prior to finalizing a decision.

4. **Fish and Aquatic Life passage:** In addition to the requirements of NWP General Conditions 2 and 9, all activities authorized by a NWP shall not restrict passage of aquatic life temporarily or permanently. Aquatic life shall be interpreted to include amphibians, reptiles, and mammals whose natural habitat includes waters of the United States and which are generally present in and/or around waters of the United States.

   a. Activities such as the installation of culvert, intake structures, diversion structures, or other modifications to stream channel morphology must conform to fish passage standards developed by the ODFW and the National Marine Fisheries Service (NMFS). ODFW's standards can be found at OAR 635-412-0035; ODFW provides an overview at http://www.dfw.state.or.us/fish/passage/ and NMFS provides an overview at http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf.

5. **Fish Screening:** The permittee shall ensure that all intake pipes utilize fish screening that complies with standards developed by NMFS and ODFW ("Anadromous Salmonid Passage Facility Design", February 2008). http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish-Passage-Design.pdf or the most current version.

6. **Work Area Isolation and Dewatering:** Appropriate best management practices shall be implemented to prevent erosion and sediments from entering wetlands or waterways.

   a. All in-water work shall be isolated from the active channel or conducted during low seasonal stream flows.

   b. Permittee shall provide for fish passage upstream and downstream of the worksite.

   c. Cofferdams shall be constructed of non-erosive material, such as concrete jersey barriers, sand and gravel bag dams, or water bladders. Constructing a cofferdam by pushing material from the streambed or sloughing material from the streambanks is not authorized.

   d. Sand and gravel bag dams shall be lined with a plastic liner or geotextile fabric to reduce permeability and prevent sediments and/or construction materials from entering the active stream channel.

   e. Upstream and downstream flows shall be maintained by routing flows around the construction site with a pump, bypass pipe, or diversion channel.

   f. A sediment basin shall be used to settle sediments in return water prior to release back into the waterbody. Settled water shall be returned to the waterbody in such a manner as to avoid erosion of the streambank. Settlement basins shall be placed in uplands.

   g. Fish and other aquatic species must be salvaged prior to dewatering. The State of Oregon requires a Scientific Take Permit be obtained to salvage fish and wildlife. Permittee is advised to contact the nearest ODFW office. For further information contact ODFW at http://www.dfw.state.or.us.

7. **Dredging:** For any NWP-authorized activities, including but not limited to NWP 1, 3, 12, 13, 19, 27, 28, 35, 36, 40, and 41 that involve removal of sediment from waters of the United States permittee shall ensure that:

a. Prior to dredging, appropriate sediment characterization as to size composition and potential contaminants has been undertaken and the material is suitable for in-water disposal per the Sediment Evaluation Framework for the Pacific Northwest, 2009 (available at: http://www.nwp.usace.army.mil/environment/sediment.asp) or the most current version.

b. Permittee shall use the least impactful methodology and activity sequencing to ensure impacts to the aquatic system are minimized to the maximum extent practicable. Examples include using a hydraulic, closed-lipped clamshell bucket, toothed clamshell bucket, dragline and/or excavator.

c. Dredged or excavated material is placed where sediment-laden water cannot enter waterways or wetlands in an uncontrolled manner. The discharge associated with the return of sediment-laden water into a water of the United States from an upland disposal site requires separate authorization from the District Engineer under NWP 16.

8. **Chemically Treated Wood:** Withdrawn

9. **Mechanized Equipment:** In addition to the requirements in NWP General Condition 11, permittee shall implement the following to prevent or limit aquatic impacts from mechanized equipment:

a. In all events use the type of equipment that minimizes aquatic impacts spatially and temporally.

b. Use existing roads, paths, and drilling pads where available. Temporarily place mats or pads onto wetlands or tidal flats to provide site access. Temporary mats or pads shall be removed upon completion of the authorized work.

c. Operate equipment from the top of a streambank and conduct work outside of the active stream channel, unless specifically authorized by the District Engineer.

d. Isolate storage, staging, and fueling areas, and operate and maintain equipment in isolation from waters, wetlands, and riparian areas.

e. Maintain spill prevention and containment materials with ready access at vehicle staging areas. Permittee and staff shall be trained to effectively deploy the measures. Spill response materials include straw matting/bales, geotextiles, booms, diapers, and other absorbent materials, shovels, brooms, and containment bags. In the event of a spill of petroleum products or other chemicals with potential to affect waters or wetlands, permittee shall immediately report the spill to the Oregon Emergency Response Service (OERS) at 1-800-452-0311 and shall implement containment and cleanup measures, as directed.

10. **Deleterious Waste:** In addition to the requirements in NWP General Condition 6, permittee shall not dispose of biologically harmful or waste materials into waters or wetlands. These materials include but are not limited to the following:

a. Petroleum products, chemicals, cement cured less than 24 hours, welding slag and grindings, concrete saw cutting by-products, sandblasted materials, chipped paint, tires, wire, steel posts, asphalt and waste concrete.

b. Discharge water created during construction activities (such as but not limited to concrete wash out, pumping for work area isolation, vehicle wash water, drilling fluids, dredging return flows, and sediment laden runoff) shall be treated to remove debris, sediment, petroleum products, metals, and other pollutants and discharged in a controlled fashion to avoid erosion. A separate Department of the Army permit and/or a National Pollutant Discharge Elimination System (NPDES) permit from Oregon Department of Environmental Quality's (DEQ) may be required prior to discharge. Permittee is directed to contact the nearest DEQ office (http://www.deq.state.or.us/about/locations.htm) for more information about the NPDES program.

11. **Stormwater Discharge Pollution Prevention:** Activities that result in stormwater runoff passing over disturbed areas and impervious surfaces must include reduction measures, controls, treatment techniques and management practices to avoid discharge of soil, debris, toxics and other pollutants to waterways and wetlands.

a. **Erosion Control:** During construction and until the site is stabilized, the permittee shall ensure all practicable measures are implemented and maintained to prevent erosion and runoff. For proper erosion control measure selection and implementation, the Permittee is referred to DEQ "Oregon Sediment and Erosion Control Manual," April 2005, available at: http://www.deq.state.or.us/wq/stormwater/escmanual.htm. Appropriate control measures and maintenance include, but are not limited to the following:

1) Permittee shall inspect and maintain control measures in good condition throughout construction and until permanent measures are well established. Permittee shall repair or replace any damages such as rips, broken stakes that result in loss of intended function. Permittee shall install additional control measures and reseed or replant with native and/or non-competitive species as necessary to achieve stabilization of the site. Spray-on mulches imbedded with benign sterile species may be used to temporarily stabilize the area until permanent controls are in place.

2) Once soils or slopes have been stabilized, permittee shall completely remove and properly dispose of or re-use all components of installed control measures.

b. **Post-Construction Stormwater Management:** If the activity will result in creation of new impervious surfaces and federally listed aquatic species or their habitat may be affected by the proposed activity permittee shall forward a copy of the post-construction stormwater management plan (SWMP) to the Portland District Engineer for our consultation under the Endangered Species Act. A copy of the SWMP must be submitted to the DEQ for their review and approval prior to initiating construction.

1) Submittal of the post-construction stormwater management plan to DEQ at the same time the application is submitted to the Corps will streamline the project review. DEQ's Stormwater Management Plan Submission Guidelines for Removal/Fill Permit Applications which involve impervious surfaces can be found at http://www.deq.state.or.us/wq/sec401cert/docs/stormwaterGuidlines.pdf. This document provides information to determine the level of detail required for the plan based on project type, scope, location, and other factors, as well as references to assist in designing the plan and a checklist for a complete submission.

12. **Upland Disposal:** Material disposed of in uplands shall be placed in a location and manner that prevents discharge of the material and/or return water into waters or wetlands unless otherwise authorized by the Portland District Engineer.

a. Final disposition of materials removed from waters and wetlands to uplands may require separate approvals under Oregon State Solid Waste Rules. For more information please visit DEQ's Solid Waste program at http://www.deq.state.or.us/lq/sw/index.htm.

b. Temporary upland stockpiles of excavated or dredged materials shall be isolated from waterways, wetlands, and floodwaters; stabilized prior to wet weather; and maintained using best management practices unless specifically authorized by the District Engineer.

13. **Restoration of Temporary Impacts:** To minimize temporal losses of waters of the U. S. construction activities within areas identified as temporary impacts shall not exceed two construction seasons or 24 months, whichever is less. For all temporary impacts, permittee shall provide the Portland District Engineer a description, photos, and any other documentation which demonstrates pre-project conditions with the Preconstruction Notification.

a. Site restoration of temporarily disturbed areas shall include returning the area to pre-project ground surface contours. Permittee shall revegetate temporarily disturbed areas with native, noninvasive herbs, shrubs, and tree species sufficient in number, spacing, and diversity to replace affected aquatic functions.

b. Site restoration shall be completed within 24 months of the initiation of impacts (unless otherwise required by the specific NWP). However, if the temporary impact requires only one construction season, site restoration shall be completed within that same construction season before the onset of seasonal rains.

14. **Permittee-responsible Compensatory Mitigation:** When permittee-responsible compensatory mitigation is required by the Portland District Engineer to replace lost or adversely affected aquatic functions, the permittee shall provide long-term protection for the mitigation site through real estate instruments (e.g., deed restriction or conservation easement) or other available mechanisms. The appropriate long-term protection mechanism will be determined by the Portland District Engineer based on project-specific review and must be in place prior to initiating the permitted activity.

15. **Inspection of the Project Site:** The permittee shall allow representatives of the Portland District Engineer and/or DEQ to inspect the authorized activity to confirm compliance with nationwide permit terms and conditions. A request for access to the site will normally be made sufficiently in advance to allow a property owner or representative to be on site with the agency representative making the inspection.

16. **Sale of Property/Transfer of Permit:** Permittee shall obtain the signature(s) of the new owner(s) and transfer this permit in the event the permittee sells the property associated with this permit. To validate the transfer of this permit authorization, a copy of this permit with the new owner(s) signature shall be sent to the Portland District Engineer at the letterhead address on the verification letter.

US Army Corps of Engineers
Portland District

Nationwide (NWP) Permit Conditions
33 CFR Part 330; Issuance of Nationwide Permits – March 19, 2012

C. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation
(a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course; condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or Study River (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species.
(a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties.
(a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the

requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district

engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a

final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, and ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation

may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l) (3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification.
(a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity.

The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b) (1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of

NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

F. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulations of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide

line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b) (1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of

immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b) (1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a jurisdictional wetland is adjacent – meaning bordering, contiguous, or neighboring – to a waterbody determined to be a water of the United States under 33 CFR 328.3(a)(1)-(6), that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

State of Oregon
Department of
Environmental
Quality

Oregon Department of Environmental Quality (DEQ) 401 Water Quality (WQC) General Conditions

In addition to all USACE permit conditions and regional permit conditions, the following 401 Water Quality Certification conditions apply to all Nationwide Permit (NWP) categories certified or partially certified Additional 401 Water Quality Certification category specific conditions follow, which must also be complied with as applicable.

1) Turbidity: All Permittees must implement all reasonably availably technological controls and management practices to meet the standard rule of no more than a 10 percent increase in project caused turbidity above background levels. However, if all reasonably available controls and practices are implemented by a permittee, turbidity exceedances of more than 10 percent above background are allowed for limited times depending on the severity of the increase, as specified in this condition.

a. **Monitoring and Compliance Requirements:** Permittee must monitor and record in a daily log stream turbidity levels during work below ordinary high water, compare turbidity caused by authorization actions to background levels, and adapt activities to minimize project-caused turbidity. Required monitoring steps include:

i. Identify two monitoring locations:

A. Background location: A relatively undisturbed location, approximately 100 feet upcurrent from the disturbing activity; and,

B. Compliance location: A location downcurrent from the disturbing activity, at approximately mid-depth, within any visible plume, at the distance that corresponds to the size of the waterbody where work is taking place as listed on the table below:

WETTED STREAM WIDTH	COMPLIANCE DISTANCE
Up to 30 feet	50 feet
>30 feet to 100 feet	100 feet
>100 feet to 200 feet	200 feet
>200 feet	300 feet
LAKE, POND RESERVOIR	Lesser of 100 feet or Maximum surface dimension

ii. Determine Compliance:

A. At the start of work, measure turbidity at both locations and record in the daily log date, time, location, tidal stage (if waterbody is tidally influenced), and turbidity levels at each point and comparison. Permittee must also record in the daily log all controls and practices implemented at the start of the work.

B. During work, measure turbidity at both locations at the frequency directed in the tables below and record in the daily log date, time, location, tidal stage (if waterbody is tidally influenced), and turbidity measurements.

C. Turbidity measurements must be representative of stream turbidity when the activity is being conducted. Measurements cannot be taken during a cessation of activity.

D. If project caused turbidity is elevated above background, Permittee must implement additional controls and practices and monitor both points again as described below for either monitoring method. A description of the additional controls and the date, time, and location where they are implemented must be recorded in the daily log:

MONITORING WITH A TURBIDIMETER*		
ALLOWABLE EXCEEDANCE TURBIDITY LEVEL	ACTION REQUIRED AT 1ST MONITORING INERNAL	ACTION REQUIRED AT 2ND MONITORING INTERNAL
0 to 5 NTU above background	Continue to monitor every 4 hours	Continue to monitor every 4 hours
5 to 29 NTU above background	Modify controls & continue to Monitor every 4 hours	Stop work after 8 hours at 5-29 NTU above background
30 to 49 NTU above Background	Modify controls & continue to Monitor every 2 hours	Stop work after 2 confirmed hours At 30-49 NTU above background
50 NTU or more above Background	Stop work	Stop work

VISUAL MONITORING*		
No plume observed	Continue to monitor every 4 hours	Continue to monitor every 4 hours
Plume observed within compliance distance	Modify controls & continue to Monitor every 4 hours	Stop work after 8 hours with an observed plume within compliance distance
Plume observed beyond compliance distance	Stop work	Stop work
**Note: Monitoring visually may require stopping work as soon as the visual plume exceeds the waterbody specific compliance distance. However, using a turbidimeter can allow work to continue based on more precise determination of the severity of the turbidity increase over time.*		

iii. Work must **stop immediately for the remainder of the 24-hour period** if:

A. A visible turbidity plume extends beyond the compliance distance; or,

B. Turbidity is measured at the compliance point at:

I. 50 NTU or more over background at any time;
II. 30 NTU over background for 2 hours; or
III. 5-29 NTU over background for 8 hours.

iv. Work may continue if no visible plume is observed, turbidity measured at the compliance point is no more than 0-5 NTU above background, or additional control measures can be applied to keep the visible plume within the compliance distance, measured turbidity ranges, and durations listed in the tables above.

b. Turbidity Control Measures - The permittee must implement all reasonably available controls and practices to minimize turbidity during in-water work, which may include, but are not limited to:

i. Schedule, sequence or phase work activities so as to minimize in-water disturbance and duration of activities below ordinary high water;

ii. Install and maintain containment measures to prevent erosion of upland material to waterways and wetlands, isolate work areas from flowing waters, and prevent suspension of in-stream sediments to the maximum extent practicable;

iii. Apply control measures for all in-stream digging, including but not limited to: employing an experienced equipment operator; not dumping partial or full buckets of material back into the wetted stream; adjusting the volume, speed, or both of loads or hydraulic suction equipment; or by using a closed-lipped environmental bucket;

iv. Limit the number and location of stream crossing events. If equipment must cross a waterway, establish temporary crossing sites at an area with stable banks, where the least vegetation disturbance will occur, shortest distance across water, oriented perpendicular to the stream, and supplement with clean gravel or other temporary methods as appropriate;

v. Place excavated, disturbed, and stockpiled material so that it is isolated from the edge of waterways and wetlands and not allowed to enter waters of the state uncontrolled; and

vi. Apply other effective turbidity control techniques, such as those in Appendix D and throughout DEQ's *Oregon Sediment and Erosion Control Manual*, April 2005, http://www.deq.state.or.us/wq/stormwater/docs/escmanual/appxd.pdf.

c. Reporting: Copies of daily logs for turbidity monitoring must be made available to DEQ and other regulatory agencies upon request. The log must include:

i. Background NTUs or observation, compliance point NTUs or observation, comparison of the points in NTUs or narrative, and location, time, date, and tidal stage (if applicable) for each reading or observation.

ii. A narrative discussing all exceedances, controls applied and their effectiveness, subsequent monitoring, work stoppages, and any other actions taken.

2) Stormwater Discharge Pollution Prevention: All projects that involve land disturbance or impervious surfaces must implement prevention or control measures to avoid discharge of pollutants in stormwater runoff to waters of the state.

a. For land disturbances during construction, the permittee must obtain and implement permits where required (see: http://www.deq.state.or.us/wq/stormwater/construction.htm) and follow DEQ's *Oregon Sediment and Erosion Control Manual*, April 2005 (or most current version), http://www.deq.state.or.us/wq/stormwater/docs/escmanual/appxd.pdf.

b. Following construction, prevention or treatment of on-going stormwater runoff from impervious surfaces must be provided (including but not limited to NWP categories 3, 12, 14, 15, 28, 29, 31, 32, 36, 39, 42, 43, and 51). DEQ encourages prevention of discharge by managing stormwater on site through Low Impact Development principles and other prevention techniques. Assistance in developing an approvable stormwater management plan is available in DEQ's *Stormwater Management Plan Submission Guidelines for Removal/Fill Permit Applications Which Involve Impervious Surfaces*, January 2012 (or most current version), available at: http://www.deq.state.or.us/wq/sec401cert/docs/stormwaterGuidlines.pdf.

c. In lieu of a complete stormwater management plan, the applicant may submit:

i. Documentation of acceptance of the stormwater into a DEQ permitted National Pollutant Discharge Elimination Strategy (NPDES) Phase I or II Municipal Separate Storm Sewer System (MS4); or

ii. Reference to implementation of a programmatic process developed to achieve these expectations, and acknowledged by DEQ as adequately addressing pollution control or reduction through basin-wide post-construction stormwater management practices.

3) Vegetation Protection and Restoration: Riparian, wetland, and in-water vegetation in the authorized project area must be protected from unnecessary disturbance to the maximum extent practicable through methods including:

a. Minimization of project and impact footprint;

b. Designation of staging areas and access points in open, upland areas;

c. Fencing or other barriers demarking construction areas;

d. Use of alternative equipment (e.g., spider hoe or crane); and,

e. Replacement - If authorized work results in unavoidable vegetative disturbance that has not been accounted for in planned mitigation actions; riparian, wetland and in-water vegetation must be successfully reestablished to a degree that it functions (for water quality purposes) at least as well as it did before the disturbance. The vegetation must be reestablished by the completion of authorized work.

4) Land Use Compatibility Statement: In accordance with OAR 340-048-0020(2) (i), each permittee must submit findings prepared by the local land use jurisdiction that demonstrates the activity's compliance with the local comprehensive plan. Such findings can be submitted using Block 7 of the USACE & DSL Joint Permit Application, signed by the appropriate local official and indicating:

a. "This project is consistent with the comprehensive plan and land use regulations;" or,

b. "This project will be consistent with the comprehensive plan and land use regulations when the following local approvals are obtained," accompanied by the obtained local approvals.

c. Rarely, such as for federal projects on federal land, "this project is not regulated by the comprehensive plan" will be acceptable.

5) A copy of all applicable 401 WQC conditions must be kept on the job site and readily available for reference by the permittee, their contractors, DEQ, USACE, NMFS, USFWS, DSL, ODFW, and other appropriate state and local government inspectors.

6) DEQ may modify or revoke these 401 WQC conditions, in accordance with OAR 340-048-0050, in the event that project activities are having a significant adverse impact on state water quality or beneficial uses.

Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

For

Revised Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Stormwater, Transportation, and Utility Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES for Stormwater, Transportation or Utilities)

NMFS Consultation No. NWR-2013-10411

Action Agency: U.S. Army Corps of Engineers
Portland District, Operations and Regulatory Branches

Affected Species and Determinations:

ESA-Listed Species	ESA Status	Is the action likely to adversely affect this species or its critical habitat?	Is the action likely to jeopardize this species?	Is the action likely to destroy or adversely modify critical habitat for this species?
Lower Columbia River Chinook salmon	T	Yes	No	No
Upper Willamette River Chinook salmon	T	Yes	No	No
Upper Columbia River spring-run Chinook salmon	E	Yes	No	No
Snake River spring/summer run Chinook salmon	T	Yes	No	No
Snake River fall-run Chinook salmon	T	Yes	No	No
Columbia River chum salmon	T	Yes	No	No
Lower Columbia River Coho salmon	T	Yes	No	No*
Oregon Coast Coho salmon	T	Yes	No	No
Southern Oregon/Northern California coasts Coho	T	Yes	No	No
Snake River sockeye salmon	E	Yes	No	No
Lower Columbia River steelhead	T	Yes	No	No
Upper Willamette River steelhead	T	Yes	No	No
Middle Columbia River steelhead	T	Yes	No	No
Upper Columbia River steelhead	T	Yes	No	No
Snake River Basin steelhead	T	Yes	No	No
Southern green sturgeon	T	Yes	No	No
Eulachon	T	Yes	No	No
Southern resident killer whale	T	No	No	N/A

*Critical habitat has been proposed for LCR Coho salmon.

Fishery Management Plan that Describes	Would the action adversely affect	Are EFH conservation recommendations
Coastal Pelagic Species	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service West Coast Region

Issued by: for William W. Stelle, Jr. Regional Administrator

Date Issued: March 14, 2014

Excerpt from SLOPES for Stormwater, Transportation, or Utilities General Construction March 14, 2014

Natural hazard response to complete an unplanned, immediate, or short-term repair of a stormwater facility, road, culvert, bridge, or utility line without federal assistance. These include in-water repairs that must be made before the next in-water work period to resolve critical conditions that, unless corrected, are likely to cause loss of human life, unacceptable loss of property, or natural resources. Natural hazards may include, but are not limited to, a flood that causes scour erosion and significantly weakens the foundation of a road or bridge; culvert failure due to blockage by fluvial debris, overtopping, or crushing; and ground saturation that causes a debris slide, earth flow, or rock fall to cover a road. This category of actions is only included to the extent that they require Corps permits or are undertaken by the Corps, but otherwise do not require federal authorization, funding, or federal agency involvement.. The response will include an assessment of its effects to listed species and critical habitats and a plan to bring the response into conformance with all other applicable PDC in this opinion, including compensatory mitigation based on the baseline conditions prior to the natural hazard.

Streambank and channel stabilization to ensure that roads, culverts, bridges and utility lines do not become hazardous due to the long-term effects of toe erosion, scour, subsurface entrainment, or mass failure. This action includes installation and maintenance of scour protection, such as at a footing, facing, or headwall, to prevent scouring or down-cutting of an existing culvert, road foundation, or bridge support. It does not include scour protection for bridge approach fills. Proposed streambank stabilization methods include alluvium placement, vegetated riprap with large wood (LW), log or roughened rock toe, woody plantings, herbaceous cover, deformable soil reinforcement, coir logs, bank reshaping and slope grading, floodplain flow spreaders, floodplain roughness, and engineered log jams (ELJs), alone or in combination. Any action that requires additional excavation or structural changes to a road, culvert, or bridge foundation is covered under road, culvert and bridge maintenance, rehabilitation, and replacement.

Road surface, culvert and bridge maintenance, rehabilitation and replacement. Maintenance, rehabilitation, and replacement to ensure that roads, culverts and bridges remain safe and reliable for their intended use without impairing fish passage, to extend their service life, and to withdraw temporary access roads from service in a way that promotes watershed restoration when their usefulness has ended. This includes actions necessary to complete geotechnical surveys, such as access road construction, drill pad preparation, mobilization and set up, drilling and sampling operations, demobilization, boring abandonment, and access road and drill pad reclamation. It also includes, excavation, grading, and filling necessary to maintain, rehabilitate, or replace existing roads, culverts, and bridges. This type of action does not include significant channel realignment, installation of fish passage (*e.g.*, fish ladders, juvenile fish bypasses, culvert baffles, roughened chutes, step weirs), tidegate maintenance or replacements other than full removal, construction of new permanent roads within the riparian zone that are not a bridge approach, or construction of a new bridge where a culvert or other road stream crossing did not previously exist, or any project which will result in or contribute to other land use changes that trigger effects, including indirect effects not considered in this opinion.

Stormwater facilities and utility line stream crossings to install, maintain, rehabilitate, or replace stormwater facilities, or pipes or pipelines used to transport gas or liquids, including new or upgraded stormwater outfalls, and cables, or lines or wires used to transmit electricity or communication. Construction, maintenance or improvement of stormwater facilities include surveys, access road construction, excavation, grading, and filling necessary to maintain, rehabilitate, or replace existing stormwater treatment or flow control best management practices (BMPs). Utility line actions involve excavation, temporary side casting of excavated material, backfilling of the trench, and restoration of the work site to preconstruction contours and vegetation. This type of action does not include construction or enlargement of gas, sewer, or water lines to support a new or expanded service area for which effects, including indirect effects from interrelated or interdependent activities, have not been analyzed in this opinion. This opinion also does not include construction of any line that transits the bed of an estuary or saltwater area at depths less than -10.0 feet (mean lower low water).

1.3.1.2 Project Design Criteria - General Construction Measures

13. Project Design

a. Use the best available scientific information regarding the likely impacts of climate change on resources in the project area to design the project so that it will be resilient to those impacts, including projections of local stream flow, water temperature, and extreme events.

b. Assess whether the project area is contaminated by chemical substances that may cause harm if released by the project. The assessment will be commensurate with site history and may include the following:

i. Review available records, *e.g.*, the history of existing structures and contamination events.

ii. If the project area was used for industrial processes, inspect to determine the environmental condition of the property.

iii. Interview people who are knowledgeable about the site, *e.g.*, site owners, operators, and occupants, neighbors, or local government officials.

iv. If contamination is found or suspected, consult with a suitably qualified and experienced contamination professional and NMFS before carrying out ground disturbing activities.

c. Obtain all applicable regulatory permits and authorizations before starting construction.

d. Minimize the extent and duration of earthwork, *e.g.*, compacting, dredging, drilling, excavation, and filling.

14. In-Water Work Timing

a. Unless the in-water work is part of a natural hazard response, complete all work within the wetted channel during dates listed in the most recent version of Oregon In-water Work Guidelines (ODFW 2008), except that that in-water work in the Willamette River below Willamette Falls is not approved between December 1 and January 31.

b. Hydraulic and topographic measurements and placement of LW or gravel may be completed anytime, provided the affected area is not occupied by adult fish congregating for spawning, or redds containing eggs or pre-emergent alevins.

15. Pile Installation. Pile may be concrete, or steel round pile 24 inches in diameter or smaller, steel H-pile designated as HP24 or smaller, or wood that has not been treated with preservatives or pesticides. Any proposal to use treated wood pilings is not covered by this consultation and will require individual consultation.

a. NMFS will review and approve pile installation plans.

b. When practical, use a vibratory hammer for in-water pile installation. In the lower Columbia River only a vibratory hammer may be used in October.

c. Jetting may be used to install pile in areas with coarse, uncontaminated sediments that meet criteria for unconfined in-water disposal (USACE Northwest Division 2009).

d. When using an impact hammer to drive or proof a steel pile, one of the following sound attenuation methods will be used:

i. Completely isolate the pile from flowing water by dewatering the area around the pile.

ii. If water velocity is 1.6 feet per second or less, surround the pile being driven by a confined or unconfined bubble curtain that will distribute small air bubbles around 100% of the pile perimeter for the full depth of the water column. See, *e.g.*, NMFS and USFWS (2006), Wursig *et al.* (2000), and Longmuir and Lively (2001).

iii. If water velocity is greater than 1.6 feet per second, surround the pile being driven with a confined bubble curtain (*e.g.*, surrounded by a fabric or non-metallic sleeve) that will distribute air bubbles around 100% of the pile perimeter for the full depth of the water column.

iv. Provide NMFS information regarding the timing of in-water work, the number of impact hammer strikes per pile and the estimated time required to drive piles, hours per day pile driving will occur, depth of water, and type of substrate, hydroacoustic assumptions, and the pile type, diameter, and spacing of the piles.

16. Pile Removal. The following steps will be used to minimize creosote release, sediment disturbance and total suspended solids:

a. Install a floating surface boom to capture floating surface debris.

b. Keep all equipment (*e.g.*, bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline, and complete all work during low water and low current conditions.

c. Dislodge the pile with a vibratory hammer, when possible; never intentionally break a pile by twisting or bending.

d. Slowly lift the pile from the sediment and through the water column.

e. Place the pile in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment. A containment basin for the removed piles and any adhering sediment may be constructed of durable plastic sheeting with sidewalls supported by hay bales or another support structure to contain all sediment and return flow which may otherwise be directed back to the waterway.

f. Fill the hole left by each pile with clean, native sediments immediately after removal.

g. Dispose of all removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site.

17. Broken or Intractable Pile. If a pile breaks above the surface of uncontaminated sediment, or less than 2 feet below the surface, make every attempt short of excavation to remove it entirely. If the pile cannot be removed without excavation, drive the pile deeper if possible.

a. If a pile in contaminated sediment is intractable or breaks above the surface, cut the pile or stump off at the sediment line.

b. If a pile breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site.

c. If dredging is likely where broken piles are buried, use a global positioning system (GPS) device to note the location of all broken piles for future use in site debris characterization.

18. Fish Capture and Release

a. If practicable, allow listed fish species to migrate out of the work area or remove fish before dewatering; otherwise remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, or trapping with minnow traps (or gee-minnow traps).

b. Fish capture will be supervised by a qualified fisheries biologist, with experience in work area isolation and competent to ensure the safe handling of all fish.

c. Conduct fish capture activities during periods of the day with the coolest air and water temperatures possible, normally early in the morning to minimize stress and injury of species present.

d. Monitor the nets frequently enough to ensure they stay secured to the banks and free of organic accumulation.

e. Electrofishing will be used during the coolest time of day, only after other means of fish capture are determined to be not feasible or ineffective.

i. Do not electrofish when the water appears turbid, *e.g.*, when objects are not visible at depth of 12 inches.

ii. Do not intentionally contact fish with the anode.

iii. Follow NMFS (2000) electrofishing guidelines, including use of only direct current (DC) or pulsed direct current within the following ranges:[11]

1. If conductivity is less than 100 µs, use 900 to 1100 volts.
2. If conductivity is between 100 and 300 µs, use 500 to 800 volts.
3. If conductivity greater than 300 µs, use less than 400 volts.

iv. Begin electrofishing with a minimum pulse width and recommended voltage, then gradually increase to the point where fish are immobilized.

v. Immediately discontinue electrofishing if fish are killed or injured, *i.e.*, dark bands visible on the body, spinal deformations, significant de-scaling, torpid or inability to maintain upright attitude after sufficient recovery time. Recheck machine settings, water temperature and conductivity, and adjust or postpone procedures as necessary to reduce injuries.

[11] National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing Salmonid listed under the Endangered Species Act. Portland, Oregon and Santa Rose, California http://swr.nmfs.noaa.gov/sr/Electrofishing_Guidelines.pdf

f. If buckets are used to transport fish:

i. Minimize the time fish are in a transport bucket.

ii. Keep buckets in shaded areas or, if no shade is available, covered by a canopy.

iii. Limit the number of fish within a bucket; fish will be of relatively comparable size to minimize predation.

iv. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water.

v. Release fish in an area upstream with adequate cover and flow refuge; downstream is acceptable provided the release site is below the influence of construction.

vi. Be careful to avoid mortality counting errors.

g. Monitor and record fish presence, handling, and injury during all phases of fish capture and submit a fish salvage report (Appendix A, Part 1 with Part 3 completed) to the Corps and the SLOPES mailbox (slopes.nwr@noaa.gov) within 60 days.

19. Fish Passage

a. Provide fish passage for any adult or juvenile ESA-listed fish likely to be present in the action area during construction, unless passage did not exist before construction or the stream is naturally impassable at the time of construction.

b. After construction, provide fish passage for any adult or juvenile ESA-listed fish that meets NMFS's fish passage criteria (NMFS 2011a) for the life of the action.

20. Fish Screens

a. Submit to NMFS for review and approval fish screen designs for surface water diverted by gravity or by pumping at a rate that exceeds 3 cubic feet per second (cfs).

b. All other diversions will have a fish screen that meets the following specifications:

i. An automated cleaning device with a minimum effective surface area of 2.5 square feet per cubic foot per second, and a nominal maximum approach velocity of 0.4 feet per second, <u>or</u> no automated cleaning device, a minimum effective surface area of 1 square foot per cubic foot per second, and a nominal maximum approach rate of 0.2 foot per second; <u>and</u>

ii. A round or square screen mesh that is no larger than 2.38 millimeters (mm) (0.094") in the narrow dimension, <u>or</u> any other shape that is no larger than 1.75 mm (0.069") in the narrow dimension.

c. Each fish screen will be installed, operated, and maintained according to NMFS's fish screen criteria.

21. Surface Water Withdrawal

a. Surface water may be diverted to meet construction needs, including dust abatement, only if water from developed sources (*e.g.,* municipal supplies, small ponds, reservoirs, or tank trucks) are unavailable or inadequate; and

b. Diversions may not exceed 10% of the available flow and will have a juvenile fish exclusion device that is consistent with NMFS's criteria (NMFS 2011a).[12]

[12] National Marine Fisheries Service 2011. Anadromous Salmonid passage facility design. Northwest Region. http://www.nwr.noaa.gov/publications/hydropower/ferc/fish-passage-design.pdf

22. Construction Discharge Water. Treat all discharge water using best management practices to remove debris, sediment, petroleum products, and any other pollutants likely to be present (*e.g.*, green concrete, contaminated water, silt, welding slag, sandblasting abrasive, grout cured less than 24 hours, drilling fluids), to avoid or minimize pollutants discharged to any perennial or intermittent water body. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel. Treat water used to cure concrete until pH stabilizes to background levels.

23. Temporary Access Roads and Paths

a. Whenever reasonable, use existing access roads and paths preferentially.

b. Minimize the number and length of temporary access roads and paths through riparian areas and floodplains.

c. Minimize removal of riparian vegetation.

d. When it is necessary to remove vegetation, cut at ground level (no grubbing).

e. Do not build temporary access roads or paths where grade, soil, or other features suggest slope instability.

f. Any road on a slope steeper than 30% will be designed by a civil engineer with experience in steep road design.

g. After construction is complete, obliterate all temporary access roads and paths, stabilize the soil, and revegetate the area.

h. Temporary roads and paths in wet areas or areas prone to flooding will be obliterated by the end of the in-water work window. Decompact road surfaces and drainage areas, pull fill material onto the running surface, and reshape to match the original contours.

24. Temporary Stream Crossings

a. No stream crossing may occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel.

b. Do not place temporary crossings in areas that may increase the risk of channel re-routing or avulsion, or in potential spawning habitat, *e.g.*, pools and pool tailouts.

c. Minimize the number of temporary stream crossings; use existing stream crossings whenever reasonable.

d. Install temporary bridges and culverts to allow for equipment and vehicle crossing over perennial streams during construction.

e. Wherever possible, vehicles and machinery will cross streams at right angles to the main channel.

f. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock, or where mats or off-site logs are placed in the stream and used as a crossing.

g. Obliterate all temporary stream crossings as soon as they are no longer needed, and restore any damage to affected stream banks or channel.

25. Equipment, Vehicles and Power Tools

a. Select, operate and maintain all heavy equipment, vehicles, and power tools to minimize adverse effects on the environment, *e.g.*, low pressure tires, minimal hard-turn paths for track vehicles, use of temporary mats or plates to protect wet soils.

b. Before entering wetlands or working within 150 feet of a water body:

i. Power wash all heavy equipment, vehicles and power tools, allow them to fully dry, and inspect them for fluid leaks, and to make certain no plants, soil, or other organic material are adhering to the surface.

ii. Replace petroleum-based hydraulic fluids with biodegradable products[13] in hydraulic equipment, vehicles, and power tools.

c. Repeat cleaning as often as necessary during operation to keep all equipment, vehicles, and power tools free of external fluids and grease, and to prevent a leak or spill from entering the water.

d. Avoid use of heavy equipment, vehicles or power tools below ordinary high water (OHW) unless project specialists determine such work is necessary, or would result in less risk of sedimentation or other ecological damage than work above that elevation.

e. Before entering the water, inspect any watercraft, waders, boots, or other gear to be used in or near water and remove any plants, soil, or other organic material adhering to the surface.

f. Ensure that any generator, crane or other stationary heavy equipment that is operated, maintained, or stored within 150 feet of any water body is also protected as necessary to prevent any leak or spill from entering the water.

26. Site Layout and Flagging

a. Before any significant ground disturbance or entry of mechanized equipment or vehicles into the construction area, clearly mark with flagging or survey marking paint the following areas:

i. Sensitive areas, *e.g.*, wetlands, water bodies, OHW, spawning areas.

ii. Equipment entry and exit points.

iii. Road and stream crossing alignments.

iv. Staging, storage, and stockpile areas.

b. Before the use of herbicides, clearly flag no-application buffer zones.

27. Staging, Storage, and Stockpile Areas

a. Designate and use staging areas to store hazardous materials, or to store, fuel, or service heavy equipment, vehicles and other power equipment with tanks larger than 5 gallons, that are at least 150 feet from any natural water body or wetland, or on an established paved area, such that sediment and other contaminants from the staging area cannot be deposited in the floodplain or stream.

b. Natural materials that are displaced by construction and reserved for restoration, *e.g.*, LW, gravel, and boulders, may be stockpiled within the 100-year floodplain.

c. Dispose of any material not used in restoration and not native to the floodplain outside of the functional floodplain.

[13] For additional information and suppliers of biodegradable hydraulic fluids, motor oil, lubricant, or grease, see, Environmentally Acceptable Lubricants by the U.S. EPA (2011a); *e.g.*, mineral oil, polyglycol, vegetable oil, synthetic ester; Mobil® biodegradable hydraulic oils, Total® hydraulic fluid, Terresolve Technologies Ltd.® bio-based biodegradable lubricants, Cougar Lubrication® 2XT Bio engine oil, Series 4300 Synthetic Bio-degradable Hydraulic Oil, 8060-2 Synthetic Bio-Degradable Grease No. 2, *etc.* The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of Commerce or NMFS of any product or service to the exclusion of others that may be suitable.

d. After construction is complete, obliterate all staging, storage, or stockpile areas, stabilize the soil, and revegetate the area.[14]

28. Drilling and Boring

a. If drilling or boring are used, isolate drilling operations in wetted stream channels using a steel casing or other appropriate isolation method to prevent drilling fluids from contacting water.

b. If drilling through a bridge deck is necessary, use containment measures to prevent drilling debris from entering the channel.

c. Sampling and directional drill recovery/recycling pits, and any associated waste or spoils will be completely isolated from surface waters, off-channel habitats and wetlands.

d. All waste or spoils will be covered if precipitation is falling or imminent.

e. All drilling fluids and waste will be recovered and recycled or disposed to prevent entry into flowing water.

f. If a drill boring case breaks and drilling fluid or waste is visible in water or a wetland, make all possible efforts to contain the waste and contact NMFS within 48 hours.

g. Waste containment

i. All drilling equipment, drill recovery and recycling pits, and any waste or spoil produced, will be contained and then completely recovered and recycled or disposed of as necessary to prevent entry into any waterway. Use a tank to recycle drilling fluids.

ii. When drilling is completed, remove as much of the remaining drilling fluid as possible from the casing (*e.g.*, by pumping) to reduce turbidity when the casing is removed.

29. Pesticide and Preservative-Treated Wood[15]

a. Treated wood may not be used in a structure that will be in or over water or permanently or seasonally flooded wetlands, *except to maintain or repair an existing wood bridge*. The following criteria in b, c, and d below apply to the use of treated wood for maintenance or repair of existing wood bridges.

b. No part of the treated wood may be exposed to leaching by precipitation, overtopping waves, or submersion (*e.g.,* no treated wood piles (per PDC#10, and stringers or decking of a timber bridge can be made from treated wood only if they will be covered by a non-treated wood wearing surface that covers the entire roadway width), and all elements of the structure using the treated wood are designed to avoid or minimize impacts or abrasion that could create treated wood debris or dust.

c. Installation of treated wood

i. Treated wood shipped to the project area will be stored out of contact with standing water and wet soil, and protected from precipitation.

ii. Each load and piece of treated wood will be visually inspected and rejected for use in or above aquatic environments if visible residue, bleeding of preservative, preservative-saturated sawdust, contaminated soil, or other matter is present.

[14] Road and path obliteration refers to the most comprehensive degree of decommissioning and involves decompacting the surface and ditch, pulling the fill material onto the running surface, and reshaping to match the original contour.

[15] Treated woods may contain chromated copper arsenate (CCA), ammoniacal copper zinc arsenate (ACZA), alkaline copper quat (ACQ-B and ACQ-D), ammoniacal copper citrate (CC), copper azole (CBA-A), copper dimethyldithiocarbamate (CDDC), borate preservatives, and oil-type wood preservatives, such as creosote, pentachlorophenol, and copper naphthenate.

iii. Prefabrication will be used whenever possible to minimize cutting, drilling and field preservative treatment.

iv. When field fabrication is necessary, all cutting, drilling, and field preservative treatment of exposed treated wood will be done above OHW to minimize discharge of sawdust, drill shavings, excess preservative and other debris.

v. Tarps, plastic tubs or similar devices will be used to contain the bulk of any fabrication debris, and any excess field preservative will be removed from the treated wood by wiping and proper disposal.

d. Removal of treated wood

i. Evaluate all wood construction debris removed during a project, including pile, to ensure proper disposal of treated wood.

ii. Ensure that no treated wood debris falls into the water or, if debris does fall into the water, remove it immediately.

iii. After removal, place treated wood debris in an appropriate dry storage site until it can be removed from the project area.

iv. Do not leave any treated wood debris in the water or stacked on the streambank at or below OHW.

30. Erosion Control

a. Use site planning and site erosion control measures commensurate with the scope of the project to prevent erosion and sediment discharge from the project site.

b. Before significant earthwork begins, install appropriate, temporary erosion controls downslope to prevent sediment deposition in the riparian area, wetlands, or water body.

c. During construction,

i. Complete earthwork in wetlands, riparian areas, and stream channels as quickly as possible.

ii. Cease project operations when high flows may inundate the project area, except for efforts to avoid or minimize resource damage.

iii. If eroded sediment appears likely to be deposited in the stream during construction, install additional sediment barriers as necessary.

iv. Temporary erosion control measures may include fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.

v. Soil stabilization using wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil, if the materials are free of noxious weeds and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation.

vi. Remove sediment from erosion controls if it reaches 1/3 of the exposed height of the control.

vii. Whenever surface water is present, maintain a supply of sediment control materials and an oil-absorbing floating boom at the project site.

viii. Stabilize all disturbed soils following any break in work unless construction will resume within four days.

d. Remove temporary erosion controls after construction is complete and the site is fully stabilized.

31. Hazardous Material Safety

a. At the project site:

i. Post written procedures for notifying environmental response agencies, including an inventory and description of all hazardous materials present, and the storage and handling procedures for their use.

ii. Maintain a spill containment kit, with supplies and instructions for cleanup and disposal, adequate for the types and quantity of hazardous materials present.

iii. Train workers in spill containment procedures, including the location and use of the spill containment kits.

iv. Temporarily contain any waste liquids generated under an impervious cover, such as a tarpaulin, in the staging area until the wastes can be properly transported to, and disposed of, at an approved receiving facility.

32. Barge Use. Any barge used as a work platform to support construction will be:

a. Large enough to remain stable under foreseeable loads and adverse conditions.

b. Inspected before arrival to ensure vessel and ballast are free of invasive species.

c. Secured, stabilized and maintained as necessary to ensure no loss of balance, stability, anchorage, or other condition that can result in the release of contaminants or construction debris.

33. Dust Abatement

a. Use dust abatement measures commensurate with soil type, equipment use, wind conditions, and the effects of other erosion control measures.

b. Sequence and schedule work to reduce the exposure of bare soil to wind erosion.

c. Maintain spill containment supplies on-site whenever dust abatement chemicals are applied.

d. Do not use petroleum-based products.

e. Do not apply dust-abatement chemicals, *e.g.*, magnesium chloride, calcium chloride salts, lignin sulfonate, within 25 feet of a water body, or in other areas where they may runoff into a wetland or water body.

f. Do not apply lignin sulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50:50 solution of lignin sulfonate to water.

34. Work Area Isolation

a. Isolate any work area within the wetted channel from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300 feet upstream from known spawning habitats.

b. Engineering design plans for work area isolation will include all isolation elements and fish release areas.

c. Dewater the shortest linear extent of work area practicable, unless wetted in-stream work is deemed to be minimally harmful to fish, and is beneficial to other aquatic species.[16]

[16] For instructions on how to dewater areas occupied by lamprey, see *Best management practices to minimize adverse effects to Pacific lamprey* (*Entosphenus tridentatus*) (USFWS 2010).

i. Use a coffer dam and a by-pass culvert or pipe, or a lined, non-erodible diversion ditch to divert flow around the dewatered area. Dissipate flow energy to prevent damage to riparian vegetation or stream channel and provide for safe downstream reentry of fish, preferably into pool habitat with cover.

ii. Where gravity feed is not possible, pump water from the work site to avoid rewatering. Maintain a fish screen on the pump intake to avoid juvenile fish entrainment.

iii. Pump seepage water to a temporary storage and treatment site, or into upland areas, to allow water to percolate through soil or to filter through vegetation before reentering the stream channel with a treatment system comprised of either a hay bale basin or other sediment control device.

iv. Monitor below the construction site to prevent stranding of aquatic organisms.

v. When construction is complete, re-water the construction site slowly to prevent loss of surface flow downstream, and to prevent a sudden increase in stream turbidity.

d. Whenever a pump is used to dewater the isolation area and ESA-listed fish may be present, a fish screen will be used that meets the most current version of NMFS's fish screen criteria (NMFS 2011a). NMFS approval is required for pumping at a rate that exceeds 3 cfs.

35. Invasive and Non-Native Plant Control

a. ***Non-herbicide methods.*** Limit vegetation removal and soil disturbance within the riparian zone by limiting the number of workers there to the minimum necessary to complete manual, mechanical, or hydro-mechanical plant control (*e.g.*, hand pulling, bending[17], clipping, stabbing, digging, brush-cutting, mulching, radiant heat, portable flame burner, super-heated steam, pressurized hot water, or hot foam (Arsenault *et al.* 2008; Donohoe *et al.* 2010))[18]. Do not allow cut, mowed, or pulled vegetation to enter waterways.

b. ***Herbicide Label.*** Herbicide applicators will comply with all label instructions

c. ***Power equipment.*** Refuel gas-powered equipment with tanks larger than 5 gallons in a vehicle staging area placed 150 feet or more from any natural water body, or in an isolated hazard zone such as a paved parking lot.

d. ***Maximum herbicide treatment area.*** Do not exceed treating 1.0% of the acres of riparian habitat within a 6th-field HUC with herbicides per year.

e. ***Herbicide applicator qualifications.*** Herbicides may only be applied by an appropriately licensed applicator using an herbicide specifically targeted for a particular plant species that will cause the least impact. The applicator will be responsible for preparing and carrying out the herbicide transportation and safely plan, as follows.

f. ***Herbicide transportation and safety plan.*** The applicator will prepare and carry out an herbicide safety/spill response plan to reduce the likelihood of spills or misapplication, to take remedial actions in the event of spills, and to fully report the event.

[17] Knotweed treatment pre-treatment; See Nickelson (2013).
[18] See http://ahmct.ucdavis.edu/limtask/equipmentdetails.html

g. ***Herbicides.*** The only herbicides proposed for use under this opinion are (some common trade names are shown in parentheses):[19]

i. aquatic imazapyr (*e.g.*, Habitat)
ii. aquatic glyphosate (*e.g.*, AquaMaster, AquaPro, Rodeo)
iii. aquatic triclopyr-TEA (*e.g.*, Renovate 3)
iv. chlorsulfuron (*e.g.*, Telar, Glean, Corsair)
v. clopyralid (*e.g.*, Transline)
vi. imazapic (*e.g.*, Plateau)
vii. imazapyr (*e.g.*, Arsenal, Chopper)
viii. metsulfuron-methyl (*e.g.*, Escort)
ix. picloram (*e.g.*, Tordon)
x. sethoxydim (*e.g.*, Poast, Vantage)
xi. sulfometuron-methyl (*e.g.*, Oust, Oust XP)

h. ***Herbicide adjuvants.*** When recommended by the label, an approved aquatic surfactant or drift retardant can be used to improve herbicidal activity or application characteristics. Adjuvants that contain alky amine etholoxylates, *i.e.*, polyethoxylated tallow amine (POEA), alkylphenol ethoxylates (including alkyl phenol ethoxylate phosphate esters), or herbicides that contain these compounds are **not** covered by this opinion. The following product names are covered by this opinion:

i. Agri-Dex
ii. AquaSurf
iii. Bond
iv. Bronc Max
v. Bronc Plus Dry-EDT
vi. Class Act NG
vii. Competitor
viii. Cut Rate
ix. Cygnet Plus
x. Destiny HC
xi. Exciter
xii. Fraction
xiii. InterLock
xiv. Kinetic
xv. Level 7
xvi. Liberate
xvii. Magnify
xviii. One-AP XL
xix. Pro AMS Plus
xx. Spray-Rite
xxi. Superb HC
xxii. Tactic
xxiii. Tronic

i. ***Herbicide carriers.*** Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil. Use of diesel oil as an herbicide carrier is not covered by this opinion.

j. ***Dyes.*** Use a non-hazardous indicator dye (*e.g.*, Hi-Light or Dynamark™) with herbicides within 100 feet of water. The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye also makes it easier to detect missed spots, avoid spraying a plant or area more than once, and minimize over-spraying (SERA 1997).

k. ***Herbicide mixing.*** Mix herbicides and adjuvants, carriers, and/or dyes more than 150 feet from any perennial or intermittent water body to minimize the risk of an accidental discharge.

[19] The use of trade, firm, or corporation names in this opinion is for the information and convenience of the action agency and applicants and does not constitute an official endorsement or approval by the U.S. Department of Commerce or NMFS of any product or service to the exclusion of others that may be suitable.

i. ***Tank Mixtures.*** The potential interactive relationships that exist among most active ingredient combinations have not been defined and are uncertain. Therefore, combinations of herbicides in a tank mix are not covered by this opinion.

m. ***Spill Cleanup Kit.*** Provide a spill cleanup kit whenever herbicides are used, transported, or stored. At a minimum, cleanup kits will include material safety data sheets, the herbicide label, emergency phone numbers, and absorbent material such as cat litter to contain spills.

n. ***Herbicide application rates.*** Apply herbicides at the lowest effective label rates.

o. ***Herbicide application methods.*** Apply liquid or granular forms of herbicides as follows:

i. Broadcast spraying – hand held nozzles attached to back pack tanks or vehicles, or by using vehicle mounted booms.

ii. Spot spraying – hand held nozzles attached to back pack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants.

iii. Hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump.

iv. Triclopyr – will not be applied by broadcast spraying.

v. Keep the spray nozzle within four feet of the ground when applying herbicide. If spot or patch spraying tall vegetation more than 15 feet away from the high water mark (HWM), keep the spray nozzle within 6 feet of the ground.

vi. Apply spray in swaths parallel towards the project area, away from the creek and desirable vegetation, *i.e.*, the person applying the spray will generally have their back to the creek or other sensitive resource.

vii. Avoid unnecessary run off during cut surface, basal bark, and hack-squirt/injection applications.

p. ***Washing spray tanks.*** Wash spray tanks 300 feet or more away from any surface water.

q. ***Minimization of herbicide drift and leaching.*** Minimize herbicide drift and leaching as follows:

i. Do not spray when wind speeds exceed 10 miles per hour, or are less than 2 miles per hour.

ii. Be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind.

iii. Keep boom or spray as low as possible to reduce wind effects.

iv. Increase spray droplet size whenever possible by decreasing spray pressure, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents.

v. Do not apply herbicides during temperature inversions, or when air temperature exceeds 80 degrees Fahrenheit.

vi. Wind and other weather data will be monitored and reported for all broadcast applications.

r. ***Rain.*** Do not apply herbicides when the soil is saturated or when a precipitation event likely to produce direct runoff to salmon bearing waters from the treated area is forecasted by the NOAA National Weather Service or other similar forecasting service within 48 hours following application. Soil-activated herbicides may follow label instructions. Do not conduct hack-squirt/injection applications during periods of heavy rainfall.

s. ***Herbicide buffer distances.*** Observe the following no-application buffer-widths, measured in feet, as map distance perpendicular to the bankfull elevation for streams, the upland boundary for wetlands, or the upper bank for roadside ditches. Widths are based on herbicide formula, stream type, and application method, during herbicide applications (Table 3). Before herbicide application begins, flag or mark the upland boundary of each applicable herbicide buffer to ensure that all buffers are in place and functional during treatment.

Table 3. Herbicide buffer distances by herbicide formula, stream type, and application method.

Herbicide	**No Application Buffer Width (feet)**					
	Streams and Roadside Ditches with flowing or standing water present and Wetlands			Dry Streams, Roadside Ditches, and Wetlands		
	Broadcast Spraying	Spot Spraying	Hand Selective	Broadcast Spraying	Spot Spraying	Hand Selective
Labeled for Aquatic Use						
Aquatic Glyphosate	100	waterline	waterline	50	None	none
Aquatic Imazapyr	100	15	waterline	50	None	none
Aquatic Triclopyr-TEA	**Not Allowed**	15	waterline	**Not Allowed**	None	none
Low Risk to Aquatic Organisms						
Imazapic	100	15	bankfull elevation	50	None	none
Clopyralid	100	15	bankfull elevation	50	None	none
Metsulfuron-methyl	100	15	bankfull elevation	50	None	none
Moderate Risk to Aquatic Organisms						
Imazapyr	100	50	bankfull elevation	50	15	bankfull elevation
Sulfometuron-methyl	100	50	5	50	15	bankfull elevation
Chlorsulfuron	100	50	bankfull elevation	50	15	bankfull elevation
High Risk to Aquatic Organisms						
Picloram	100	50	50	100	50	50
Sethoxydim	100	50	50	100	50	50

36. Actions Requiring Stormwater Management[20]

a. Provide stormwater management for any project that will:

i. Increase the contributing impervious area within the project area

ii. Construct new pavement that increases capacity or widens the road prism.

iii. Reconstructs pavement down to subgrade.

iv. Rehabilitate or restore a bridge to repair structural or functional deficiencies that are too complicated to be corrected through normal maintenance, except for seismic retrofits that make a bridge more resistant to earthquake damage (*e.g.*, external post-tensioning, supplementary dampening) but do not affect the bridge deck or drainage.

v. Replace a stream crossing

vi. Change stormwater conveyance

b. Stormwater management is not required for the following pavement actions: minor repairs, patching, chip seal, grind/inlay, overlay or resurfacing (*i.e.,* nonstructural pavement preservation, a single lift or inlay).

c. Stormwater management plans will consist of:

i. Low impact development.

ii. Water quality (pollution reduction) treatment for post-construction stormwater runoff from all contributing impervious area.

iii. Water quantity treatment (retention or detention facilities), unless the outfall discharges directly into a major water body (*e.g.,* mainstem Columbia River, Willamette River (downstream of Eugene), large lakes, reservoir, ocean, or estuary). Retention or detention facilities must limit discharge to match pre-developed discharge rates (i.e., the discharge rate of the site based on its natural groundcover and grade before any development occurred) using a continuous simulation for flows between 50% of the 2-year event and the 10-year flow event (annual series).

d. Stormwater management plans will:

i. Explain how runoff from all contributing impervious area that is within or contiguous with the project area will be managed using site sketches, drawings, specifications, calculations, or other information commensurate with the scope of the action.

ii. Identify the pollutants of concern.

iii. Identify all contributing and non-contributing impervious areas that are within and contiguous with the project area.

iv. Describe the BMPs that will be used to treat the identified pollutants of concern, and the proposed maintenance activities and schedule for the treatment facilities.

[20] The most efficient way for an applicant or the Corps to prepare and submit a stormwater management plan for NMFS' review is to attach a completed *Checklist for Submission of a Stormwater Management Plan* (the *Checklist*, ODEQ updated 2012, or the most recent version) with the electronic notification when it is sent to the SLOPES mailbox. However, stormwater conveyance to a DEQ permitted Municipal Separate Storm Sewer System (MS4) or consistency with any other program acknowledged by DEQ as adequate for stormwater management will not meet the requirements of this opinion unless NMFS determines that the facility accepting the stormwater will provide a level of treatment that is equivalent to that called for in this opinion. The *Checklist* and guidelines for its use are available from NMFS or the ODEQ in Portland Oregon. The latest version of the *Checklist* is also available online in a portable document format (pdf) through the ODEQ Water Quality Section 401 certification webpage (ODEQ 2014) at http://www.deq.state.or.us/wq/sec401cert/process.htm#add (see "Post Construction Stormwater Management Plan").

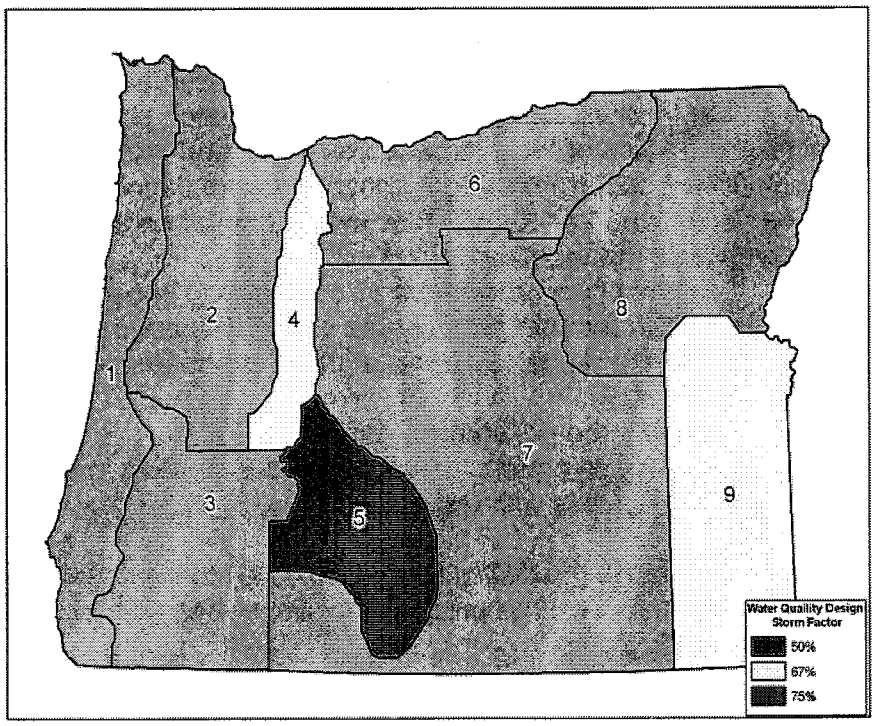
v. Provide a justification for the capacity of the facilities provided based on the expected runoff volume, including, *e.g.*, the design storm, BMP geometry, analyses of residence time, as appropriate.

vi. Include the name, email address, and telephone number of the person responsible for designing the stormwater management facilities that NMFS may contact if additional information is necessary to complete the effects analysis.

vii. The proposed action will include a maintenance, repair, and component replacement plan that details what needs to be done, when, and by whom for each facility.

e. All stormwater quality treatment practices and facilities will be designed to accept and fully treat the volume of water equal to 50% of the cumulative rainfall from the 2-year, 24-hour storm for that site, except as follows: climate zone 4 – 67%; climate zone 5 – 75%; and climate zone 9 – 67% (Figure 1). (ESA-listed species considered in this opinion are unlikely to occur in Zones 5 or 9.) A continuous rainfall/runoff model may be used instead of runoff depths to calculate water quality treatment depth.

Figure 1. Water Quality Design Storm Factor – Oregon Climate Regions (Oregon Department of Transportation 2008)



f. Use low impact development practices to infiltrate or evaporate runoff to the maximum extent feasible. For runoff that cannot be infiltrated or evaporated and therefore will discharge into surface or subsurface waters, apply one or more of the following specific primary treatment practices, supplemented with appropriate soil amendments:

i. Bioretention cell
ii. Bioslope, also known as an "ecology embankment"
iii. Bioswale
iv. Constructed wetlands
v. Infiltration pond
vi. Media filter devices with demonstrated effectiveness. Propriety devices should be on a list of "Approved Proprietary Stormwater Treatment Technologies" *i.e.*, City of Portland (2008) Stormwater Management Manual. Bureau of Environmental Services.
vii. Porous pavement, with no soil amendments and appropriate maintenance
viii. All stormwater flow control treatment practices and facilities will be designed to maintain the frequency and duration of instream flows generated by storms within the following end-points:
1. Lower discharge endpoint, by U.S. Geological Survey (USGS) flood frequency zone:
a. Western Region = 42% of 2-year event
b. Eastern Region
i. Southeast, Northeast, North Central = 48% of 2-year event
ii. Eastern Cascade = 56% of 2-year event
2. Upper discharge endpoint
a. Entrenchment ratio <2.2 = 10-year event, 24-hour storm
b. Entrenchment ratio >2.2 = bank overtopping event

g. When conveyance is necessary to discharge treated stormwater directly into surface water or a wetland, the following requirements apply:

i. Maintain natural drainage patterns.
ii. To the maximum extent feasible, ensure that water quality treatment for contributing impervious area runoff is completed before commingling with offsite runoff for conveyance.
iii. Prevent erosion of the flow path from the project to the receiving water and, if necessary, provide a discharge facility made entirely of manufactured elements (*e.g.*, pipes, ditches, discharge facility protection) that extends at least to OHW.

h. **NMFS review and approval.** NMFS will review proposed stormwater treatment and new or upgraded stormwater outfalls plans.

37. Site Restoration

a. Restore any significant disturbance of riparian vegetation, soils, stream banks or stream channel.

b. Remove all project related waste; *e.g.*, pick up trash, sweep roadways in the project area to avoid runoff-containing sediment, *etc.*

c. Obliterate all temporary access roads, crossings, and staging areas.

d. Loosen compacted areas of soil when necessary for revegetation or infiltration.

e. Although no single criterion is sufficient to measure restoration success, the intent is that the following features should be present in the upland parts of the project area, within reasonable limits of natural and management variation:

i. Human and livestock disturbance, if any, are confined to small areas necessary for access or other special management situations.

ii. Areas with signs of significant past erosion are completely stabilized and healed, bare soil spaces are small and well-dispersed.

iii. Soil movement, such as active rills and soil deposition around plants or in small basins, is absent or slight and local.

iv. Native woody and herbaceous vegetation, and germination microsites, are present and well distributed across the site; invasive plants are absent.

v. Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation.

vi. Plant litter is well distributed and effective in protecting the soil with little or no litter accumulated against vegetation as a result of active sheet erosion ("litter dams").

vii. A continuous corridor of shrubs and trees appropriate to the site are present to provide shade and other habitat functions for the entire streambank.

38. Revegetation

a. Plant and seed disturbed areas before or at the beginning of the first growing season after construction.

b. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, *etc.* When feasible, use vegetation salvaged from local areas scheduled for clearing due to development.

c. Use species native to the project area or region that will achieve shade and erosion control objectives, including forb, grass, shrub, or tree species that are appropriate for the site.

d. Short-term stabilization measures may include use of non-native sterile seed mix if native seeds are not available, weed-free certified straw, jute matting, and similar methods.

e. Do not apply surface fertilizer within 50 feet of any wetland or water body.

f. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

g. Do not use invasive or non-native species for site restoration.

h. Conduct post-construction monitoring and treatment to remove or control invasive plants until native plant species are well-established.

39. Actions That Require Compensatory Mitigation

a. The Corps will rely on 33 CFR 332.3 when considering appropriate mitigation. The first option for an applicant is to purchase credits from an appropriate mitigation bank. The second option is to purchase credits from an approved in-lieu-fee sponsor. The third option is Permittee-responsible mitigation. The fourth option is a combination of some or all of the above options that collectively satisfies the mitigation requirements.

b. NMFS will review and approve compensatory mitigation plans.

c. The following actions require compensatory mitigation:

i. Any stormwater management facility that requires a new or enlarged structure within the riparian zone; or that has insufficient capacity to infiltrate and retain the volume of stormwater called for by this opinion.

ii. Any riprap revetment that extends rock above the streambank toe extends the use of riprap laterally into an area that was not previously revetted, or revetment that does not include adequate vegetation and LW.

iii. Any bridge rehabilitation or replacement that does not span the functional floodplain, or causes a net increase in fill within the functional floodplain.

d. The electronic notification (Appendix A, Part 1 with Part 4 completed) for an action that requires compensatory mitigation will explain how the Corps or applicant will complete the mitigation, including site sketches, drawings, specifications, calculations, or other information commensurate with the scope of the action.

e. Include the name, address, and telephone number of a person responsible for designing this part of the action that NMFS may contact if additional information is necessary to complete the effects analysis.

f. Describe practices that will be used to ensure:

i. No net loss of habitat function

ii. Completion before, or concurrent with, construction whenever possible

iii. Achieve a mitigation ratio that is greater than one-to-one and larger (*e.g.*, 1.5 to1.0 when necessary to compensate for time lags between the loss of conservation value in the project area and replacement of conservation value in the mitigation area, uncertainty of conservation value replacement in the mitigation area, or when the affected area has demonstrably higher conservation value than the mitigation area.[21]

iv. When practicable and environmentally sound, mitigation should be near the project impact site, or within the same local watershed and area occupied by the affected population(s) and age classes. Mitigation should be completed prior to or concurrent with the adverse impacts, or have an increased ratio as noted above.

[21] For additional information on compensatory mitigation, see Compensatory Mitigation for Losses of Aquatic Resources (33CFR332) at *www.poa.usace.army.mil/Portals/34/docs/regulatory/33cfr332.pdf.* More information is available from the U.S. Army Corps of Engineers, Portland District, Portland, Oregon. See: http://www.nwp.usace.army.mil/Missions/Regulatory/Mitigation.aspx

v. To minimize delays and objections during the review process, applicants are encouraged to seek the advice of NMFS during the planning and design of mitigation plans. For complex mitigation projects, such consultation may improve the likelihood of mitigation success and reduce permit-processing time.

g. For stormwater management:

i. The primary habitat functions of concern are related to the physical and biological features essential to the long-term conservation of listed species, *i.e.*, water quality, water quantity, channel substrate, floodplain connectivity, forage, natural cover (such as submerged and overhanging LW, aquatic vegetation, large rocks and boulders, side channels and undercut banks), space, and free passage.

ii. Acceptable mitigation for riparian habitat displaced by a stormwater treatment facility is restoration of shallow-water or off-channel habitat

iii. Acceptable mitigation for inadequate stormwater treatment includes providing adequate stormwater treatment where it did not exist before, and retrofitting an existing but substandard stormwater facility to provide capacity necessary to infiltrate and retain the proper volume of stormwater. Such mitigation can be measured in terms of deficit stormwater treatment capacity.

h. For riprap:

i. The primary habitat functions of concern are related to floodplain connectivity, forage, natural cover, and free passage.

ii. Acceptable mitigation for those losses include removal of existing riprap; retrofit existing riprap with vegetated riprap and LW, or one or more other streambank stabilization methods described in this opinion, and restoration of shallow water or off-channel habitats.

i. For a bridge replacement:

i. The primary habitat functions of concern are floodplain connectivity, forage, natural cover, and free passage.

ii. Acceptable mitigation is removing fill from elsewhere in the floodplain – native channel material, soil and vegetation may not be counted as fill.

j. Mitigation actions will meet general construction criteria and other appropriate minimization measures (dependent on the type of proposed mitigation).

1.3.1.3 Project Design Criteria - Types of Actions

40. Natural Hazard Response

a. A manager of a state, regional, county, or municipal stormwater facility, public transportation feature, or utility must initiate a natural hazard response by notifying the Corps.[22] The Corps will encourage the applicant to:

i. Act as necessary to resolve the initial natural hazard.

ii. Without endangering human life or contributing to further loss of property or natural resources, apply all proposed design criteria from this opinion which are applicable to the response to the maximum extent possible.

b. The Corps will also contact NMFS as part of the natural hazard response.

i. As soon as possible after the onset of the natural hazard, the Corps will require the applicant to contact the Corps and NMFS to describe the nature and location of the natural hazard, review design criteria from this opinion that are applicable to the situation, and determine whether additional steps may be taken to further minimize the effects of the initial response action on listed species or their critical habitat.

ii. For the Oregon Coast contact Ken Phippen (541-957-3385), for the Willamette Basin contact Marc Liverman (503-231-2336), and Lower Columbia River up to and including Oregon tributaries contact Jeff Fisher (360-534-9342), and for eastern Oregon contact Dale Bambrick (509-962-8911x221).

41. Streambank and Channel Stabilization

a. The following streambank stabilization methods may be used individually or in combination:

i. Alluvium placement
ii. Large wood placement
iii. Vegetated riprap with large wood
iv. Roughened toe
v. Woody plantings
vi. Herbaceous cover, in areas where the native vegetation does not include trees or shrubs.
vii. Bank reshaping and slope grading
viii. Coir logs
ix. Deformable soil reinforcement
x. Engineered log jams (ELJ)
xi. Floodplain flow spreaders
xii. Floodplain roughness

[22] Natural hazard response actions do not include federal assistance following a gubernatorial, county or local declaration of emergency or disaster with a request for federal assistance; a federal declaration of emergency or disaster; or any response to an emergency or disaster that takes place on federal property or to a federal asset because those actions are subject to emergency consultation provisions of 50 CFR 402.05

b. For more information on the above methods see Federal Emergency Management Agency (2009)[23] or Cramer *et al.* (2003).[24] Other than those methods relying solely upon woody and herbaceous plantings, streambank stabilization projects should be designed by a qualified engineer that is appropriately registered in the state where the work is performed.

c. Stream barbs and full-spanning weirs are not allowed for stream bank stabilization under this opinion.

d. Alluvium Placement can be used as a method for providing bank stabilization using imported gravel/cobble/boulder-sized material of the same composition and size as that in the channel bed and banks, to halt or attenuate streambank erosion, and stabilize riffles. This method is predominantly for use in small to moderately sized channels and is not appropriate for application in mainstem systems. These structures are designed to provide roughness, redirect flow, and provide stability to adjacent streambed and banks or downstream reaches, while providing valuable fish and wildlife habitat.

i. **NMFS fish passage review and approval.** NMFS will review alluvium placement projects that would occupy more than 25% of the channel bed or more than 25% of the bankfull cross sectional area.

ii. This design method is only approved in those areas where the natural sediment supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate or simulate sediment accumulations in conjunction with other structures, such as LW placements and ELJs.

iii. Material used to construct the toe should be placed in a manner that mimics attached longitudinal bars or point bars.

iv. Size distribution of toe material will be diverse and predominately comprised of D_{84} to D_{max} size class material.

v. Spawning gravels will constitute at least one-third of the total alluvial material used in the design.

vi. Spawning gravels are to be placed at or below an elevation consistent with the water surface elevation of a bankfull event.

vii. Spawning size gravel can be used to fill the voids within toe and bank material and placed directly onto stream banks in a manner that mimics natural debris flows and erosion.

viii. All material will be clean alluvium with similar angularity as the natural bed material. When possible use material of the same lithology as found in the watershed. Reference *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream.

ix. Material can be mined from the floodplain at elevations above bankfull, but not in a manner that will cause stranding during future flood events.

x. Crushed rock is not permitted.

xi. After placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.

[23] http://www.fema.gov/pdf/about/regions/regionx/Engineering_With_Nature_Web.pdf
[24] http://wdfw.wa.gov/publications/00046/wdfw00046.pdf

xii. Do not place material directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.

xiii. Imported material will be free of invasive species and non-native seeds. If necessary, wash prior to placement.

e. **Large Wood Placements** are defined as structures composed of LW that do not use mechanical methods as the means of providing structure stability (*i.e.,* large rock, rebar, rope, cable, *etc.*). The use of native soil, alluvium with similar angularity as the natural bed material, large wood, or buttressing with adjacent trees as methods for providing structure stability are authorized. This method is predominantly for use in small to moderately sized channels and is not appropriate for application in mainstem systems. These structures are designed to provide roughness, redirect flow, and provide stability to adjacent streambed and banks or downstream reaches, while providing valuable fish and wildlife habitat.

i. **NMFS fish passage review and approval.** NMFS will review LW placement projects that would occupy greater than 25% of the bankfull cross section area.

ii. Structure shall simulate disturbance events to the greatest degree possible and include, but not be limited to, log jams, debris flows, wind-throw, and tree breakage.

iii. Structures may partially or completely span stream channels or be positioned along stream banks.

iv. Where structures partially or completely span the stream channel LW should be comprised of whole conifer and hardwood trees, logs, and rootwads. LW size (diameter and length) should account for bankfull width and stream discharge rates.

v. Structures will incorporate a diverse size (diameter and length) distribution of rootwad or non-rootwad, trimmed or untrimmed, whole trees, logs, snags, slash, *etc.*

vi. For individual logs that are completely exposed, or embedded less than half their length, logs with rootwads should be a minimum of 1.5 times bankfull channel width, while logs without rootwads should be a minimum of 2.0 times bankfull width.

vi. Consider orienting key pieces such that the hydraulic forces upon the LW increase stability.

f. Vegetated riprap with large wood (LW)

i. NMFS will review and approve bank stabilization projects that use vegetated riprap with LW.

ii. When this method is necessary, limit installation to the areas identified as most highly erodible, with highest shear stress, or at greatest risk of mass-failure, and provide compensatory mitigation. The greatest risk of mass-failure will usually be at the toe of the slope and will not extend above OHW elevation except in incised streams.

iii. Do not use invasive or non-native species for site restoration.

iv. Remove or control invasive plants until native plant species are well-established.

v. Do not apply surface fertilizer within 50-feet of any stream channel.

vi. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

vii. Vegetated riprap with LW will be installed as follows:

1. When present, use natural hard points, such as large, stable trees or rock outcrops, to begin or end the toe of the revetment.

2. Develop rock size gradations for elevation zones on the bank, especially if the rock will extend above OHW – the largest rock should be placed at the toe of the slope, while small rock can be used higher in the bank where the shear stress is generally lower. Most upper bank areas will not require the use of any rock but can depend on the vegetation for erosion protection.

3. For bank areas above OHW where rock is still deemed necessary, mix rock with soil to provide a better growing medium for plants.

4. Minimum amount of wood incorporated into the treated area, for mitigation of riprap, is equal to the number of whole trees whose cumulative summation of rootwad diameters is equal to 80% of linear-feet of treated streambank or 20% of the treated area (square feet) of streambank, whichever is greater.

5. Where whole trees are not used (*i.e.,* snags, logs, and partial trees) designers are required to estimate the dimensions of parent material based on rootwad diameter, and calculating a cumulative equivalency of whole trees.

6. LW should be distributed throughout the structure (not just concentrated at the toe) to engage flows up to the bankfull flow. LW placed above the toe may be in the form of rootwad or non-rootwad, trimmed or untrimmed, whole trees, logs, snags, slash, *etc.* Maximize the exposure of wood to water by placing and orienting wood to project into the water column up to the bankfull elevation.

7. Develop an irregular toe and bank line to increase roughness and habitat value.

8. Use LW and irregular rock to create large interstitial spaces and small alcoves to create planting spaces and habitat to mitigate for flood-refuge impacts – do not use geotextile fabrics as filter behind the riprap whenever possible, if a filter is necessary to prevent sapping, use a graduated gravel filter.

9. Structure toe will incorporate LW with intact rootwads. Minimum spacing between rootwads placed at the toe will be no greater than an average rootwad diameter.

10. Minimum rootwad diameter for LW placed at the toe of the structure shall be 1.0 times the bankfull depth, unless LW availability constrains the project to a smaller rootwad size. Where rootwad size is constrained due to availably, the largest diameter rootwads available should be used.

11. LW placed at the toe will be sturdy material, intact, hard, and undecayed and should be sized or embedded sufficiently to withstand the design flood.

12. Space between root wads may be filled with large boulders, trimmed or untrimmed, whole trees, logs, snags, slash, *etc.*

When used, diameter of boulders placed between toe logs with rootwads should be 1.5 to 2.0 times log diameter at breast height (dbh) of adjacent toe logs. A reasonable maximum rock size is 5-6 feet in diameter.

13. Plant woody vegetation in the joints between the rocks to enhance streambank vegetation.

14. Where possible, use terracing, or other bank shaping, to increase habitat diversity.

15. When possible, create or enhance a vegetated riparian buffer.

viii. Monitor vegetated riprap each year following installation by visual inspection during low flows to examine transitions between undisturbed and treated banks to ensure that native soils above and behind the riprap are not collapsing, sinking, or showing other evidence of piping loss or movement of rock materials; and the overall integrity of the riprap treatment, including:

1. Loss of rock materials
2. Survival rate of vegetation
3. Anchoring success of LW placed in the treatment.
4. Any channel changes since construction.

g. Roughened toe

i. Where designs use any of the approved streambank stabilization methods outlined in this section, in lieu of lining the bank with riprap above the toe, the design of any rock-filled toe will adhere to project criteria outlined in (f) Vegetated riprap with large wood (7-15, from above).

ii. Minimum amount of wood incorporated into the treated area, for mitigation of riprap, is equal to the number of whole trees whose cumulative summation of rootwad diameters is equal to 80% of linear-feet of treated streambank.

h. **Engineered log jams (ELJ).** ELJs are structures composed of LW with at least three key members and incorporating the use of any mechanical anchoring system (*i.e.*, rebar, rope, angular or large rock, *etc.*). Native soil, simulated streambed and bank materials, wood, or buttressing with adjacent trees, are not mechanical anchoring systems. ELJs are designed to redirect flow, provide roughness, and provide stability to adjacent streambed and banks or downstream reaches, while providing valuable fish and wildlife habitat.

i. **NMFS fish passage review and approval.** NMFS will review proposed ELJ projects.

ii. ELJs will be patterned, to the greatest degree possible, after stable natural log jams.

iii. Stabilizing or key pieces of LW will be intact and solid (little decay). If possible, acquire LW with untrimmed rootwads to provide functional refugia habitat for fish.

i. If LW mechanical anchoring is required, a variety of methods may be used. These include large angular rock, buttressing the wood between adjacent trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, rebar pinning or bolted connections, may be used. Use of cable is not covered by this opinion.

j. When a hole in the channel bed caused by local scour will be filled with rock to prevent damage to a culvert, road, or bridge foundation, the amount of rock will be limited to the minimum necessary to protect the integrity of the structure.

k. When a footing, facing, head wall, or other protection will be constructed with rock to prevent scouring or down-cutting of, or fill slope erosion or failure at, an existing culvert or bridge, the amount of rock used will be limited to the minimum necessary to protect the integrity of the structure. Whenever feasible, include soil and woody vegetation as a covering and throughout the structure.

42. Road Maintenance, Rehabilitation and Replacement

a. All maintenance and rehabilitation actions shall observe applicable criteria detailed in the most recent version of NMFS fish passage criteria

i. Projects affecting fish passage shall adhere to industry design standards found in the most recent version of any of the following:

1. *Water Crossings Design Guidelines* (Barnard *et al.* 2013)[25]
2. *Part XII, Fish Passage Design and Implementation, Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2009)[26]
3. *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream* (USDA-Forest Service 2008)[27]
4. Or other design references approved by NMFS.

ii. Routine road surface, culvert and bridge maintenance activity will be completed in accordance with the *ODOT Routine Road Maintenance: Water Quality and Habitat Guide Best Management Practices* (ODOT 2009) or the most recent version approved by NMFS, unless maintenance activities and practices in that manual conflict with PDC in this opinion.

1. Any conflict between ODOT (2009) and this opinion (*e.g.*, stormwater management for maintenance yards, erosion repair related to use of riprap, dust abatement, and use of pesticides) will be resolved in favor of PDC in this opinion.

b. Grade stabilization

i. Grade control materials may include both rock and LW. Material shall not in any part consist of gabion baskets, sheet piles, concrete, articulated concrete blocks, or cable anchors.

ii. Grade control shall be provided using morphologically-appropriate constructed riffles for riffle-pool morphologies, rough constructed riffles/ramps for plane bed morphologies, wood/debris jams, rock bands, and boulder weirs for step-pool morphologies, and roughened channels for cascade morphologies.

iii. LW placements and ELJs may be used to control grade individually or together with other grade control methods by simulating natural log jams and debris accumulation that traps sediment and creates forced, riffle-pool, step-pool, or cascade-pool morphologies.

[25] http://wdfw.wa.gov/publications/01501/
[26] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=12512
[27] http://stream.fs.fed.us/fishxing/aop_pdfs.html

iv. Stream banks and bed shall be designed to be immobile at the design event to reduce undermining and flanking.

v. The crest of channel spanning structures will be slightly sloped on either side, with the low point in the center, to direct flows to the middle of channel and away from streambanks. Install these structures low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.0- to 1.5-year flow event).

vi. Construct boulder weir structures in a 'V' or 'U' shape, oriented with the apex upstream.

vii. Key all structures into the streambed at a depth which minimizes structure undermining due to scour, at least 2.5 times their exposure height, or the Lower Vertical Adjustment Potential (LVAP) line with an offset of 2 times D_{90}, whichever is deeper.

1. LVAP, and 2 times D_{90} offset, as calculated in *Stream Simulation: An ecological approach to providing passage for aquatic organisms at road crossings* (USDA-Forest Service 2008).

viii. Structures should be keyed into both banks—if feasible greater than 8 feet.

ix. If several drop structures will be used in series, space them at the appropriate distances to promote fish passage of target species and life histories. Incorporate NMFS (2011a) fish passage criteria (jump height, pool depth, *etc.*) in the design of drop structures.

x. Recommended spacing for boulder weirs should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure designed with a project slope of two-percent gradient will have a minimum spacing of 50-feet [1/0.02]). Maximum project slope for boulder weir designs is 5%.

xi. A series of short steep rough ramps/chutes, cascades, or roughened channel type structures, broken up by energy dissipating pools, are required where project slope is greater than 5%.

c. Rock Structures

i. Rock structures will be constructed out of a mix of well-graded boulder, cobble, and gravel, including the appropriate level of fines, to allow for compaction and sealing to ensure minimal loss of surface flow through the newly placed material.

ii. Rock sizing depends on the size of the stream, maximum depth of flow, plan form, entrenchment, and ice and debris loading.

iii. The project designer or an inspector experienced in these structures should be present during installation.

iv. To ensure that the structure is adequately sealed, no sub-surface flow will be present before equipment leaves the site.

v. Rock shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used.

i. Where feasible, channel spanning structures should be coupled with LW to improve habitat complexity of riparian areas.

d. Structure Stabilization

i. When a footing, facing, head wall, or other protection will be constructed with rock to prevent scouring or down-cutting of, or fill slope erosion or failure at, an existing culvert or bridge, the amount of rock used is limited to the minimum necessary to protect the integrity of the structure. Include soil, vegetation, and wood throughout the structure to the level possible.

e. Road-stream crossing replacement or retrofit

i. Projects shall adhere to industry design standards found in the most recent version any of the following:

1. *Water Crossings Design Guidelines* (Barnard *et al.* 2013)[28]
2. *Part XII, Fish Passage Design and Implementation, Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2009)[29]
3. *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream* (USDA-Forest Service 2008)[30]
4. Or other design references approved by NMFS.

i. General road-stream crossing criteria

1. Span

a. Span is determined by the crossing width at the proposed streambed grade.

b. Single span structures will maintain a clear, unobstructed opening above the general scour elevation that is at least as wide as 1.5 times the active channel width.[31]

c. Multi-span structures will maintain clear, unobstructed openings above the general scour elevation (except for piers or interior bents) that are at least as wide as 2.2 times the active channel width.

d. Entrenched streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the crossing width will accommodate the flood prone width. Flood prone width is the channel width measured at twice the maximum bankfull depth (Rosgen 1996).

e. Minimum structure span is 6 feet.

2. Bed Material

a. Install clean alluvium with similar angularity as the natural bed material, no crushed rock.

b. Bed material shall be designed based on the native particle size distribution of the adjacent channel or reference reach, as quantified by a pebble count.

c. Rock band designs as detailed in *Water Crossings Design Guidelines* (Barnard *et al.* 2013) are authorized.

d. Bed material in systems where stream gradient exceeds 3% may be conservatively sized to resist movement.

[28] http://wdfw.wa.gov/publications/01501/
[29] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=12512
[30] http://stream.fs.fed.us/fishxing/aop_pdfs.html
[31] Active channel width means the stream width measured perpendicular to stream flow between the OHW lines, or at the channel bankfull elevation if the OHW lines are indeterminate. This width includes the cumulative active channel width of all individual side- and off-channel components of channels with braided and meandering forms, and measure outside the area influence of any existing stream crossing, *e.g.*, five to seven channel widths upstream and downstream.

3. Scour Prism

a. Designs shall maintain the general scour prism, as a clear, unobstructed opening (*i.e.*, free of any fill, embankment, scour countermeasure, or structural material to include abutments, footings, and culvert inverts). No scour or stream stability countermeasure may be applied above the general scour elevation.[32]

a. The lateral delineation of the scour prism is defined by the criteria span.

b. The vertical delineation of the scour prism is defined by the Lower Vertical Adjustment Potential (LVAP) with an additional offset of 2 times D_{90}, as calculated in *Stream Simulation: An ecological approach to providing passage for aquatic organisms at road crossings* (USDA-Forest Service 2008).

b. When bridge abutments or culvert footings are set back beyond the applicable criteria span they are outside the scour prism.

4. Embedment

a. All abutments, footings, and inverts shall be placed below the thalweg a depth of 3 feet, or the LVAP line with an offset of 2 times D_{90}, whichever is deeper.

i. AP, and 2 times D_{90} offset, as calculated in *Stream Simulation: An ecological approach to providing passage for aquatic organisms at road crossings* (USDA-Forest Service 2008).

b. In addition to embedment depth, embedment of closed bottom culverts shall be between 30% and 50% of the culvert rise.

5. Bridges

a. Primary bridge structural elements will be concrete, metal, fiberglass, or untreated timber. The use of treated wood for bridge construction or replacement is not part of this proposed action. The use of treated wood for maintenance and repair of existing wooden bridges is part of the proposed action if in conformance with project design criterion 29.

b. All concrete will be poured in the dry, or within confined waters not connected to surface waters, and will be allowed to cure a minimum of 7 days before contact with surface water as recommended by Washington State Department of Transportation (2010).

c. Riprap may only be placed below bankfull height of the stream when necessary for protection of abutments and pilings. The amount and placement of riprap will not constrict the bankfull flow.

d. Temporary work bridges will also meet the latest version of NMFS (2011a) criteria.

[32] For guidance on how to complete bridge scour and stream stability analysis, see Lagasse *et al.* (2012) (HEC-20), Lagasse *et al.* (2001) (HEC-23), Richardson and Davis (2001) (HEC-18), ODOT (2011), and AASHTO (2013).

iii. The electronic notification for each permanent stream crossing replacement will contain the following:

1. Site sketches, drawings, aerial photographs, or other supporting specifications, calculations, or information that is commensurate with the scope of the action, that show the active channel, the 100-year floodplain, the functional floodplain, any artificial fill within the project area, the existing crossing to be replaced, and the proposed crossing.

2. A completed scour and stream stability analysis for any crossing that includes scour or stream stability countermeasures within the crossing opening that shows the general scour elevation and the local scour elevation for any pier or interior bent.

3. The name, address, and telephone number of a person responsible for designing this part of the action that NMFS may contact if additional information is necessary to complete the effects analysis.

f. **NMFS fish passage review and approval.** The Corps will not issue a permit to install, replace, or improve a road-stream crossing, step structure, fish ladder, or projects containing grade control, stream stability, or headcut countermeasures, until the action has been reviewed and approved by NMFS for consistency with NMFS's fish passage criteria (NMFS 2011a).

43. Utility Line Stream Crossings

a. Design utility line stream crossings in the following priority:

i. Aerial lines, including lines hung from existing bridges.

ii. Directional drilling, boring and jacking that spans the channel migration zone and any associated wetland.

iii. Trenching – this method is restricted to intermittent streams and may only be used when the stream is naturally dry, all trenches will be backfilled below the OHW line with native material and capped with clean gravel suitable for fish use in the project area.

b. Align each crossing as perpendicular to the watercourse as possible. Ensure that the drilled, bored or jacked crossings are below the total scour prism.

c. Any large wood displaced by trenching or plowing will be returned as nearly as possible to its original position, or otherwise arranged to restore habitat functions.

d. Any action involving a stormwater outfall will meet the stormwater management criteria.[33]

e. NMFS will review new or upgraded stormwater outfalls.

[33] The most efficient way for an applicant or the Corps to prepare and submit a stormwater management plan for NMFS' review is to attach a completed *Checklist for Submission of a Stormwater Management Plan* (the *Checklist*, ODEQ updated 2012, or the most recent version) with the electronic notification when it is sent to the SLOPES mailbox. However, stormwater conveyance to a DEQ permitted Municipal Separate Storm Sewer System (MS4) or consistency with any other program acknowledged by DEQ as adequate for stormwater management will not meet the requirements of this opinion unless NMFS determines that the facility accepting the stormwater will provide a level of treatment that is equivalent to that called for in this opinion. The *Checklist* and guidelines for its use are available from NMFS or the ODEQ in Portland Oregon. The latest version of the *Checklist* is also available online in a portable document format (pdf) through the ODEQ Water Quality Section 401 certification webpage (ODEQ 2014) at http://www.deq.state.or.us/wq/sec401cert/process.htm#add (see "Post Construction Stormwater Management Plan").

Action Completion Reporting. It is the applicant's responsibility to submit this form to the Corps within 60 days of completing all work below ordinary high water (OHW). Upon receipt, the Corps will resubmit this form with the Action Completion Report portion completed to NMFS at *slopes.nwr@noaa.gov*. If it is a Corps project, the Corps shall complete and submit this form within 60 days of completing the project.

Major hazard response reporting. It is the applicant's responsibility to submit this form to the Corps within 30 days of completing all work below OHW. Upon receipt, the Corps will resubmit this form with the Action Completion Report portion completed to NMFS at *slopes.nwr@noaa.gov*. If it is a Corps project, the Corps shall complete and submit this form within 30 days of completing the project.

Fish Salvage Reporting. It is the applicant's responsibility to submit this form to the Corps within 60 days of completing a capture and release as part of an action completed under SLOPES V Transportation. Upon receipt, the Corps will resubmit this form with the Fish Salvage Report portion completed with the following information to NMFS at *slopes.nwr@noaa.gov*. If it is a Corps project, the Corps shall complete and submit this form within 60 days of completing fish salvage operations.

1. ACTION COMPLETION REPORT

The applicant shall submit this form to the Corps within 60 days of completing all work below ordinary high water (OHW). The Corps shall submit this form to NMFS at *slopes.nwr@noaa.gov* upon receipt from the applicant. If it is a Corps project, the Corps shall submit this form within 60 days of completing all work below OHW.

Actual Start and End Dates for the Completion of In-water Work:	***Start***:	***End***:
Actual Linear-feet of Riparian and/or Channel Modification within 150 feet of OHW		
Actual Acreage of Herbicide Treatment		
Turbidity Monitoring/Sampling Completed	☐ Yes (include details below)	☐ No

Please include the following:

1. Attach as-built drawings for any action involving a riprap revetment, stormwater management facility, or a bridge rehabilitation or replacement.
2. Attach photos of habitat conditions before, during, and after action completion.
3. Describe compliance with fish screen criteria, as defined below, for any pump used.
4. Summarize results of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
5. Describe number, type and diameter of any pilings removed or broken during removal.
6. Describe any riparian area cleared within 150 feet of OHW.
7. Describe turbidity monitoring (visual or by turbidimeter) including dates, times and location of monitoring and any exceedances and steps taken to reduce turbidity observed.
8. Describe site restoration.

If the project was a Major Hazard Response, ALSO include the following:

1. Name of the major hazard event.
2. Type of major hazard.
3. Name of the public transportation district manager that declared the response necessary.
4. NMFS staff contacted, with date and time of contact.
5. Description of the amount and type of riprap or other material used to repair a culvert, road, or bridge.
6. Assess the effects of the initial response to listed species and critical habitats.
7. Summary of the design criteria followed and not followed.
8. Remedial actions necessary to bring the initial response into compliance with design criteria in this opinion.

2. FISH SALVAGE REPORT

If applicable: The applicant shall submit a completed Fish Salvage Report and Fish Salvage Data Table (see below) to the Corps within 60 days of completing a capture and release as part of an action completed under SLOPES V Transportation. The Corps will submit the report to NMFS at *slopes.nwr@noaa.gov* upon receipt from the applicant. If it is a Corps project, the Corps shall submit this form to NMFS within 60 days of completing a capture and release event.

Date(s) of Fish Salvage Operation(s): _____

Supervisory Fish Biologist: _____

Address _____

Telephone Number _____

Describe methods that were used to isolate the work area and remove fish

Fish Salvage Data

Water Temperature:

Air Temperature:

Time of Day:

ESA-Listed Species	Number Handled		Number Injured		Number Killed	
	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult
Lower Columbia River Chinook						
Upper Willamette River Chinook						
Upper Columbia River spring-run Chinook						
Snake River spring/summer run Chinook						
Snake River fall-run Chinook						
Chinook, unspecified						
Columbia River chum						
Lower Columbia River Coho						
Oregon Coast Coho						
Southern Oregon/Northern California Coasts Coho						
Snake River sockeye						
Lower Columbia River steelhead						
Upper Willamette River steelhead						
Middle Columbia River steelhead						
Upper Columbia River steelhead						
Snake River Basin steelhead						
Steelhead, unspecified						
Southern green sturgeon						
Eulachon						

3. SITE RESTORATION/ COMPENSATORY MITIGATION

By December 31 of any year in which the Corps approves that the site restoration or compensatory mitigation is complete, the Corps, will submit a complete a Site Restoration/Compensatory Mitigation Reporting Form, or its equivalent, with the following information to NMFS at slopes.nwr@noaa.gov.

Describe location of mitigation or restoration work.

Summarize the results of mitigation or restoration work completed.

COMPLIANCE CERTIFICATION

U.S. Army Corps of Engineers
CENWP-OD-GP
Compliance, Lane County
PO Box 2946
Portland, Oregon 97208-2946

1. Permittee Name: City of Springfield
2. County: Lane County
3. Corps Permit No: NWP-2013-438/1
4. Corps Contact: Benny A. Dean Jr.
5. Type of Activity: Stormwater Facility and outfall improvements.

Please sign and return form to the address above:

I hereby certify that the work authorized the above referenced permit has been completed in accordance with the terms and conditions of said permit and that required mitigation is completed in accordance with the permit conditions, except as described below.

_____

Signature of Permittee **Date**

Department of State Lands
775 Summer Street, Suite 100
Salem, OR 97301-1279
☎ 503-986-5200

Attachment 4 to Addendum 1 Dated 06/16/15

Permit No.:	**57082-RF**
Permit Type:	**Removal/Fill**
Waterway:	**Wetland/Mill Race**
County:	**Lane**
Expiration Date:	**April 7, 2016**

CITY OF SPRINGFIELD

IS AUTHORIZED IN ACCORDANCE WITH ORS 196.800 TO 196.990 TO PERFORM THE OPERATIONS DESCRIBED IN THE ATTACHED COPY OF THE APPLICATION, SUBJECT TO THE SPECIAL CONDITIONS LISTED ON ATTACHMENT A AND TO THE FOLLOWING GENERAL CONDITIONS:

1. This permit does not authorize trespass on the lands of others. The permit holder shall obtain all necessary access permits or rights-of-way before entering lands owned by another. For new linear facility projects, the removal-fill activity cannot occur until the permit holder obtains either the landowner's consent, a right, title or interest with respect to the property that is sufficient to undertake the removal or fill activity, or a court order or judgment authorizing the use of the property.
2. This permit does not authorize any work that is not in compliance with local zoning or other local, state, or federal regulation pertaining to the operations authorized by this permit. The permit holder is responsible for obtaining the necessary approvals and permits before proceeding under this permit.
3. All work done under this permit must comply with Oregon Administrative Rules, Chapter 340; Standards of Quality for Public Waters of Oregon. Specific water quality provisions for this project are set forth on Attachment A.
4. Violations of the terms and conditions of this permit are subject to administrative and/or legal action, which may result in revocation of the permit or damages. The permit holder is responsible for the activities of all contractors or other operators involved in work done at the site or under this permit.
5. Employees of the Department of State Lands and all duly authorized representatives of the Director shall be permitted access to the project area at all reasonable times for the purpose of inspecting work performed under this permit.
6. Any permit holder who objects to the conditions of this permit may request a hearing from the Director, in writing, within twenty-one (21) calendar days of the date this permit was issued.
7. In issuing this permit, the Department of State Lands makes no representation regarding the quality or adequacy of the permitted project design, materials, construction, or maintenance, except to approve the project's design and materials, as set forth in the permit application, as satisfying the resource protection, scenic, safety, recreation, and public access requirements of ORS Chapters 196, 390, and related administrative rules.
8. Permittee shall defend and hold harmless the State of Oregon, and its officers, agents, and employees from any claim, suit, or action for property damage or personal injury or death arising out of the design, material, construction, or maintenance of the permitted improvements.
9. Authorization from the U.S. Army Corps of Engineers may also be required.

NOTICE: If removal is from state-owned submerged and submersible land, the applicant must comply with leasing and royalty provisions of ORS 274.530. If the project involves creation of new lands by filling on state-owned submerged or submersible lands, you must comply with ORS 274.905 to 274.940. This permit does not relieve the permittee of an obligation to secure appropriate leases from the Department of State Lands, to conduct activities on state-owned submerged or submersible lands. Failure to comply with these requirements may result in civil or criminal liability. For more information about these requirements, please contact the Department of State Lands, 503-986-5200.

Lori Warner-Dickason, Aquatic Resource Manager
Aquatic Resource Management
Oregon Department of State Lands

Authorized Signature

April 7, 2015
Date Issued

Attachment 4 to Addendum 1 Dated 06/16/15

ATTACHMENT A

Permit Holder: City of Springfield

Project Name: Mill Race Stormwater Facility and Path

Special Conditions for Removal/Fill Permit No. 57082-RF

READ AND BECOME FAMILIAR WITH CONDITIONS OF YOUR PERMIT.

The project site may be inspected by the Department of State Lands (DSL) as part of our monitoring program. DSL has the right to stop or modify the project at any time if you are not in compliance with these conditions. A copy of this permit shall be available at the work site whenever authorized operations are being conducted.

1. **Responsible Party:** By proceeding under this permit, the City of Springfield agrees to comply with and fulfill all terms and conditions of this permit, unless the permit is officially transferred to another party as approved by DSL.

2. **Authorization to Conduct Removal and/or Fill:** This permit authorizes the placement of up to 25 cubic yards and removal of up to 61 cubic yards of material in the Springfield Mill Race and removal of up to 1526 Cubic yards of material in wetlands,T17S R3W Section 35, Tax Lots 302 and 307, Lane County, as described in the attached permit application, map and drawings, received December 15, 2014. In the event information in the application conflicts with the permit conditions, the permit conditions prevail. See Attachment B for project impact location(s).

3. **Work Period in Jurisdictional Areas:** Fill or removal activities below the ordinary high water elevation of the Mill Race shall be conducted between June 1 and October 31, unless otherwise coordinated with Oregon Department of Fish and Wildlife and approved in writing by DSL.

4. **Changes to the Project or Inconsistent Requirements from Other Permits:** It is the permittee's responsibility to ensure that all state, federal and local permits are consistent and compatible with the final approved project plans and the project as executed. Any changes made in project design, implementation and/or operating conditions to comply with conditions imposed by other permits must be approved by DSL prior to implementation.

5. **DSL May Halt or Modify:** DSL retains the authority to temporarily halt or modify the project in case of unforeseen damage to natural resources.

6. **DSL May Modify Conditions Upon Permit Renewal:** DSL retains the authority to modify conditions upon renewal, as appropriate, pursuant to the applicable rules in effect at the time of the request for renewal or to protect waters of this state.

Pre-Construction

7. **Local Government Approval Required Before Beginning Work:** Issuance of this permit is contingent upon acquisition of any required local permits.

8. **Stormwater Management Approval Required Before Beginning Work:** Issuance of the permit is contingent upon acquisition of a National Pollution Discharge Elimination System (NPDES) permit from the Oregon Department of Environmental Quality.

9. **Pre-construction Resource Area Flagging:** Before any site grading, the boundaries of the avoided wetlands and waterway shall be surrounded by bright orange construction fencing, which shall be maintained during construction of the project. There shall be no heavy equipment within fenced areas, except during mitigation construction.

General Construction Conditions

10. **Water Quality Certification:** The Department of Environmental Quality (DEQ) may evaluate this project for a Clean Water Act Section 401 Water Quality Certification (WQC). If the evaluation results in issuance of a Section 401 WQC, that turbidity condition will govern any allowable turbidity exceedance and monitoring requirements.

11. **Erosion Control Methods:** The following erosion control measures (and others as appropriate) shall be installed prior to construction and maintained during and after construction as appropriate, to prevent erosion and minimize movement of soil into waters of this state.

    a. All exposed soils shall be stabilized during and after construction in order to prevent erosion and sedimentation.
    b. Filter bags, sediment fences, sediment traps or catch basins, leave strips or berms, or other measures shall be used to prevent movement of soil into waterways and wetlands.
    c. To prevent erosion, use of compost berms, impervious materials or other equally effective methods, shall be used to protect soil stockpiled during rain events or when the stockpile site is not moved or reshaped for more than 48 hours.
    d. Unless part of the authorized permanent fill, all construction access points through, and staging areas in, riparian and wetland areas shall use removable pads or mats to prevent soil compaction. However, in some wetland areas under dry summer conditions, this requirement may be waived upon approval by DSL. At project completion, disturbed areas with soil exposed by construction activities shall be stabilized by mulching and native vegetative plantings/seeding. Sterile grass may be used instead of native vegetation for temporary sediment control. If soils are to remain exposed more than seven days after completion of the permitted work, they shall be covered with erosion control pads, mats or similar erosion control devices until vegetative stabilization is installed.
    e. Where vegetation is used for erosion control on slopes steeper than 2:1, a tackified seed mulch shall be used so the seed does not wash away before germination and rooting.
    f. Dredged or other excavated material shall be placed on upland areas having stable slopes and shall be prevented from eroding back into waterways and wetlands.
    g. Erosion control measures shall be inspected and maintained as necessary to ensure their continued effectiveness until soils become stabilized.
    h. All erosion control structures shall be removed when the project is complete and soils are stabilized and vegetated.

12. **Hazardous, Toxic, and Waste Material Handling:** Petroleum products, chemicals, fresh cement, sandblasted material and chipped paint, wood treated with leachable preservatives or other deleterious waste materials shall not be allowed to enter waters of this state. Machinery refueling is to occur at least 150 feet from waters of this state and confined in a designated area to prevent spillage into waters of this state. Barges shall have containment system to effectively prevent petroleum products or other deleterious material from entering waters of this state. Project-related spills into waters of this state or onto land with a potential to enter waters of this state shall be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311.

13. **Federally Listed Endangered or Threatened Species:** When listed species are present, the authorization holder must comply with the Federal Endangered Species Act. If previously unknown listed species are encountered during construction, all construction activity shall immediately cease and the permit holder must contact DSL.

14. **Archaeological Resources**: If any archaeological resources and/or artifacts are encountered during construction, all construction activity shall immediately cease. The State Historic Preservation Office shall be contacted (phone: 503-986-0674).

15. **Hazards to Recreation, Navigation or Fishing:** The activity shall be timed so as not to interfere with or create a hazard to recreational or commercial navigation or fishing.

16. **Construction Corridor:** There shall be no removal of vegetation or heavy equipment operating or traversing outside the designated construction corridor.

17. **Work Area Isolation:** The work area shall be isolated from the water during construction according to the Work Area Isolation Plan contained in the application. All structures and materials used to isolate the work area shall be removed immediately following construction and water flow returned to pre-construction conditions.

18. **Stream Diversion Prohibited:** The stream shall not be diverted from the natural bed.

19. **Trenching in Wetlands:** During trenching or excavation, the top layer of soil shall be separated from the rest of the excavated material and put back on top when the trench or pit is back-filled. If the native underlying soils are not used as bedding material, and a coarser, non-native soil or other material is used, preventative measures such as clay or concrete plugs shall be used so that underground hydraulic piping does not dewater the site and adjacent wetlands.

20. **Temporary Ground Disturbances:** All temporarily disturbed areas shall be returned to original ground contours at project completion, as proposed in the Site Restoration Plan in the application.

21. **Operation of Equipment in the Water:**
Heavy equipment may be positioned on or traverse the area below ordinary high water or highest measured tide only when the area is free of flowing or standing water.

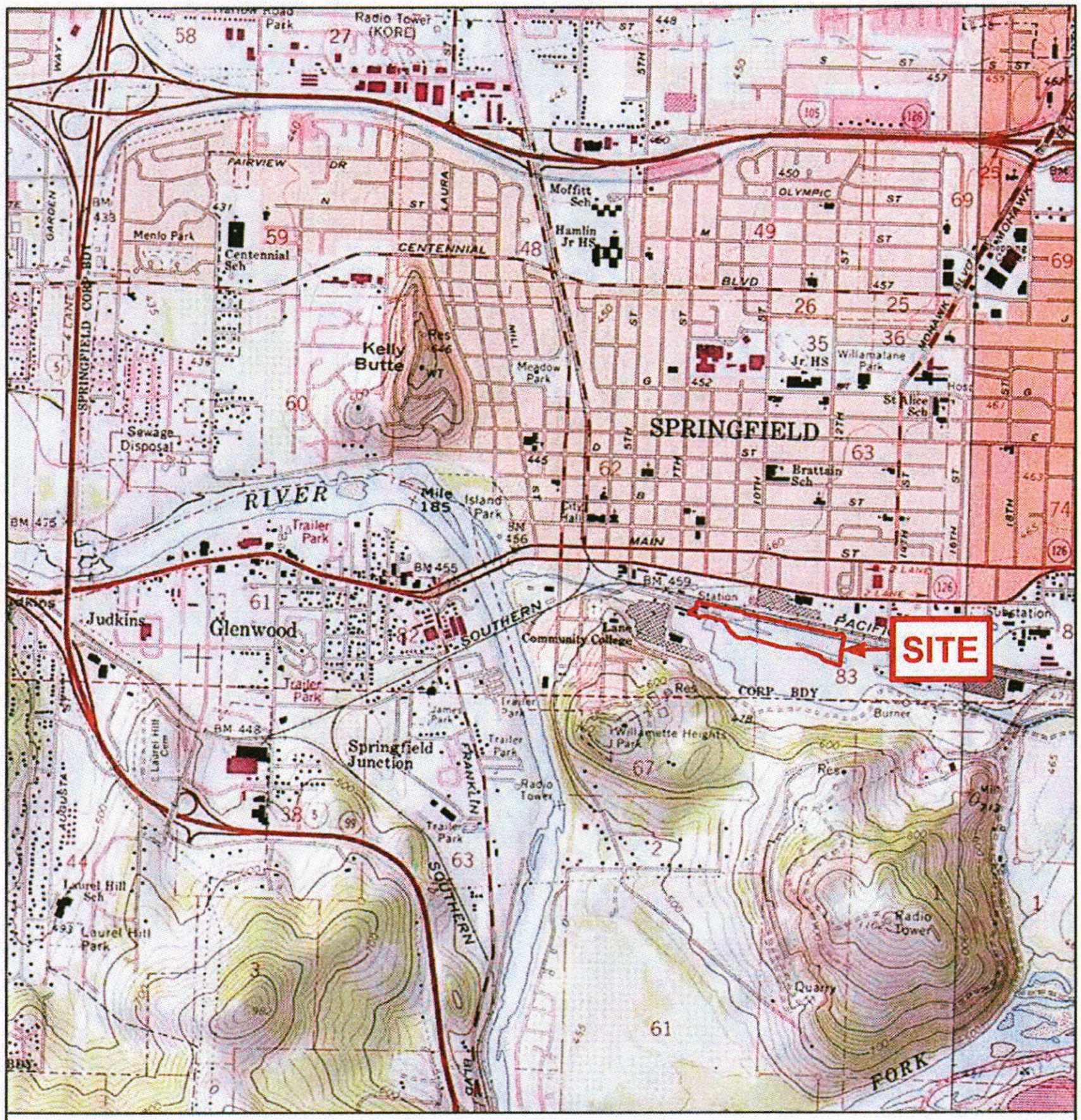
22. **Fish Passage Required:** The project shall meet Oregon Department of Fish and Wildlife requirements for fish passage.

Mitigation Conditions

23. **Mitigation Bank Credit Purchase**: Mitigation for the unavoidable loss of 0.06 acres of PEM wetland has been accomplished via purchase of 0.08 credits from the Muddy Creek Wetland Mitigation Bank, per the proof of purchase.

Issued: April 7, 2015

ATTACHMENT B



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TITLE: U.S.G.S. TOPOGRPAHIC MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
	PROJECTION: OR SP S. Ft.	SCALE: 1 inch = 2,000 feet	FIGURE No.: 2

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0 300 600 1,200 Feet

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AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD	
TITLE: TAX LOT MAP		DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH		CHK'D BY: EH	REV. NO.: -	PROJECT NO.: 3-61M-127900
		PROJECTION: OR SP S Ft	SCALE: 1 inch = 500 feet	FIGURE No.: FIGURE 3

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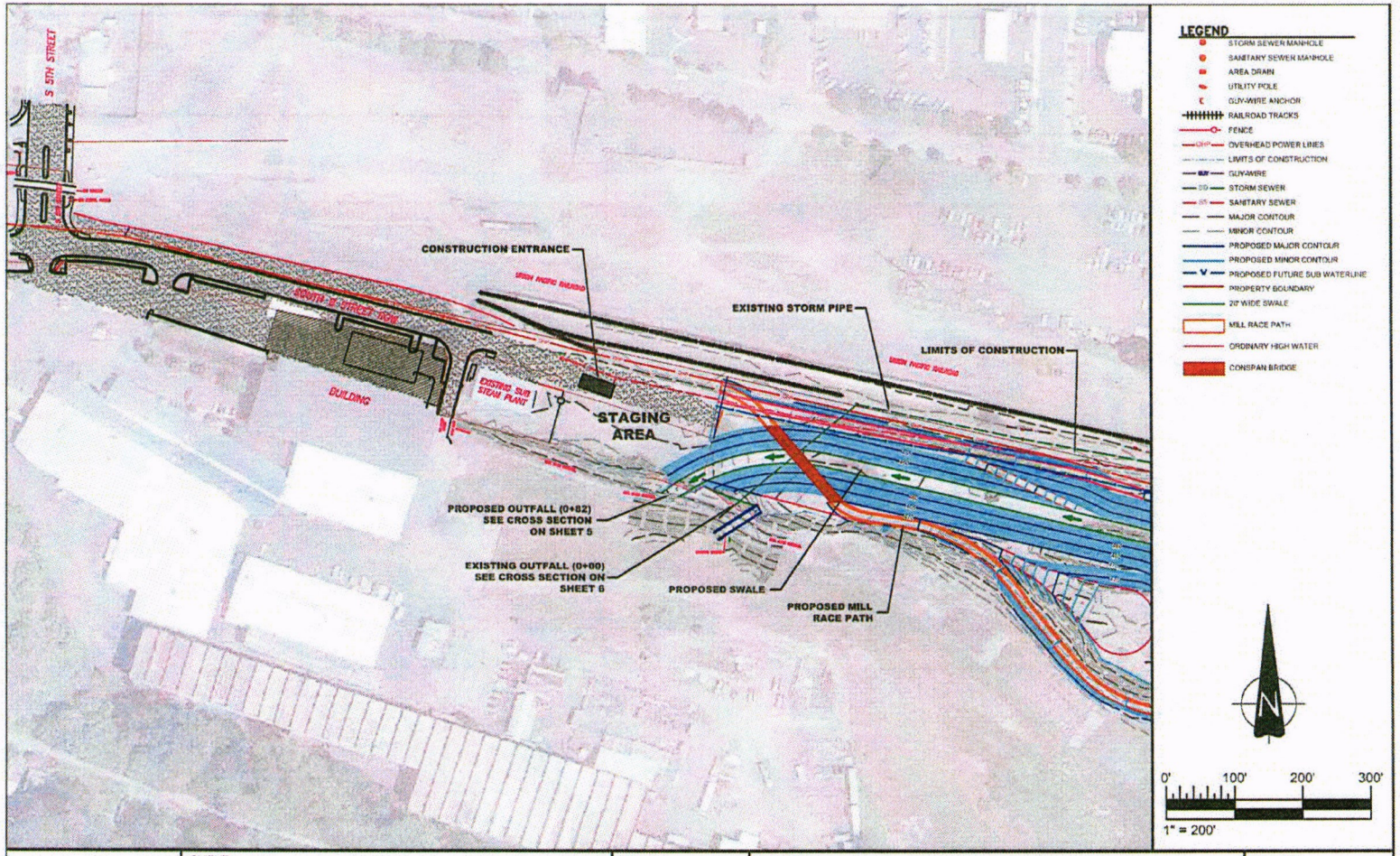

	CLIENT: CITY OF SPRINGFIELD	DWN BY: PM CHK'D BY: DS	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: - DATE: DECEMBER 2014
AMEC 7376 S.W. Durham Road Portland OR, U.S.A. 97224	amec	DATUM: NAD83 PROJECTION: OR SP S. Ft. SCALE: 1" = 400'	TITLE: SITE OVERVIEW - WEST	PROJECT NO: 4-61M-127901 FIGURE No. 4A

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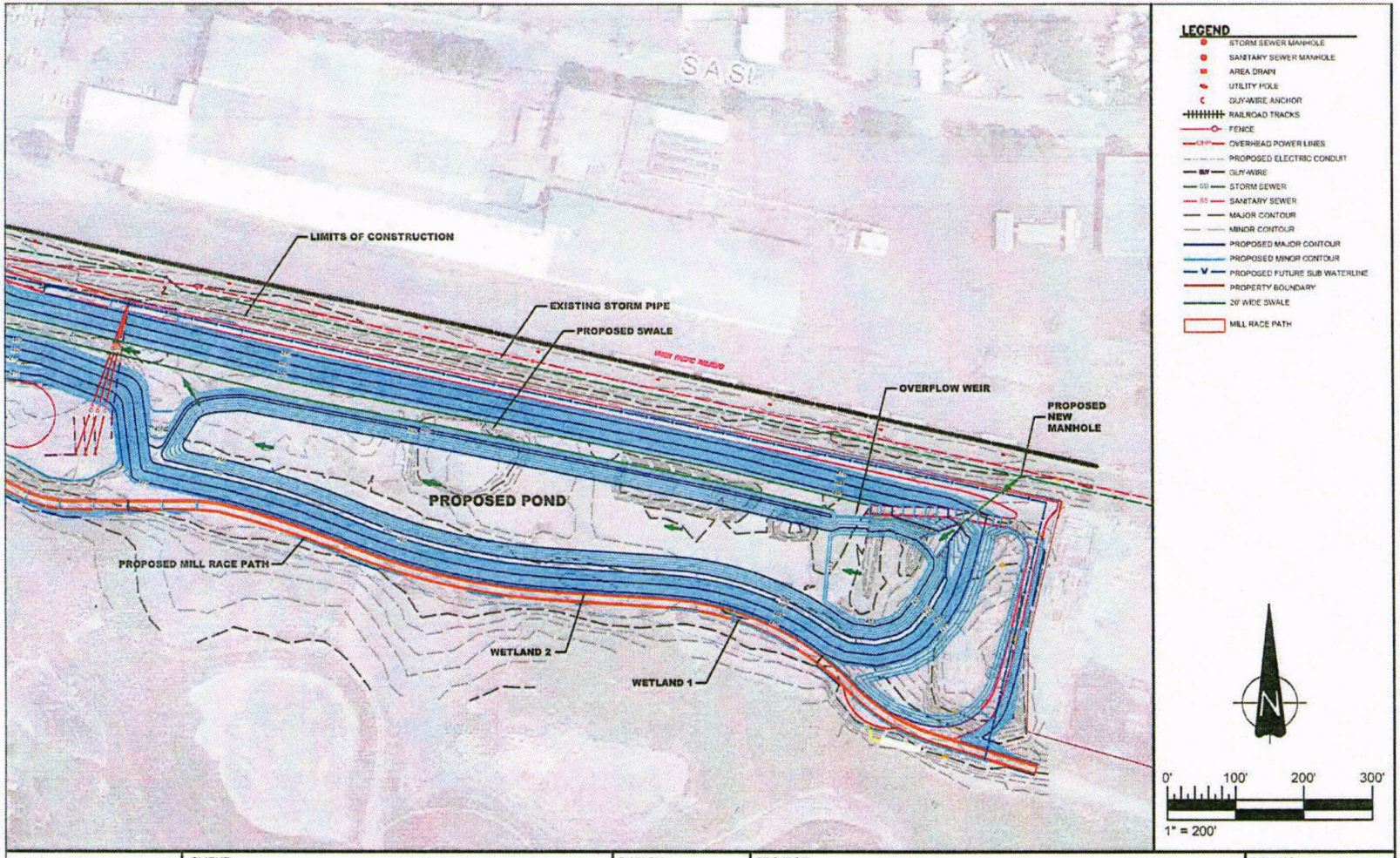

CLIENT: CITY OF SPRINGFIELD	DWN BY: PM CHK'D BY: DS	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: - DATE: DECEMBER 2014
AMEC 7376 S.W. Durham Road Portland OR, U.S.A. 97224	DATUM: NAD83 PROJECTION: OR SP S. Ft. SCALE: 1" = 400'	TITLE: SITE OVERVIEW - EAST	PROJECT NO: 4-61M-127901 FIGURE No. 4B

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RECEIVED
DEC 15 2014
DEPARTMENT OF STATE LANDS
Date Stamp

Joint Permit Application

This is a joint application, and must be sent to both agencies, who administer separate permit programs. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Corps Action ID Number | DSL Number 57082

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) ■ Consultant ■ Contractor
Contact Name	Molly Markarian	Jeff Nelson	Dan Schall, Project Manager Erin Hale, Env. Scientist
Business Name	City of Springfield	Springfield Utility Board	AMEC Environment & Infrastructure
Mailing Address 1	225 Fifth Street	202 S. 18th Street	7376 SW Durham Rd.
Mailing Address 2			
City, State, Zip	Springfield, OR 97477	Springfield, OR 97477	Portland, OR 97224
Business Phone	541-726-4611	541-746-8451	503-639-3400
Cell Phone			
Fax	541-726-3689	541-746-0230	503-620-7892
Email	mmarkarian@springfield-or.gov	jeffn@subutil.com	

A. Provide the project location.

Project Name	Tax Lot #	Latitude & Longitude*
Mill Race Stormwater Facility & Path	~~1703350000~~307; ~~1703350000~~302	44.043 -123.012
Project Address / Location	**City (nearest)**	**County**
Nearest cross street is OR 528 S and Main Street.	Springfield	Lane

Township	Range	Section	Quarter/Quarter
17S	3W	35	

Brief Directions to the Site Take I-5 towards Springfield. Take the 126 exit east. Exit on pioneer parkway. Turn left on "S A ST" t (not to be confused with "A St"). Turn right on S 5th St. Just past rail road there is a dirt road. Turn left on the dirt road. Site is straight ahead.

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

■ River / Stream ■ Non-Tidal Wetland ■ Lake / Reservoir / Pond
■ Estuary or Tidal Wetland ■ Other ■ Pacific Ocean

Waterbody or Wetland Name**	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
Mill Race and state jurisdictional only Wetlands 1 & 2.		8th field: Middle Fork Willamette	17090011003

C. Indicate the project category. (Check all that apply.)

■ Commercial Development	■ Industrial Development	■ Residential Development
■ Institutional Development	■ Agricultural	■ Recreational
■ Transportation	■ Restoration	■ Bank Stabilization
■ Dredging	■ Utility lines	■ Survey or Sampling
■ In- or Over-Water Structure	■ Maintenance	■ Other: Stormwater facility development

* In decimal format (e.g., 44.9399, -123.0283)
** If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A").

Provide a statement of the purpose and need for the overall project.
The purpose of the proposed project is to improve water quality in the Mill Race waterway that receives stormwater (SW) from a 117.2-acre industrial and commercial subbasin located east and southeast of downtown Springfield. Monitoring results indicate that high concentrations of bacteria, as well as other urban pollutants, are present in the Mill Race. The City's Stormwater Management Plan identifies the proposed project as one of several capital improvement projects to improve water quality. The pervious and impervious areas of the sub-basin are estimated at 25.8 acres and 91.4 acres, respectively. The City of Springfield (City) is currently conducting a multi-phased restoration of the Mill Race to improve water quality and fish passage. The multi-phase restoration project was initiated in 2009. The project is proposed to improve water quality in the Mill Race. Specific target pollutants are the bacterium *Escherichia coli*, heavy metals, total suspended solids (TSS), and TMDL parameters and industrial pollutants. Water quality is expected to be improved following completion of the project; therefore, the project is expected to result in a net beneficial effect to water quality in the Mill Race.

A. Describe the existing physical and biological characteristics of each wetland or waterway. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.
The Study Area occupies approximately 15.1 acres and is located on terrace landforms, at an elevation between 465 to 480 feet above North American Vertical Datum, 88'. The Study Area is located adjacent to Mill Race and a former log pond (See Attachment B Figures).

The Study Area consists primarily of degraded ruderal upland habitat dominated by *Rubus armeniacus* (Himalayan blackberry), *Holcus lanatus* (common velvet grass), and *Phalaris arundinacea* (reed canarygrass). Native species observed at the ruderal upland habitat area include *Populus balsamifera* (black cottonwood), *Pseudotsuga menziesii* (Douglas-fir), and *Galium aparine* (stickywilly).

Approximately 0.06 of state jurisdictional wetland (federally non-jurisdictional) was identified within the Study Area including 0.02-acres of palustrine emergent wetland, identified as Wetland W1 and 0.04 acres of palustrine emergent wetland identified as Wetland W2 (AMEC, 2013). W1 is dominated by reed canarygrass, *Carex obnupta*, (slough sedge), an unknown species of *Festuca* and an unknown species of grass (cf. *Lolium*, cf *Elymus*). Wetland W2 is dominated by *Juncus effusus* (common rush) and Equisetum sp. (horsetail). Precipitation is the primary source of hydrology for both wetlands.

Approximately 165 linear feet within the Study Area consists of Perennial Riverine habitat. The Mill Race flows generally in a northwesterly direction. The Mill Race was dug by hand in 1852, diverting flows of the Middle Fork Willamette River at Clearwater Park flowing northwest before rejoining the Middle Fork Willamette River at Island Park, approximately 0.5 miles downstream of the project area. In 2009, a restoration project for the Mill Race was initiated. The restoration included draining a logpond, creation of meander channels, creation of salmon rearing ponds, and installation of riparian and wetland plants. The

OHW of the Mill Race was determined by the break in slope and the presence/absence of woody vegetation.

B. Describe the existing navigation, fishing and recreational use of the waterway or wetland.
The Mill Race is not used for navigational purposes. Recreational fishing may occur, but it is doubtful, as the nearby Middle Fork Willamette River provides better fishing habitat for recreational fishers. Hikers and bicyclists may use the area.

Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterway or wetland.

Project specific criteria used to minimize impact to the Mill Race include: using the smallest footprint practical at the bioswale connection to the Mill Race itself and using best management practices to reduce impacts to water quality, species, and habitat. The City of Springfield, in working with AMEC, conducted a feasibility study to evaluate the feasibility of intercepting and treating stormwater and to provide design alternatives to assess options based on environmental and geotechnical concerns in addition to design constraints. A workshop was held between the City of Springfield, Willamalane, and Springfield Utility Board (SUB) to discuss the alternatives and how they fit into the future goals for development of this area.

The study area was the only undeveloped parcel of land, owned by the City of Springfield , that could be utilized for a stormwater treatment facility in this drainage subbasin. In addition, this location represented the furthest downstream reach of the stormwater drainage subbasin, therefore this location will provide the highest volume of stormwater capture and treatment before entering the Mill Race.

Design alternatives considered include:

Alternative 1: a narrow pond. This alternative consisted of a similar design to the wide pond alternative (preferred) but occupies a smaller footprint. This option offers less treatment capacity. The same wetland and water impacts would exist with this alternative as with the preferred alternative. This option was rejected because a smaller volume of water would be treated with the same environmental impacts.

Alternative 2 (preferred alternative): This preferred alternative consists of a wider pond and bioswale as described in the project description. The wider pond will allow for a larger treatment volume with the same impacts as the narrow pond. This alternative was selected because it meets the city objective to improve water quality. In addition, this alternative provides educational opportunities to the community, recreational opportunities, and habitat improvement.

Alternative 3: Physical treatment alternative. This alternative proposes the use of a StormFilter with

Hydrodynamic Separator. This alternative was developed to compare an "off the shelf" vault style filtration system with comparable capabilities of removing contaminants and improving water quality discharges to the Mill Race against the water quality pond/bioswale alternatives. Based on the objectives of the physical treatment option, a StormFilter with Hydrodynamic Separator was selected as the combined products provide the closest filtration capability to ponds. This alternative was not chosen because the filter/separator option provides no biologic uptake or other amenities such as habitat improvements or significant educational opportunities to the community.

No Action Alternative. Under the No Acton Alternative, the work would not be performed. Stormwater from industrial and urban areas in the drainage subbasin surrounding the site would continue to discharge directly to the Mill Race without treatment. No water quality benefits would be provided.

A. Briefly summarize the overall project including work in areas both in and outside of waters or wetlands.
The City of Springfield is proposing to construct a wet detention pond and bioswale to treat stormwater runoff prior to discharge to the Mill Race. Other project components include the construction of a pedestrian and bicycle path and upland grading. The proposed stormwater facility will reduce sediment and pollutants through sedimentation and biological uptake. A detailed project description is included as Attachment A.

B. Describe work within waters and wetlands.

Wetlands:
Wetland 1 and Wetland 2 will be excavated in their entirety to accommodate the footprint of the stormwater facility. The proposed pond will consist of a 3.39 acre area with a proposed pond depth in elevation of 455ft msl with 5' high berms surrounding the pond. The proposed pond will treat incoming stormwater runoff by allowing particles to settle out of the water column. Nutrients in the stormwater will be taken up by vegetation in the pond. A detailed description of the stormwater wet pond is included as Attachment A.

Waters:
Work conducted below Ordinary High Water (OHW) of the Mill Race will be limited to the approved in-water work window. Erosion and sediment control measures will be installed prior to conducting any work in or near the Mill Race. Proposed work below OHW includes excavation where the stormwater bioswale connects to the Mill Race. The existing bank will be pulled back and the area at the bioswale will be manipulated to the elevation shown on the project drawings. A small amount of water is expected to be present during construction. Once grading/excavation work is complete 6-12 inches of top soil will be tilled in to support vegetated plantings.

In addition, an existing outfall will be removed. The outfall is located above OHW and a sediment fence will be placed between the existing outfall and the Mill Race. No impacts are expected below OHW at this location.

C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.

Sediment fences will be placed immediately down slope of the construction area before work occurs. These fences will remain in place until all work is completed and slopes are stabilized and vegetated. Turbidity barriers will be installed below OHW to isolate the excavation activities at the new swale confluence to the Mill Race. Turbidity monitoring will be conducted to ensure the erosion and sediment control measures in-place are effective. Initial construction activities include excavation of the stormwater facility pond and swale, this task is anticipated to take 4 to 6 months, and could be the only activity that takes place during the initial construction season (June-Oct 2015). The next construction activity will include the installation of the concrete structures; bridge, orifice vault, weir, headwall, and wing walls. The access road and multi-use path will be completed next. Once the structures, path, and access road are completed, the majority of the site can be restored and vegetated. Biodegradable erosion control fabric will be used on the slopes to minimize erosion; these will be placed after the slopes are hydroseeded. The diversion manhole will be one of the last structures completed, once this work begins, stormwater flows will be pumped around and discharged into the existing pipe downstream. After completion of the new stormwater diversion vault, the existing stormwater flow can be redirected into the new stormwater facility by closing and opening sluice gates within the diversion vault. The existing outfall pipe will then be removed and cut back to drain into the new swale. The pipe will remain to drain a ditch on the adjacent railroad property, and will also serve as a maintenance bypass for conducting maintenance on the stormwater facility and associated flow control structures. These tasks will take approximately 3-4 months to complete, and may be conducted in the Summer of 2016.

In addition to those described above, Best management practices (BMPs) that will be implemented during the construction activities include:

1. All in-water work will be confined to the approved in-water work window;
2. The work area around the existing outlet and the proposed bioswale will be isolated from the Mill Race using sediment fencing and turbidity barriers;
3. All equipment will be staged out of the water, although equipment buckets are expected to come in contact with water of the Mill Race;
4. A designated equipment laydown area;
5. Placement of drip pans beneath heavy equipment when not in use;
6. Daily inspection of heavy equipment prior to use to insure that equipment is in proper running condition and that there are no leaks. Equipment with leaks or requiring maintenance will be repaired before going back into service;
7. An accidental spill prevention plan will be implemented when equipment is working near the Mill Race;
8. Routine turbidity monitoring;
9. Gravel construction entrances;
10. Wheel wash;
11. Prepare and implement an erosion and sediment control plan;
12. Sediment fence and/or barriers installed along the grading area perimeter;
13. Biobags for inlet protection at catch basins, area drains, and ditch inlets;
14. Dust control measures (e.g. water spray, plastic sheeting, straw mulch, or other approved measures) at areas susceptible to wind erosion;
15. Perimeter fencing or high-visibility marking tape will be installed around wetlands and other sensitive areas, allowing for a 25-ft wide buffer zone. Heavy equipment and vehicles will not enter the buffer zone;
16. Exposed cut or fill areas will be stabilized through the use of temporary seeding and mulching, matting, mid-slope wattles, or other appropriate measures.
17. Permanent vegetation cover will be established in accordance with the Revegetation Plan and will consist of:
    a. Grass vegetated bioswale: native sedge, rush, and grasses will be seeded or planted as plugs to provide filtration and water quality benefits in the bioswale.
    b. Detention pond: native aquatic and wetland obligate plants will be planted as plugs to provide water quality benefits in the pond.
    c. Transitional/upland buffer: Native trees will be planted along the southern perimeter of the detention pond to provide shading, habitat, and aesthetic value.

An upland native seed mix will be applied to disturbed areas.

18. All slopes 3H:1V or steeper will receive jute/coir matting overtop and native seed mix. Straw wattles will also be installed on slopes to aid in erosion and sediment control, until vegetation is established; and
19. All project-generated waste and debris will be removed from the project area for off-site disposal in an approved disposal facility.

Long term monitoring and maintenance of facilities will be performed. Expected monitoring and maintenance activities include sediment removal; debris/trash removal; sediment vacuum of manholes and vault structures; vegetation maintenance; erosion control monitoring and repair as needed; pest control and maintenance as needed; water quality monitoring, and manhole or structure repair.

D. Describe source of fill material and disposal locations if known.

The primary disposal site is Delta Sand and Gravel, located in Eugene Oregon. Minimal filling operations will take place during the project, mostly structural fill for concrete structures and crushed rock beneath the access road and path. This fill material will be sourced from a local rock supplier, yet to be determined. Topsoil and compost will be amended into existing site soils during final site restoration to enhance vegetation establishment.

E. Construction timeline.

What is the estimated project start date? June 2015

What is the estimated project completion date?

October 2016

Is any of the work underway or already complete? ■ Yes ■ No

If yes, describe.

Wetland / Waterbody Name *	Fill Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		
Mill Race	20.5	32	1.0	656 sq.ft	24.3	permanent	Top Soil

Wetland / Waterbody Name*	Removal Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
Mill Race	20.5	32	2.5	656 sq.ft.	60.7	permanent	Soil
Wetland 1	50	17	15	850 sq.ft.	472.2	permanent	Soil
Wetland 2	79	24	15	1896 sq.ft.	1,053.3	permanent	Soil

* If there is no official name for the wetland or waterway, create a unique name (such as "Wetland 1" or "Tributary A").
** Indicate the days, months or years the fill or removal will remain. Enter "permanent" if applicable. For DSL, permanent removal or fill is defined as being in place for 24 months or longer.
*** Example: soil, gravel, wood, concrete, pilings, rock etc.

Are there any state or federally listed species on the project site?	■ Yes	■ No	■ Unknown
Is the project site within designated or proposed critical habitat?	■ Yes	■ No	■ Unknown
Is the project site within a national Wild and Scenic River?	■ Yes	■ No	■ Unknown
Is the project site within the 100-year floodplain?	■ Yes	■ No	■ Unknown
*** If yes to any of the above, explain in Block 4 and describe measures to minimize adverse effects to these resources in Block 5.**			
Is the project site within the Territorial Sea Plan (TSP) Area?	■ Yes	■ No	■ Unknown
*** If yes, attach TSP review as a separate document for DSL.**			
Is the project site within a designated Marine Reserve?	■ Yes	■ No	■ Unknown
*** If yes, certain additional DSL restrictions will apply.**			
Will the overall project involve construction dewatering or ground disturbance of one acre or more?	■ Yes	■ No	■ Unknown
*** If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).**			
Is the fill or dredged material a carrier of contaminants from on-site or off- site spills?	■ Yes	■ No	■ Unknown
Has the fill or dredged material been physically and/or chemically tested?	■ Yes	■ No	■ Unknown
***If yes, explain in Block 4 and provide references to any physical/chemical testing report(s).**			
Has a cultural resource (archaeological) survey been performed on the project area?	■ Yes	■ No	■ Unknown
*** If yes, provide a copy of the survey with this application. Do not describe any resources in this document.**			

Identify any other federal agency that is funding, authorizing or implementing the project.

Agency Name	Contact Name	Phone Number	Most Recent Date of Contact

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application. For example, certain activities that require a Corps permit also require 401 Water Quality Certification from Oregon DEQ.

Approving Agency	Certificate/ approval / denial description	Date Applied

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

- ■ Work proposed on or over lands owned by or leased from the Corps
- ■ State owned waterway — DSL Waterway Lease #
- ■ Other Corps or DSL Permits — Corps # — DSL #
- ■ Violation for Unauthorized Activity — Corps # — DSL #
- ■ Wetland and Waters Delineation — Corps # NWP-2013-438 — DSL # WD2013-0250
  - ■ A wetland / waters delineation has been completed (if so, provide a copy with the application)
  - ■ The Corps has approved the wetland / waters delineation within the last 5 years
  - ■ DSL has approved the wetland / waters delineation within the last 5 years

A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.

Temporary Impacts include:

Turbidity- A temporary and localized increase in turbidity may occur in the Mill Race during removal of the existing 48-in diameter outfall and during excavation at the proposed bioswale connection. Impacts to listed species is described in the Biological Assessment included as Attachment F.

Vegetation Removal - Approximately 13.8 acres of upland will be disturbed. Of the 13.8 acres of upland disturbed 7.6 acres will be disturbed temporarily during construction and staging. The site is heavily disturbed and ground cover includes a mix of native and non-native grasses.

Permanent Impacts Include:

Vegetation Removal - Approximately 13.8 acres of upland will be disturbed. Of the 13.8 acres of upland disturbed, 4.45 acres will ultimately be part of the stormwater facility (which includes 3.39 acres of wet pond and 1.06 acres of bioswale), 0.8 acres will occupy a pathway, and 0.95 acres will be used for a service road.

State Jurisdictional Wetland Removal-Approximately 0.6 acres of wetland will be excavated completely and converted into a wet pond.

Mill Race bank manipulation- Grading will occur at the connection between the bioswale and Mill Race. The existing land surface will be excavated approximately 1.5 feet for the proposed bioswale elevation and an additional 1 foot to allow for top soil fill and mixing.

B. For temporary removal or fill or disturbance of vegetation in waterways, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction.

The 7.6 acres of upland temporary impact will be restored using a native grass seed mix. Of the 6.2 acres of permanent upland impact 4.45 will be restored as shown on the attached restoration plans, converting the use from primarily upland to a stormwater wet pond and bioswale.

Compensatory Mitigation

C. Proposed mitigation approach. Check all that apply:

■ Permittee-responsible Onsite Mitigation	■ Permittee-responsible Offsite mitigation	■ Mitigation Bank or in-lieu fee program	■ Payment to Provide (not approved for use with Corps permits)

D. Provide a brief description of mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.

The City of Springfield has arranged to purchase credits at a mitigation bank for compensatory mitigation which is the preferred option by the agencies.

Mitigation Bank / In-Lieu Fee Information:

Name of mitigation bank or in-lieu fee project:

Type of credits to be purchased:

If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?

■ Yes. Submit the plan with this application and complete the remainder of this section.

■ No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete application).

Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
County	City	Latitude & Longitude (in DD.DDDD format)

Township	Range	Section	Quarter/Quarter

■ Pre-printed mailing labels of adjacent property owners attached	Project Site Adjacent Property Owners	Mitigation Site Adjacent Property Owners

Please reference Attachment C for adjacent property owners

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

Contact Name
Address 1
Address 2
City, ST ZIP Code

I have reviewed the project described in this application and have determined that:

- ■ This project is not regulated by the comprehensive plan and land use regulations.
- ■ This project is consistent with the comprehensive plan and land use regulations.
- ■ This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained:
  - ■ Conditional Use Approval
  - ■ Development Permit
  - ■ Other Permit (see comment section)
- ■ This project is not consistent with the comprehensive plan. Consistency requires:
  - ■ Plan Amendment
  - ■ Zone Change
  - ■ Other Approval or Review (see comment section)

An application ■ has ■ has not been filed for local approvals checked above.

Local planning official name (print)	Title	City / County (circle one)
JAMES P. DONOVAN	PLANNING Supervisor	City of Springfield
[redacted]	Date 12/11/14	

Comments:

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. A public notice will be issued with the certification statement, which will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Name	Title
Signature	Date

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.
To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	$707.00

Print Name Molly Markarian, Senior	Title Senior Planner
Signature [redacted]	Date 12/11/14

Print Name Dan Schall	Title Project Manager
Signature [redacted]	Date 12/10/14

Print Name Jeff Nelson	Title General Manager
Signature [redacted]	Date 12/11/14

Print Name	Title
Signature	Date

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

Print Name	Title
Signature	Date

[redacted]

- **Drawings (items in bold are required)**
  - **Location map with roads identified**
  - **U.S.G.S topographic map**
  - **Tax lot map**
  - **Site plan(s)**
  - **Cross section drawing(s)**
  - **Recent aerial photo**
  - Project photos
  - Erosion and Pollution Control Plan(s), if applicable
  - DSL/Corps Wetland Concurrence letter and map, if approved and applicable
- Pre-printed labels for adjacent property owners (Required if more than 5)
- Restoration plan or rehabilitation plan for temporary impacts
- Mitigation plan
- Wetland functional assessment and/or stream functional assessment
- Alternatives analysis
- Biological assessment (if requested by Corps project manager during pre-application coordination.)
- Stormwater management plan (may be required by the Corps or DEQ)
- Other:
  - [redacted]
  - [redacted]

Send Completed form to:

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GP
PO Box 2946
Portland, OR 97208-2946
Phone: 503-808-4373

Counties:
Baker, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Jefferson, Lincoln, Malheur, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler, Yamhill

OR

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GE
211 E. 7th AVE, Suite 105
Eugene, OR 97401-2722
Phone: 541-465-6868

Counties:
Benton, Coos, Crook, Curry, Deschutes, Douglas Jackson, Josephine, Harney, Klamath, Lake, Lane, Linn

Send Completed form to:

DSL - West of the Cascades:

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Phone: 503-986-5200

OR

DSL - East of the Cascades:

Department of State Lands
1645 NE Forbes Road, Suite 112
Bend, Oregon 97701
Phone: 541-388-6112

Send all Fees to:
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Pay by Credit Card by Calling 503-986-5253

Attachment 4 to Addendum 1 Dated 06/16/15

ATTACHMENTS

amec

ATTACHMENT A

Project Description

PROJECT DESCRIPTION

The purpose of the project is to improve water quality in the Mill Race waterway, which receives stormwater from a 117-acre drainage subbasin at the project location. Monitoring results indicate that high levels of bacteria as well as other urban pollutants, are present in the Mill Race. The City of Springfield is currently performing multi-phased restoration of the Mill Race to improve water quality and fish passage. The Mill Race discharges to the Willamette River at Island Park, approximately 0.5 miles (2,785ft) downstream of the project area.

In the Springfield area, the Willamette River is included on the 303(d) List as being water quality limited for the parameters of temperature and mercury. The City's stormwater management strategies are aimed at addressing temperature and mercury in addition to the pollutants of concern typically found through the urban drainage system (City of Springfield 2010 Stormwater Master Plan). The Mill Race project is one of several capital improvement projects aimed at addressing Total Maximum Daily Loads (TMDLs).

Proposed Project

The project is intended to include open vegetative treatment for problematic pollutants to improve water quality in the Mill Race and also provide detention for stormwater and enhanced planned public amenities in the area. Specific target pollutants are E. coli, iron, and total suspended solids. Water quality samples collected from January 2014 to July 2014 indicate that copper and zinc are not a concern. The Springfield Stormwater Facilities Master Plan (SWFMP) identified the Mill Race project goals to include providing water quality treatment and green pipe open channel improvement. The City of Springfield is proposing to construct a wet detention pond and bioswale to treat stormwater runoff prior to discharge to the Mill Race. These stormwater facilities will reduce sediment and waste through sedimentation and biological uptake. There are six main project elements associated with the project:

1. **Wet detention pond.** The proposed pond will consist of a 3.39 acre area located primarily in upland areas. The pond depth will occur at an elevation of 455ft msl with 5' high berms surrounding the pond. Two small wetlands (i.e. Wetland 1 and Wetland 2) will be excavated during construction of the proposed pond. The proposed pond will treat incoming stormwater runoff by allowing particles to settle out of the water column. Nutrients in the stormwater will be taken up by vegetation in the pond. Stormwater will be conveyed to the northeast corner of detention pond via a new 48" high density polyethylene (HDPE) pipe. The pipe outlet will be stabilized with a concrete headwall, concrete wing walls, and a rip-rap splash pad to dissipate high energy flows and prevent scour. All concrete will be cured prior to connecting. Incoming stormwater will be pretreated in a sediment forebay, which will trap coarse particles and eliminate the need to dredge the entire pond during future maintenance activities. The detention pond has been designed to treat approximately 6.5 acre-ft. The pond is expected to hold 90% of a 24-hour water quality rain event before entering the bioswale. The southern edge of the pond will be planted with trees to reduce temperatures of the pond; however the pond is expected to be dry during the warmest months of the year (i.e. July, August, and September). The pond size was optimized by using a 59-year continuous hydrologic model to simulate the back-to-back nature of real storm events. The characteristics of the

pond geometry and outlet structures were designed such that treatment (considered to be runoff detained for at least four hours within the pond) was maximized. The continuous model showed that 63% of the total runoff would be treated. The entire pond has a storage volume of 12.5 acre-ft, comprising of 6.5 acre-ft of active storage and 9.3 acre-feet of impounded water. The active storage portion of the pond is located below the overflow weir and will drain in a controlled manner through the pond outlet/orifice at the west end of the swale. Water located below the invert of the orifice will remain as a permanent pool. In addition to the orifice structure, an emergency spillway will be constructed at the northwest corner of the sediment forebay near the inlet pipe to prevent stormwater from backing up the inlet pipe during runoff events exceeding the capacity of the pond. The spillway will allow excess stormwater to flow over a concrete overflow weir into the bioswale that will be constructed adjacent to the pond. The wet detention pond is shown on Sheet C-4.

2. **Stormwater bioswale.** A 20-foot wide grass vegetated open channel will be constructed to convey and attenuate stormwater runoff from the pond outlet as well as the flows that cause the water level to exceed the elevation of the overflow weir. Stormwater will be treated as it flows through vegetation growing in the bioswale, which will slow water velocity to allow sedimentation, and filtering through the vegetation. The bioswale will discharge to the Mill Race at the southwest project boundary at an elevation of 455 feet, which is 1.5 foot below the Ordinary High Water (OHW). The bioswale connection to the Mill Race will excavated approximately 2.5 feet below OHW in an area 40ft x10ft. Approximately 6-12 inches of topsoil will be tilled in and a native grass seed will be used within the bioswale. Erosion and/or scouring is not expected due to low velocities
3. The bioswale will receive water from three locations:
    a. The bioswale will receive treated water from the detention pond via a 5.76" diameter HDPE discharge pipe with associated orifice and vault connecting the northwest corner of the pond to the south central side of the bioswale.
    b. The bioswale may also receive overflow during high flow events via a concrete overflow weir constructed at the northeast side of the detention pond.
    c. The bioswale will also receive stormwater from the existing stormwater main, via two existing area drains located in a low spot between the subject property and the Union Pacific Railroad property to the North. The existing stormwater main pipe will be cut back so flows are directed into the bioswale approximately 140 linear feet upstream of the Mill Race. A rip-rap splash pad will be constructed at this discharge to prevent scour.
4. **Mill Race path.** Approximately 2,350 feet of pedestrian and bicycle path will be constructed North of the Mill Race and within the project area. The multi-use path will consist of a 10-foot wide asphalt path, with 2-foot wide gravels shoulders. The path will cross the 20-foot wide bioswale using a Contech CON/SPAN® bridge system. The path will be constructed entirely in upland and the path will include a 2% cross-slope to direct stormwater towards stormwater facility.
5. **Stormwater infrastructure.** Stormwater infrastructure will be removed, modified, or constructed at the following locations:
    a. A new manhole/vault will be constructed in the upland at the existing 48" storm sewer main line located at the northeast corner of the project area. The

manhole/vault will connect the existing 48" storm sewer main with the new 48" HDPE stormwater pipe that is directed towards the detention pond. The existing storm sewer pipe downstream of this connection will closed by a installing a sluice gate, the sluice gate can then be used to by-pass stormwater around the facility in the event of maintenance activities.

b. Two existing concrete vaults and associated piping will be removed from uplands, and remnant at the locations shown on Sheet C-3 and C-4.
c. Approximately 235 feet of existing 48" stormwater pipe are located in uplands at the northwest corner of the project area. This pipe formerly discharged directly to the Mill Race. 140 feet of pipe located within the project grading footprint will be removed. The upstream end of the pipe will be cut so that stormwater drains into the bioswale (refer to Item 3c above)
d. An abandoned 24" corrugated metal pipe (CMP) located at the southwest corner of the project area will be removed within grading limits, this pipe was a remnant from the former log pond operations.

6. **Site grading.** Approximately 13.8 acres of upland grading, including 250,000 cubic yards of excavation will be performed in addition to what is discussed above.

Equipment to be Used

Either large hydraulic excavators or wheel tractor scrapers will be used for the majority of the large upland excavation activities. On-road dump trucks will service the excavations activities, since the majority of excavated soils will be disposed off-site. Footings for structures will be excavated by large to medium sized excavators or backhoes. Other equipment to be used include; bull dozers, , front loaders, compaction equipment/rollers, water trucks, service vehicles, asphalt pavers, spreaders, and hydroseeding equipment.

Best Management Practices

An Erosion and Sediment Control Plan is included as Sheet C-14. Best management practices (BMPs) that will be implemented during the construction activities include:

1. All in-water work will be confined to the approved in-water work window;
2. The work area around the existing outlet and the proposed bioswale will be isolated from the Mill Race using sediment fencing and turbidity barriers;
3. All equipment will be staged out of the water, although equipment buckets are expected to come in contact with water of the Mill Race;
4. A designated equipment laydown area;
5. Placement of drip pans beneath heavy equipment when not in use;
6. Daily inspection of heavy equipment prior to use to insure that equipment is in proper running condition and that there are no leaks. Equipment with leaks or requiring maintenance will be repaired before going back into service;
7. An accidental spill prevention plan will be implemented when equipment is working near the Mill Race;
8. Routine turbidity monitoring in compliance with the National Pollutant Discharge Elimination System (NPDES) 1200C permit for this project;
9. Gravel construction entrances;

10. Wheel wash;
11. Prepare and implement an erosion and sediment control plan;
12. Sediment fence and/or barriers installed along the grading area perimeter;
13. Biobags for inlet protection at catch basins, area drains, and ditch inlets;
14. Gravel construction entrances;
15. Dust control measures (e.g. water spray, plastic sheeting, straw mulch, or other approved measures) at areas susceptible to wind erosion;
16. Perimeter fencing or high-visibility marking tape will be installed around wetlands and other sensitive areas, allowing for a 25-ft wide buffer zone. Heavy equipment and vehicles will not enter the buffer zone;
17. Exposed cut or fill areas will be stabilized through the use of temporary seeding and mulching, matting, mid-slope wattles, or other appropriate measures. Slopes exceeding 25% may require additional erosion control measures (e.g. wattles and/or mats);
18. Permanent vegetation cover will be established in accordance with the Revegetation Plan and will consist of:
    a. Grass vegetated bioswale: native sedge, rush, and grasses will be seeded or planted as plugs to provide filtration and water quality benefits in the bioswale.
    b. Detention pond: native aquatic and wetland obligate plants will be planted as plugs to provide water quality benefits in the pond.
    c. Transitional/upland buffer: Native trees will be planted along the southern perimeter of the detention pond to provide shading, habitat, and aesthetic value. An upland native seed mix will be applied to disturbed areas.
19. All slopes 3H:1V or steeper will receive jute/coir matting overtop and native seed mix. Straw wattles will also be installed on slopes to aid in erosion and sediment control, until vegetation is established; and
20. All project-generated waste and debris will be removed from the project area for off-site disposal in an approved disposal facility.

Long term monitoring and maintenance of facilities will be performed. Expected monitoring and maintenance activities include sediment removal; debris/trash removal; sediment vacuum of manholes and vault structures; vegetation maintenance; erosion control monitoring and repair as needed; pest control and maintenance as needed; water quality monitoring, manhole or structure repair; rock protection at inlet; and fish barrier maintenance.

Construction Sequencing and Schedule

Sediment fences will be placed immediately down slope of the construction area before work occurs. These fences will remain in place until all work is completed and slopes are stabilized and vegetated. Turbidity barriers will be installed below OHW to isolate the excavation activities at the new swale confluence to the Mill Race. Turbidity monitoring will be conducted to ensure the erosion and sediment control measures in-place are effective. Initial construction activities include excavation of the stormwater facility pond and swale, this task is anticipated to take 4 to 6 months, and could be the only activity that takes place during the initial construction season (June-Oct 2015). The next construction activity will include the installation of the concrete structures; bridge, orifice vault, weir, headwall, and wing walls. The access road and multi-use path will be completed next. Once the structures, path, and access road are completed,

the majority of the site can be restored and vegetated. Biodegradable erosion control fabric will be used on the slopes to minimize erosion; these will be placed after the slopes are hydroseeded. The diversion manhole will be one of the last structures completed, once this work begins, stormwater flows will be pumped around and discharged into the existing pipe downstream. After completion of the new stormwater diversion vault, the existing stormwater flow can be redirected into the new stormwater facility by closing and opening sluice gates within the diversion vault. The existing outfall pipe will be then removed and cut back to drain into the new swale. The pipe will remain to drain a ditch on the adjacent railroad property, and will also serve as a maintenance bypass for conducting maintenance on the stormwater facility and associated flow control structures. These tasks will take approximately 3-4 months to complete, and may be conducted in the Summer of 2016.

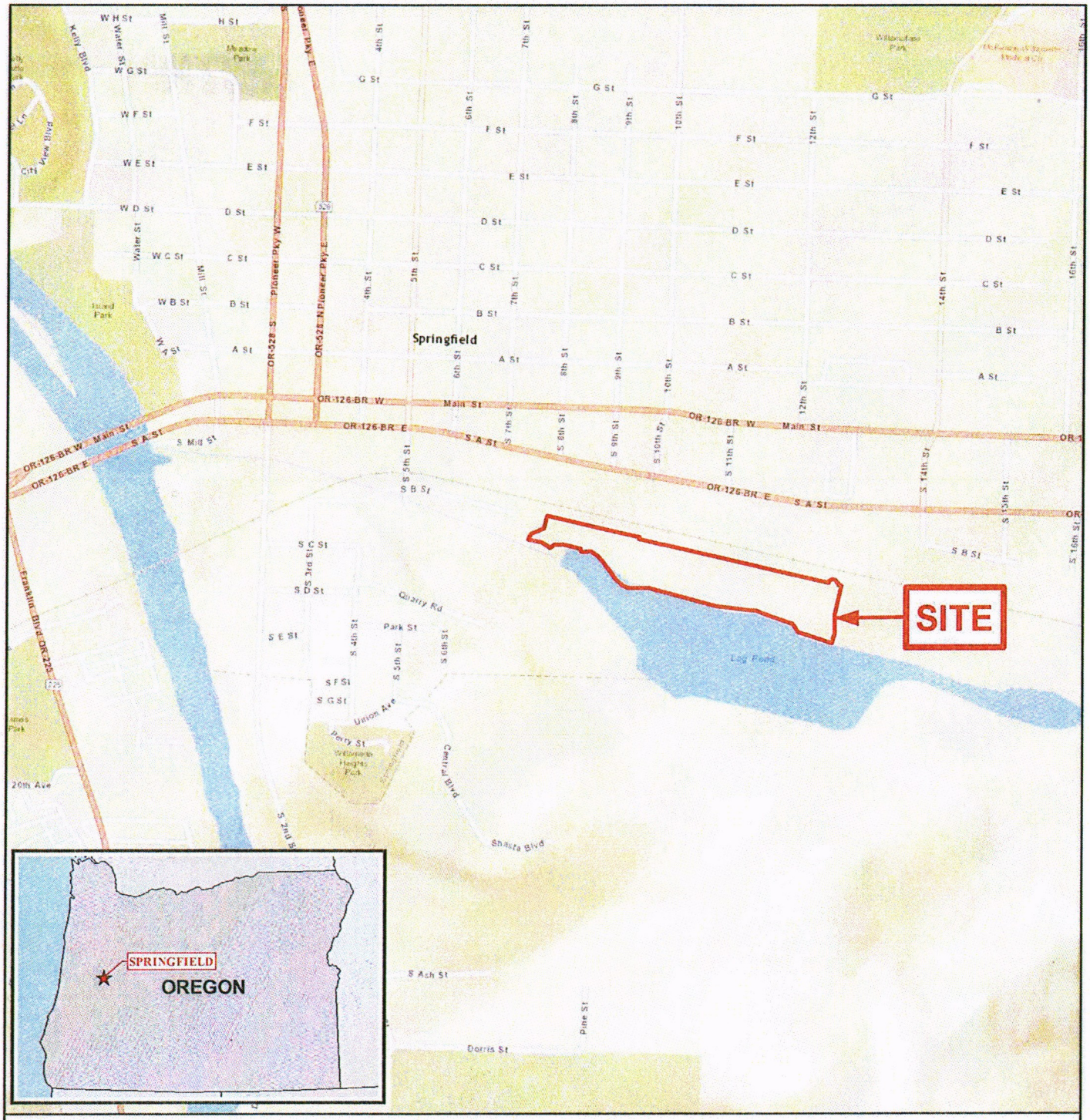
Mitigation

The City of Springfield intends to purchase mitigation banking credits to replace wetlands lost during the proposed project.

amec

ATTACHMENT B

Figures



0 500 1,000 2,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD

TITLE: SITE LOCATION MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
	PROJECTION: OR SP S. Ft.	SCALE: 1 inch = 1,000 feet	FIGURE No.: 1

K:\12000\12700\12790\127901\dwg_JPA\Figure 1 - Site Location Map.mxd - patrick.mccarthy - 12/3/2014 - 9:22:52 AM

0 1,000 2,000 4,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: U.S.G.S. TOPOGRPAHIC MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
	PROJECTION: OR SP S. Ft.	SCALE: 1 inch = 2,000 feet	FIGURE No.: 2

K:\12000\12700\12790\127901\dwg_JPA\Figure 2 - Topographic Map.mxd - patrick.mccarthy - 12/3/2014 - 9:23:03 AM

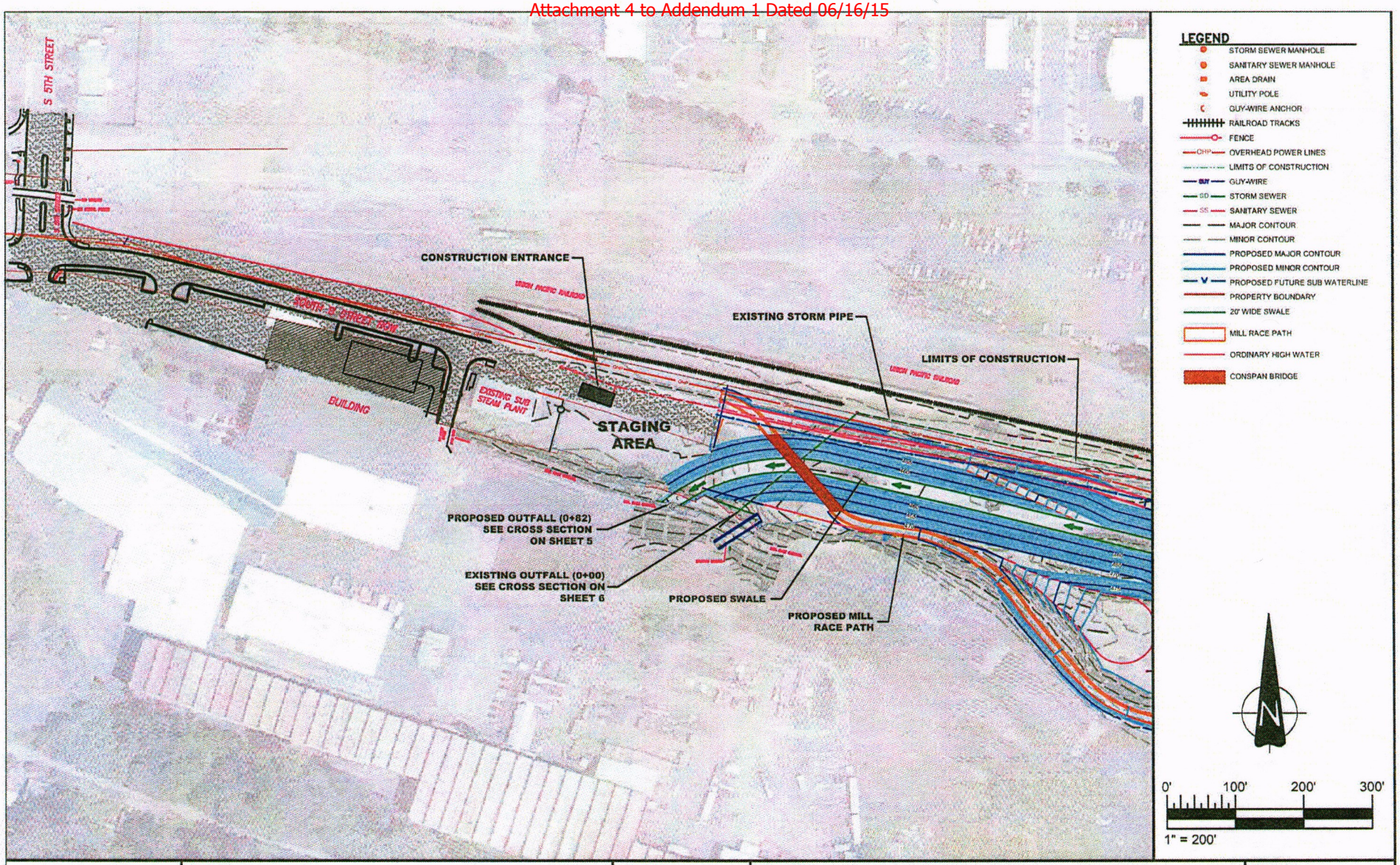
Attachment 4 to Addendum 1 Dated 06/16/15

0 300 600 1,200 Feet

N

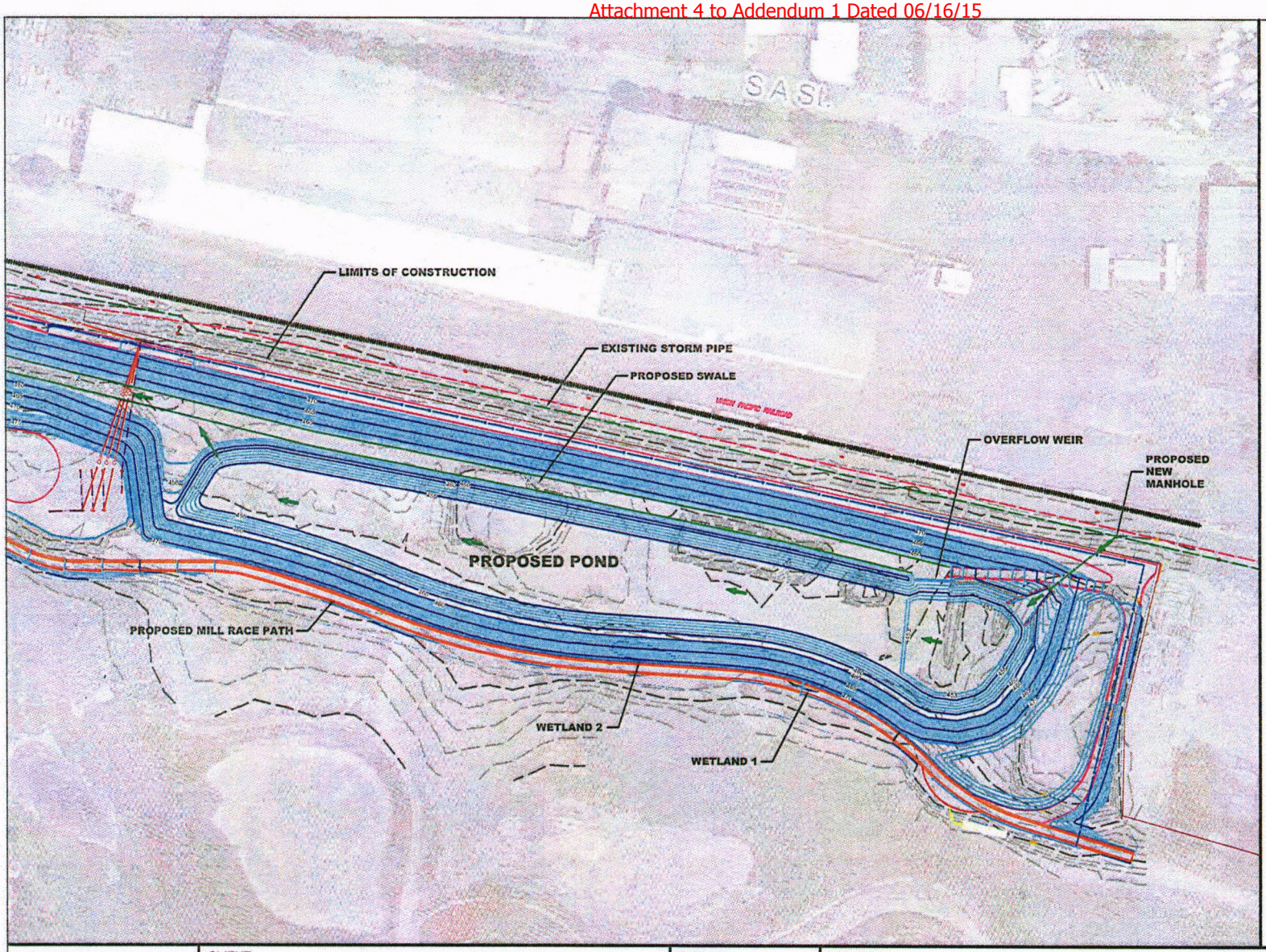
AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: TAX LOT MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: -	PROJECT NO.: 3-61M-127900
	PROJECTION: OR SP S. Ft	SCALE: 1 inch = 500 feet	FIGURE No.: FIGURE 3

K:\12000\12700\12790\127901\dwg_JPA\Figure 3 - Taxlot Map.mxd



	CLIENT CITY OF SPRINGFIELD	DWN BY: PM CHK'D BY: DS	PROJECT SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: - DATE: DECEMBER 2014
AMEC 7376 S.W. Durham Road Portland OR. U.S.A. 97224	amec	DATUM: NAD83 PROJECTION: OR SP S. Ft. SCALE: 1" = 400'	TITLE SITE OVERVIEW - WEST	PROJECT NO: 4-61M-127901 FIGURE No. 4A

K:\12000\12700\12790\127901\dwg_JPA\4 – 6 – Proposed Site Plan_X-Sections_JPA.dwg – 4A – Dec. 03, 2014 9:21am – patrick.mccarthy



LEGEND

- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- AREA DRAIN
- UTILITY POLE
- GUY-WIRE ANCHOR
- RAILROAD TRACKS
- FENCE
- OHP — OVERHEAD POWER LINES
- PROPOSED ELECTRIC CONDUIT
- GUY — GUY-WIRE
- SD — STORM SEWER
- SS — SANITARY SEWER
- MAJOR CONTOUR
- MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- W — PROPOSED FUTURE SUB WATERLINE
- PROPERTY BOUNDARY
- 20' WIDE SWALE
- MILL RACE PATH

N

0' 100' 200' 300'

1" = 200'

CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: -
	CHK'D BY: DS		DATE: DECEMBER 2014
AMEC, 7376 S.W. Durham Road, Portland OR. U.S.A. 97224	DATUM: NAD83	TITLE: SITE OVERVIEW - EAST	PROJECT NO: 4-61M-127901
	PROJECTION: OR SP S. Ft.		FIGURE No. 4B
	SCALE: 1" = 400'		

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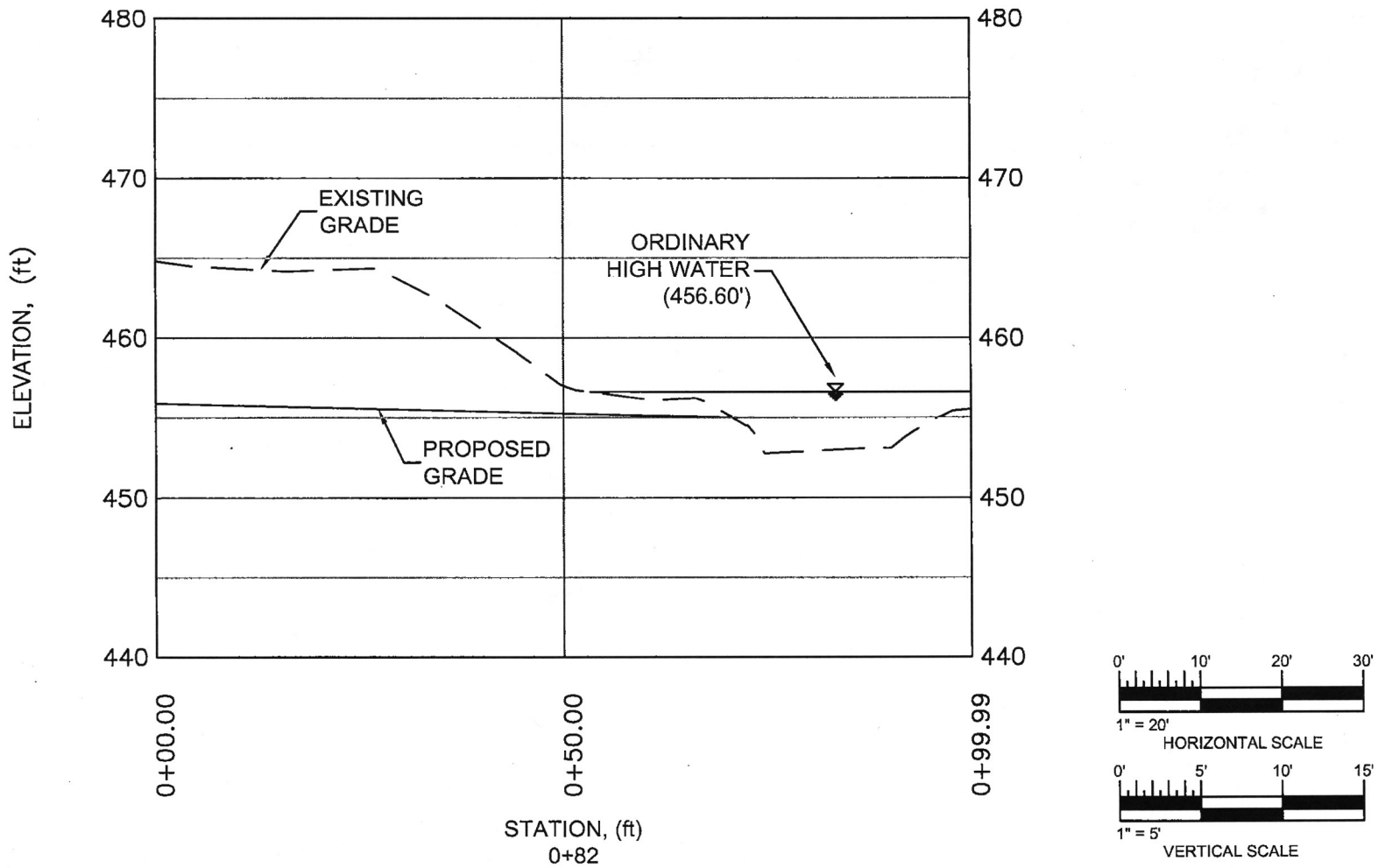
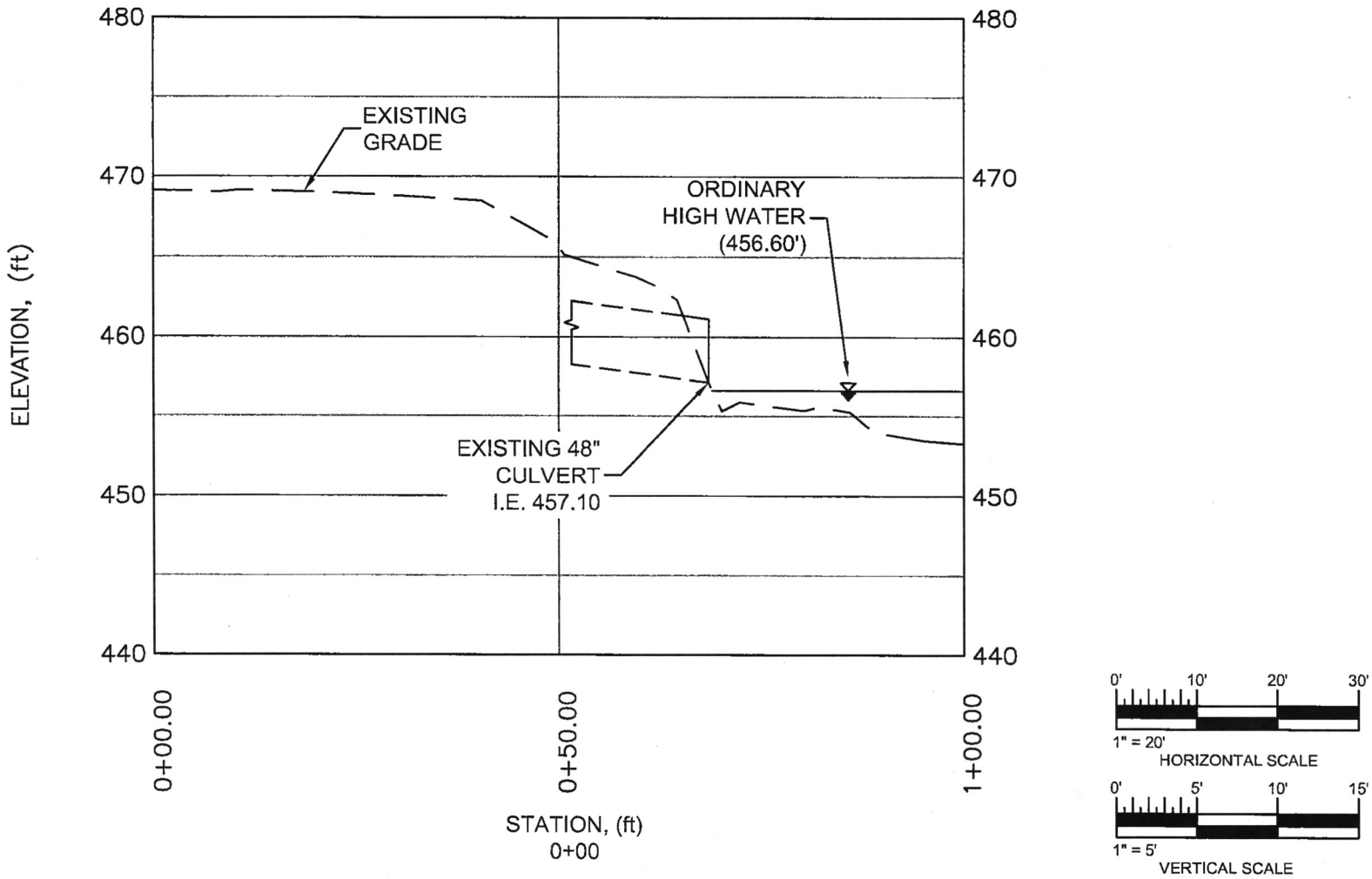


CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: -
	CHK'D BY: DS		DATE: DECEMBER 2014
AMEC, 7376 S.W. Durham Road, Portland OR. U.S.A. 97224	DATUM: NAD83	TITLE: PROPOSED BIOSWALE CROSS SECTION	PROJECT NO: 4-61M-127901
	PROJECTION: OR SP S. Ft.		FIGURE No. 5
	SCALE: 1" = 400'		

K:\12000\12700\12790\127901\dwg_JPA\4 – 6 – Proposed Site Plan_X-Sections_JPA.dwg – 5 – Dec. 03, 2014 9:21am – patrick.mccarthy



CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	REV. NO.: -
	CHK'D BY: DS		DATE: DECEMBER 2014
AMEC, 7376 S.W. Durham Road, Portland OR. U.S.A. 97224	DATUM: NAD83	TITLE: EXISTING CULVERT CROSS SECTION	PROJECT NO: 4-61M-127901
	PROJECTION: OR SP S. Ft.		FIGURE No. 6
	SCALE: 1" = 400'		

K:\12000\12700\12790\127901\dwg_JPA\4 – 6 – Proposed Site Plan_X-Sections_JPA.dwg – 6 – Dec. 03, 2014 9:21am – patrick.mccarthy

Attachment 4 to Addendum 1 Dated 06/16/15

amec

ATTACHMENT C

Adjacent Land Owner Information

OWNNAME	ADDR1	ADDR2	ADDR3	OWNERCITY	OWNERPRVST	OWNERZIP
CITY OF SPRINGFIELD	225 NO 5TH ST			SPRINGFIELD	Oregon	97477
CITY OF SPRINGFIELD	202 S 18TH ST	ATTN SPRINGFIELD UTILITY BRD		SPRINGFIELD	Oregon	97477
CITY OF SPRINGFIELD	202 S 18TH ST	ATTN SPRINGFIELD UTILITY BRD		SPRINGFIELD	Oregon	97477
TIMBER PRODUCTS CO	305 S 4TH			SPRINGFIELD	Oregon	97477
TIMBER PRODUCTS CO	PO BOX 269			SPRINGFIELD	Oregon	97477
R-H MCKENZIE COMPANY LLC	PO BOX 2280			EUGENE	Oregon	97402
KNIFE RIVER CORPORATION-NORTHWEST	32260 OLD HWY 34			TANGENT	Oregon	97389
GENTRACO INC	6860 SW WINDING WAY			CORVALLIS	Oregon	97333
KENDALL DEVELOPMENT GROUP LLC	PO BOX 1318			EUGENE	Oregon	97440
CITY OF SPRINGFIELD	225 N 5TH ST			SPRINGFIELD	Oregon	97477
UNION PACIFIC RAILROAD CO	1400 DOUGLAS ST STOP 1640			OMAHA	Nebraska	68179
R-H MCKENZIE COMPANY LLC	PO BOX 2280			EUGENE	Oregon	97402

amec

ATTACHMENT D

Wetland Concurrence Letters

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
EUGENE FIELD OFFICE
1600 EXECUTIVE PARKWAY SUITE 210
EUGENE OR 97401-2156

REPLY TO
ATTENTION OF:

January 22, 2014

Operations Division
Regulatory Branch
Corps No. NWP-2013-438

Molly Markarian and Jesse Jones, P.E.
City of Springfield
225 Fifth Street
Springfield, Oregon 97477-4671

Dear Ms. Markarian and Mr. Jones:

The U.S. Army Corps of Engineers (Corps) has received the City of Springfield's (City) request for our concurrence with the wetland delineation of potentially jurisdictional waters located at the Springfield Millrace Facility, south side of downtown Springfield, Lane County, Oregon. The site is in Section 35 of Township 17 South, Range 3 West. City's delineation has been assigned Corps No. NWP-2013-438. Please refer to this number in all correspondence.

The Corps has jurisdiction over water bodies under the authorities provided in the Rivers and Harbors Act of 1899 (RHA) and the Clean Water Act (CWA).

Under Section 10 of the RHA, the Corps has authority to issue permits for structures or work (including excavation) in or affecting navigable waters of the United States. The limits of our jurisdiction extend landward up to the mean high water mark in tidally influenced areas and to the ordinary high water mark in non-tidal, navigable waters.

Under Section 404 of the Clean Water Act, the Corps has authority to issue permits for the placement of dredged or fill material into waters of the United States. The term "waters of the United States" includes the territorial seas and tidally influenced waters. Limits of jurisdiction under Section 404 extend landward to the high tide line. "Waters" also include all other waters that are part of a surface tributary system to and including navigable (non-tidal) waters of the United States. Limits of jurisdiction extend landward up to the ordinary high water mark. Wetlands adjacent to these waters are also "waters of the United States."

The wetland delineation report entitled Mill Race Stormwater Feasibility Study Project, prepared by AMEC Environment & Infrastructure, Inc. and dated August 7, 2013 delineated approximately 0.06 acres of wetlands on the subject property and the Millrace located along the southern boundary of the site. The Corps concurs with the boundaries of wetland 1 and wetland 2 and extent of these waters of the United States as shown in Figure 4 (Enclosure 1). If you propose to discharge fill or dredged material into waters of the United States as shown in Enclosure

1, a Department of the Army permit may be required under Section 404 before you can proceed. The Millrace is considered navigable under Section 10. If City intends to place structures or conduct work in the Millrace, a Department of the Army permit is required before the City can proceed.

The drainage features in the delineation shown as UR1, UR2, UR3, and UR4 have also been reviewed. The features have been classified as riverine systems and possible fish presence. The Corps does not concur with the use of flow determinations for the drainages since there are no hydrological connections or outlets into other downstream riverine systems. Fish presence should also not be used when determining if these features are riverine or not. UR3 and UR4 met wetland criteria and have been classified as wetlands in the Corps review. Upon further review the Corps determined wetlands UR3 and UR4 are isolated and are not jurisdictional waters of the United States.

Enclosure 2 is the approved jurisdictional determination (JD) form that identifies the basis for asserting jurisdiction. If the City is not in agreement with the approved JD, City can make an administrative appeal under 33 CFR 331. Please see the enclosed Notification of Administrative Appeal Options and Process and Request for Appeal for further information about that process (Enclosure 3). This approved JD is valid for a period of five years from the date of this letter unless new information warrants revision of the determination before the expiration date, or the District Commander has identified, after public notice and comment, this geographic area as having rapidly changing environmental conditions that merit re-verification on a more frequent basis.

If City has any questions, please contact me at the letterhead address, by telephone at (541) 465-6769, or email Benny.A.Dean@usace.army.mil.

Sincerely,

[redacted]

Benny A. Dean Jr.
Project Manager
Regulatory Branch

Enclosures

Copy Furnished:

Oregon Department of State Lands (Kiryuta)
AMEC Environment & Infrastructure, Inc. (Erin Hale)

Oregon
John A. Kitzhaber, MD, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregonstatelands.us

State Land Board

John A. Kitzhaber, MD
Governor

Kate Brown
Secretary of State

Ted Wheeler
State Treasurer

January 22, 2014

City of Springfield
Attn: Molly Markarian
Attn: Kenneth Vogeney, City Engineer
225 Fifth Street
Springfield, OR 97477

Re: Wetland Delineation Report for Springfield, Lane County; T17S R3W Sec. 35, Northern Portion of Tax Lot 307; WD #2013-0250; City of Springfield Local Wetlands Inventory wetland W-7

Dear Ms. Markarian and Mr. Vogeney:

The Department of State Lands has reviewed the wetland delineation report prepared by AMEC Environment and Infrastructure, Inc. for the site referenced above. Please note that the study area includes only a portion of the tax lot described above. Based upon the information presented in the report and additional information submitted upon request, we concur with the wetland boundaries as mapped in revised Figure 4 of the report. Please replace all copies of the preliminary wetland map with this final Department-approved map. Within the study area, two wetlands (totaling approximately 0.06 acres) and no waterways were identified. The wetlands are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in the wetland (or below the ordinary high water line (OHWL) of a waterway). Four ditch segments also were identified within the study area, however these features are determined to be not state jurisdictional under OAR 141-085-0515(8) and (10).

This area may include a DSL easement, #EA17393. Please contact Jim Grimes at 503-986-5233 for more information.

This concurrence is for purposes of the state Removal-Fill Law only. Federal or local permit requirements may apply as well. The Army Corps of Engineers will review the report and make a determination of jurisdiction for purposes of the Clean Water Act at the time that a permit application is submitted. We recommend that you attach a copy of this concurrence letter to both copies of any subsequent joint permit application to speed application review.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you

work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter, unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity, or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. Please phone me at 503-986-5297 if you have any questions.

Sincerely,

Jevra Brown
Wetland Specialist

Approved by

Bill Ryan
Assistant Director

Enclosures

ec: Erin Hale, AMEC Environment and Infrastructure, Inc.
Brian Meiering, Schirmer-Satre, Inc.
City of Springfield Planning Department (Maps enclosed for updating LWI)
Benny Dean, Jr., Corps of Engineers, Eugene office
Gloria Kiryuta, DSL

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD	
TITLE: SITE LOCATION MAP		DWN BY: PM	DATUM: NAD83	DATE: AUGUST 2013
PROJECT: MILL RACE WETLAND DELINEATION DSL WD #2013-0250		CHK'D BY: EH	REV. NO.: -	PROJECT NO.: 3-61M-127900
		PROJECTION: HARN OR SP S. Int. Ft.	SCALE: 1 Inch = 2,000 feet	FIGURE No.: FIGURE 1

K:\12000\12700\12790\127900\DWG_Wetland_Delineation\Figure 1 - Site Location Map.mxd

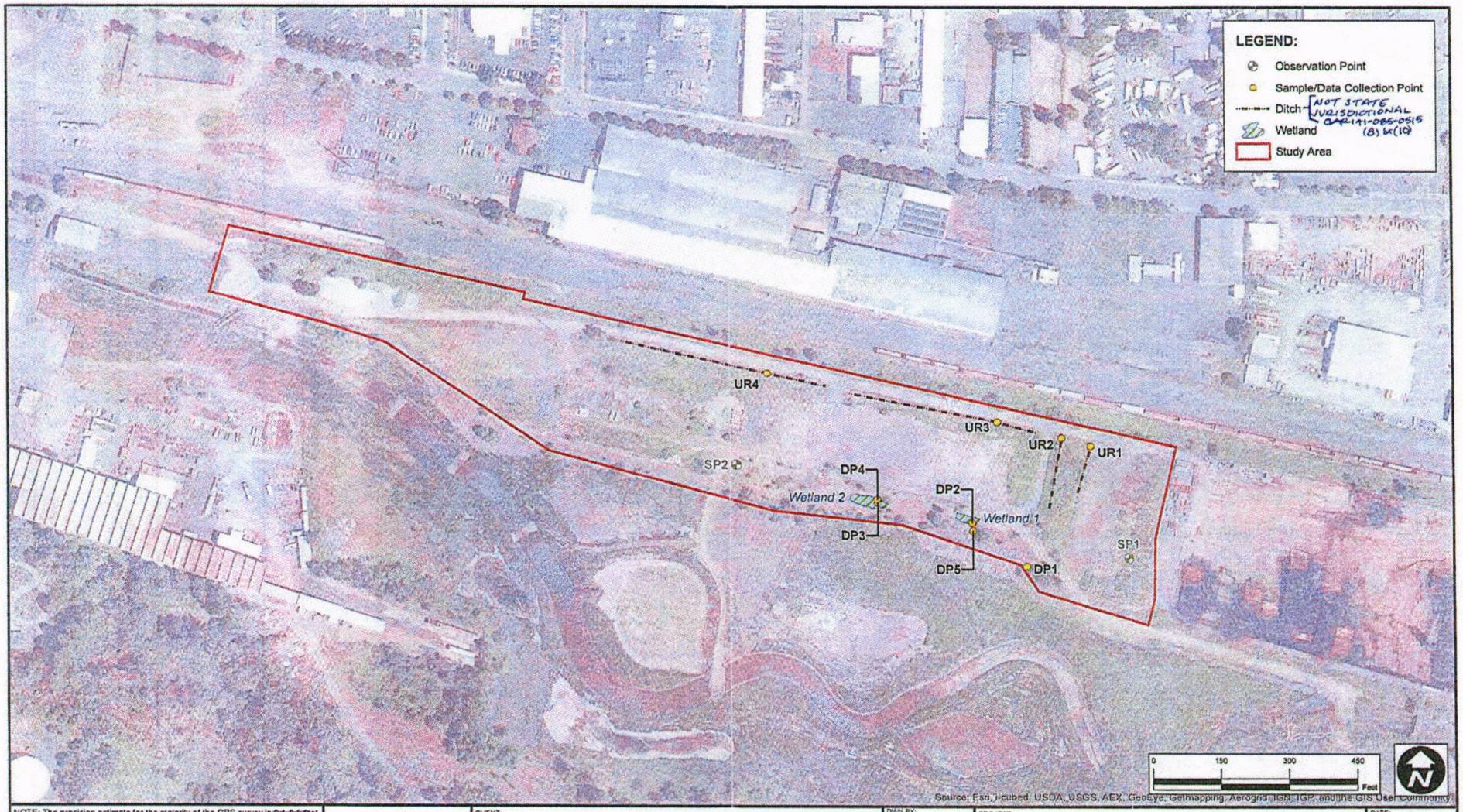
0 300 600 1,200 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: TAX LOT MAP	DWN BY: PM	DATUM: NAD83	DATE: AUGUST 2013
PROJECT: MILL RACE WETLAND DELINEATION DSL WD #2013-0250	CHK'D BY: EH	REV. NO.: -	PROJECT NO.: 3-61M-127900
	PROJECTION: HARN OR SP S. Int. Ft.	SCALE: 1 inch = 500 feet	FIGURE No.: FIGURE 2

K:\12000\12700\12790\127900\DWG_Wetland_Delineation\Figure 2 - Tax Lot Map.mxd

Attachment 4 to Addendum 1 Dated 06/16/15



NOTE: The precision estimate for the majority of the GPS survey is ~~0.1-0.5~~ feet in latitude, longitude, and elevation. submeter

DSL WD # 2013-0250

Approval Issued 01/22/2014

Approval Expires 01/22/2019

WL1 ≐ 0.02ac
WL2 ≐ 0.04ac
0.06ac

CLIENT: CITY OF SPRINGFIELD

AMEC
7376 SW Durham Road
Portland, OR, U.S.A. 97224

amec

DWN BY: PM
CHKD BY: PP
DATUM: NAD83
PROJECTION: HARN OR SP S. Int. Ft.
SCALE: 1 inch = 200 feet

PROJECT: MILL RACE WETLAND DELINEATION

TITLE: WETLAND AND OTHER WATERS MAP

DATE: AUGUST 2013
PROJECT NO.: 3-61M-127900
REV. NO.: X
FIGURE NO.: 4

K:\12000\12700\12790\127900\DWG_Wetland_Delineation\Figure 4 - Wetland and Other Waters.mxd - stephane.descombes - 8/6/2013 - 11:32:51 AM

Oregon

John A. Kitzhaber, MD, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregonstatelands.us

State Land Board

John A. Kitzhaber, MD
Governor

Kate Brown
Secretary of State

Ted Wheeler
State Treasurer

November 14, 2014

City of Springfield
Attn: Molly Markarian
225 Fifth Street
Springfield, OR 97477

Re: Revised WD#2013-0250 for the Mill Race Project Springfield, Lane County; T17S R3W Sec. 35, Northern Portion of Tax Lot 307; City of Springfield Local Wetlands Inventory wetland W-7

Dear Ms. Markarian:

The Department of State Lands has reviewed the wetland delineation addendum prepared by AMEC Environment and Infrastructure, Inc. for the site referenced above. Please note that the revised study area includes only a portion of the tax lot described above. Based upon the information presented in the report and additional information submitted upon request, we concur with the wetland boundaries as mapped in Figure 4 of the addendum. Please replace all copies of the preliminary wetland map with this final Department-approved map. Within the study area, two wetlands (totaling approximately 0.06 acres) and one waterway were identified. The wetlands and waterway are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in the wetland (or below the ordinary high water line (OHWL) of a waterway). Four ditch segments also were identified within the study area, however these features are determined to be not state jurisdictional under OAR 141-085-0515(8) and (10).

This area may include a DSL easement, #EA17393. Please contact Chuck Perino at 503-986-5288 for more information.

This concurrence is for purposes of the state Removal-Fill Law only. Federal or local permit requirements may apply as well. The Army Corps of Engineers will review the report and make a determination of jurisdiction for purposes of the Clean Water Act at the time that a permit application is submitted. We recommend that you attach a copy of this concurrence letter to both copies of any subsequent joint permit application to speed application review.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter, unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity, or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. Please phone me at 503-986-5297 if you have any questions.

Sincerely,

Lauren Brown

Lauren Brown
Jurisdiction Coordinator

Approved by Kathy Verble

Kathy Verble, CPSS
Aquatic Resource Specialist

Enclosures

ec: Erin Hale, AMEC Environment and Infrastructure, Inc.
Brian Meiering, Schirmer-Satre, Inc.
Kenneth Vogeney, City of Springfield
City of Springfield Planning Department (Maps enclosed for updating LWI)
Benny Dean, Jr., Corps of Engineers, Eugene office
Charles Redon, DSL

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the front of an unbound report or include a hard copy of the completed form with a CD/DVD that includes a single PDF file of the report cover form and report (minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF attachment of the completed cover from and report may be e-mailed to **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail instructions on how to access the file from your ftp or other file sharing website. Fees can be paid by check or credit card. Make the check payable to the Oregon Department of State Lands. To pay the fee by credit card, call 503-986-5200.

☒ Applicant ☒ Owner Name, Firm and Address: **Molly Markarian** **City of Springfield** **225 Fifth Street** **Springfield, OR 97477**	Business phone # 541 726 4611 Mobile phone # (optional) E-mail: mmarkarian@springfield-or.gov RECEIVED
☒ Authorized Legal Agent, Name and Address: **Erin Hale** **AMEC E&I** **7376 SW Durham Rd, Portland, OR 97223**	Business phone # **503-639-3400** Mobile phone # E-mail: **erin.hale@amec.com** AUG 16 2013 DEPARTMENT OF STATE LANDS

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

Typed/Printed Name: Kenneth J. Vogeney Signature: [redacted]

Date: 8/15/2013 Special instructions regarding site access:

Project and Site Information (using decimal degree format for lat/long.,enter centroid of site or start & end points of linear project)

Project Name: **Mill Race SW Facility Feasibility Study**	Latitude: **44° 2'34.69** Longitude: **123° 0' 31.98**
Proposed Use: **Stormwater**	Tax Map # 1703350000307
Project Street Address (or other descriptive location): located 800 feet south-southeast of the intersection between South 10th Street and South A Street City: **Springfield** County: **Lane**	Township **17S** Range **3W** Section **35** QQ Tax Lot(s) **307** – North Portion Waterway: **Unnamed** River Mile: NWI Quad(s):

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Erin Hale** **AMEC E&I** **7376 SW Durham Rd, Portland, OR 97223**	Phone # **503-639-3400** Mobile phone # E-mail: **erin.hale@amec.com**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

Consultant Signature: [redacted] Date: August 7, 2013

Primary Contact for report review and site access is ☒ Consultant ☒ Applicant/Owner ☐ Authorized Agent

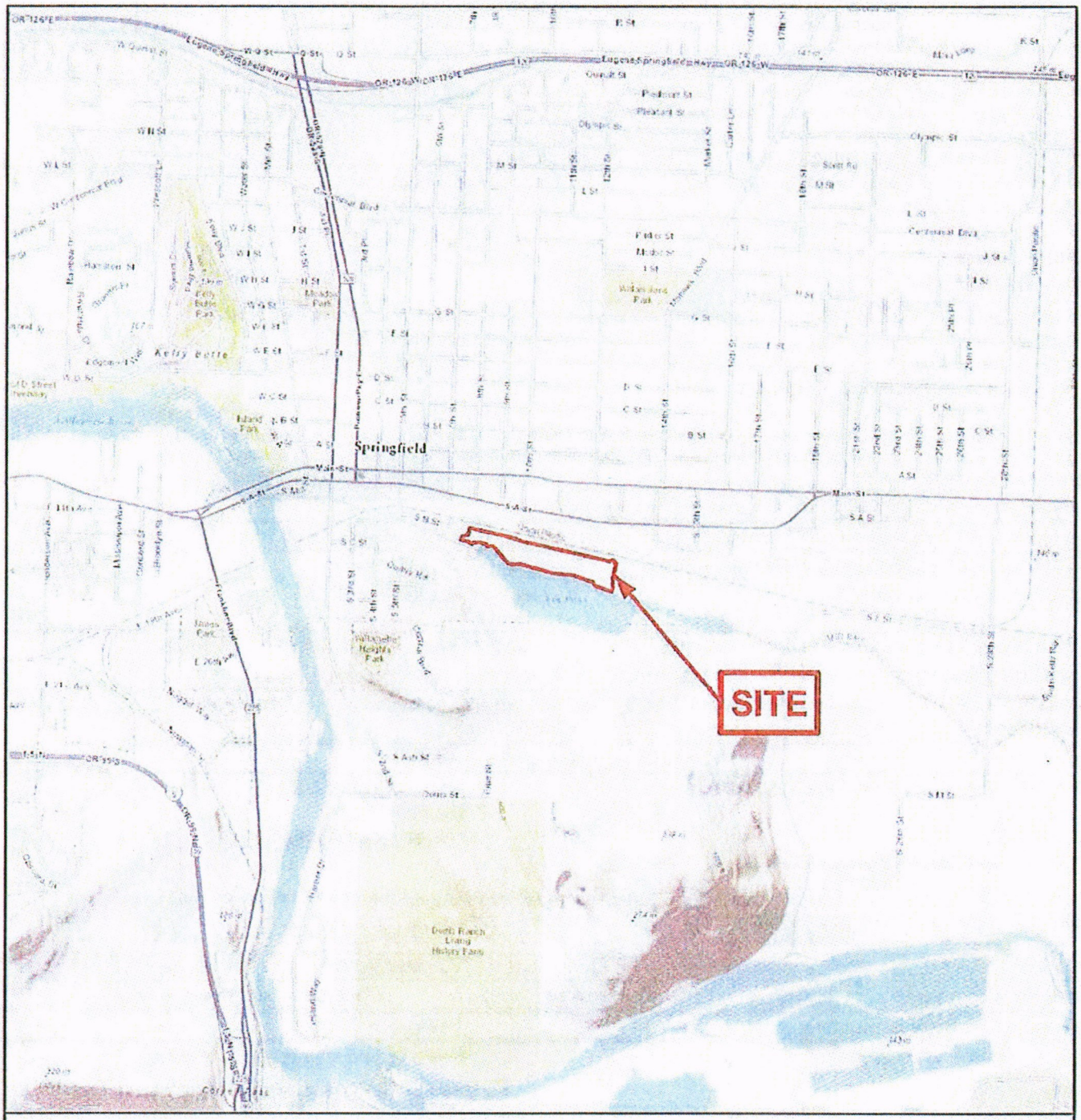
Wetland/Waters Present? ☒ Yes ☐ No | Study Area size: **14.3** Total Wetland Acreage: **0.06**

Check Box Below if Applicable:	**Fees:**
☐ R-F permit application submitted	☒ Fee payment submitted **$ 388.00**
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	☐ No fee for request for reissuance of an expired report
☐ Industrial Land Certification Program Site	
☐ Reissuance of a recently expired delineation Previous DSL # Expiration date _____	

Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☐	☒	If known, previous DSL #
Does LWI, if any, show wetland or waters on parcel?	☐	☒	

For Office Use Only

DSL Reviewer: JRLB	Fee Paid Date: 08 / 19 / 2013	DSL WD # 2013-0250
Date Delineation Received: 8 / 16 / 13	DSL Project # _____	DSL Site # _____
Scanned: ☐ Final Scan: ☐	DSL WN # _____	DSL App. # _____

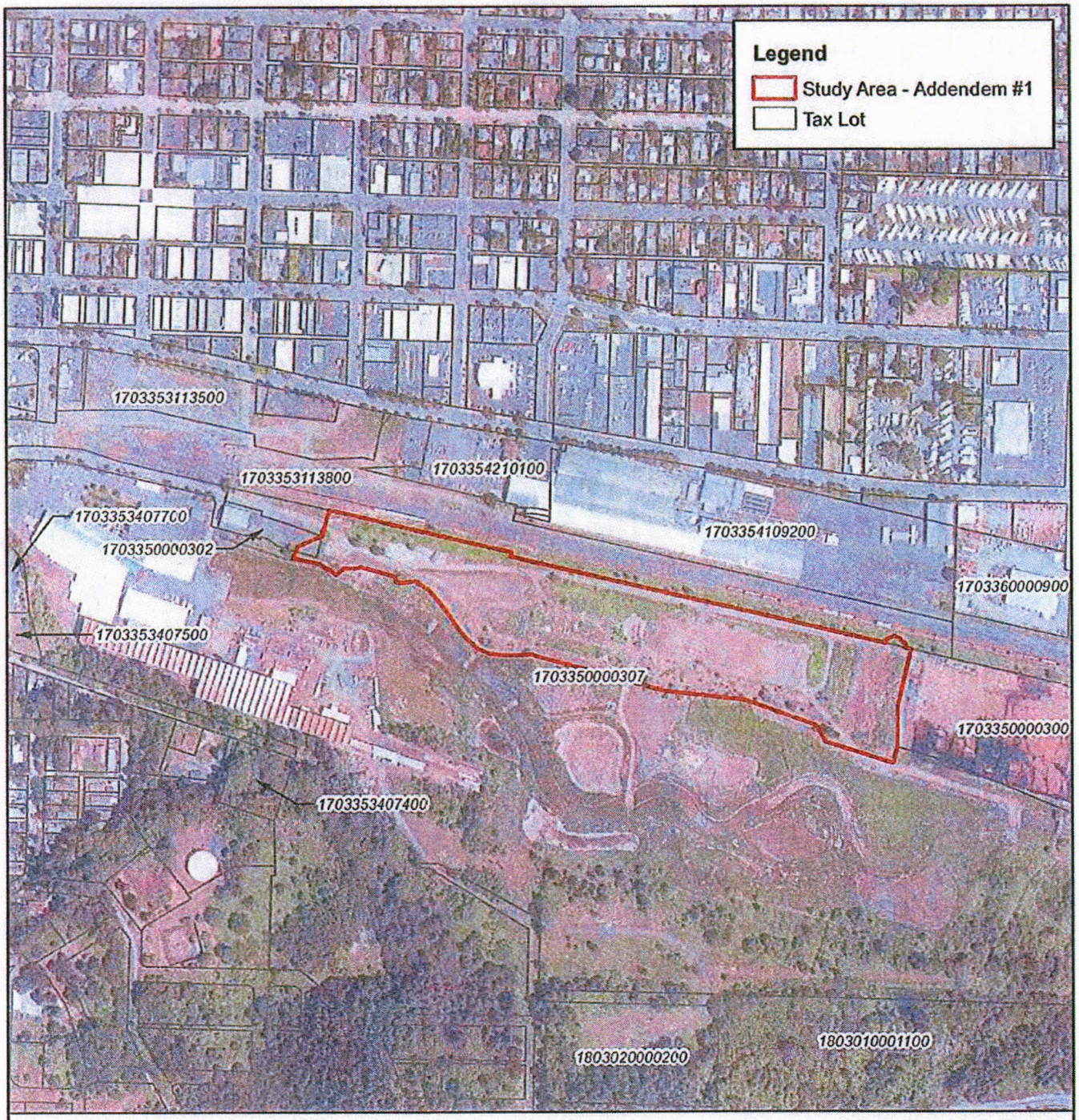


0 1,000 2,000 4,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: SITE LOCATION MAP	DWN BY: PM	DATUM: NAD83	DATE: NOVEMBER 2014
PROJECT: MILL RACE WETLAND DELINEATION ADDENDUM #1	CHK'D BY: EH	REV. NO.: B	PROJECT NO.: 4-61M-127901
	PROJECTION: HARN OR SP S. Int. Ft.	SCALE: 1 inch = 2,000 feet	FIGURE No.: FIGURE 1

K:\12000\12700\12790\127901\dwg_Wetland_Addendum\Figure 1 - Site Location Map.mxd



July 2011 Aerial Imagery from live web services provided by ERSI ArcGIS Map service online mapping system.

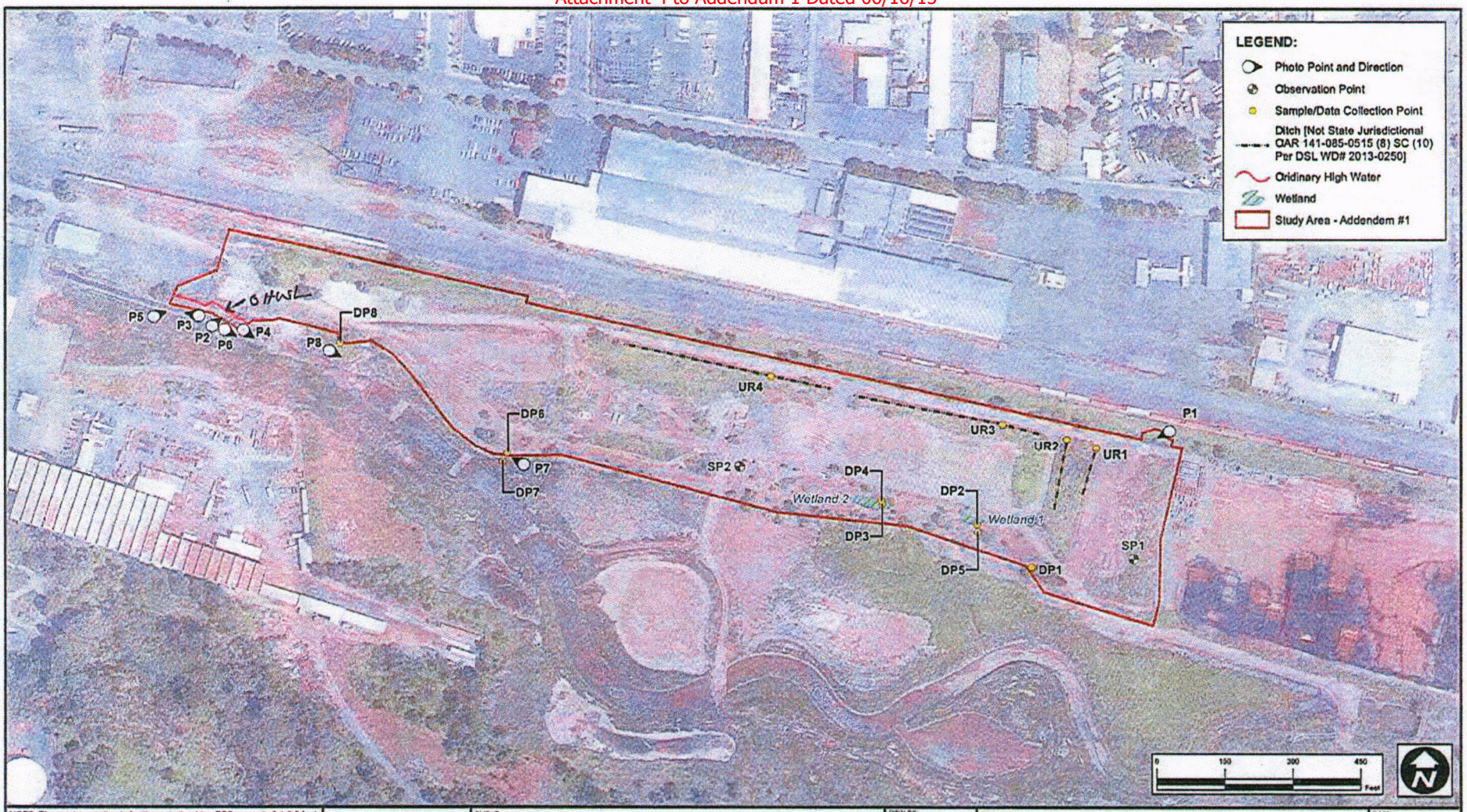
0 300 600 1,200 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: TAX LOT MAP	DWN BY: PM	DATUM: NAD83	DATE: NOVEMBER 2014
PROJECT: MILL RACE WETLAND DELINEATION ADDENDUM #1	CHK'D BY: EH	REV. NO.: B	PROJECT NO.: 4-61M-127901
	PROJECTION: HARN OR SP S. Int. Ft.	SCALE: 1 inch = 500 feet	FIGURE No.: FIGURE 2

K:\12000\12700\12790\127901\dwg_Wetland_Addendum\Figure 2 - Tax Lot Map.mxd

Attachment 4 to Addendum 1 Dated 06/16/15



NOTE: The precision estimate for the majority of the GPS survey is 0.1-0.5 feet in latitude, longitude, and elevation.

CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: MILL RACE WETLAND DELINEATION	DATE: NOVEMBER 2014
	CHKD BY: EH		PROJECT NO.: 4-61M-127901
AMEC, 7376 SW Durham Road, Portland, OR, U.S.A. 97224	DATUM: NAD83	TITLE: WETLAND AND OTHER WATERS MAP ADDENDUM #1	REV. NO.: X
amec	PROJECTION: HARN OR SP S. Int. Ft.		FIGURE NO.: 4
	SCALE: 1 inch = 200 feet		

K:\12000\12700\12790\127901\dwg_Wetland_Addendum\Figure 4 - Wetland and Other Waters.mxd - patrick.mccarthy - 11/3/2014 - 2:13:53 PM

DSL WD # 2013-0250

Approval Issued 11/14/2014

Approval Expires 01/22/2019

amec

ATTACHMENT F

Biological Assessment

BIOLOGICAL ASSESSMENT

Springfield Mill Race Stormwater Facility and Path

Prepared for:

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Prepared by:

AMEC Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon 97224
(503) 639-3400

December 2014

Project No. 4-61M-127901

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amec

December 4, 2014
AMEC Project No. 4-61M-127901

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Attention: Molly Markarian and Jesse Jones, P.E.

Subject: Biological Assessment
Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

Dear Molly and Jesse:

AMEC Environment and Infrastructure, Inc. (AMEC) has prepared the enclosed Biological Assessment (BA) to support the Mill Race Stormwater Facility and Path project in Springfield, Oregon. The BA was completed in accordance with the First Amendment to the City of Springfield Independent Contractor Agreement dated March 6, 2014.

We appreciate the opportunity to provide our services for your project. Please feel free to contact the undersigned at (503) 639-3400, if you have any questions or require additional information.

Sincerely,

AMEC Environment and Infrastructure, Inc.

[redacted]

Erin Hale, PWS
Senior Environmental Scientist

REVIEWED BY

[redacted]

Dan Schall, PE
Project Manager

EH/jm

AMEC Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel+1 (503) 639-3400
Fax+1 (503) 620-7892
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amec

BIOLOGICAL ASSESSMENT
Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

1.0 PROJECT OVERVIEW

The City of Springfield (City) is seeking to improve water quality in the Mill Race waterway by providing stormwater management and treatment as described in the City's Stormwater Master Plan. The City is proposing to construct a wet detention pond and bioswale to be located in Section 35 of Township 17 South, Range 3 West, of the Willamette Meridian within Tax Lots 1703350000307 and 1703350000302. This Biological Assessment was prepared to evaluate potential direct and indirect effects of the proposed project on Endangered Species Act (ESA)-listed threatened and endangered (T&E) and candidate species.

1.1 PROJECT LOCATION

The Springfield Mill Race Facility is approximately 15.1 acres (Study Area), located on the south side of downtown Springfield (Figure 1). The Study Area is located within Section 35, Township 17 South, Range 3 West, of the Willamette Meridian between the Springfield Mill Race and the Union Pacific rail line in an industrial area of downtown Springfield. The Study Area is comprised of Map and Tax Lot 1703350000307 (Figures 1 through 3). Photographs of the project site are presented in Appendix A.

1.2 PROJECT DESCRIPTION

The purpose of the proposed project is to improve water quality in the Mill Race waterway that receives stormwater (SW) from a 117.2-acre industrial and commercial subbasin located east and southeast of downtown Springfield. The pervious and impervious areas of the sub-basin are estimated at 25.8 acres and 91.4 acres, respectively. The Mill Race is a 3.5-miles long, man-made channel excavated in 1852 connecting the middle fork and main stem of the Willamette River. It was created to provide power to the first grist and saw mills in the area (UO, 2004). Monitoring results indicate that high concentrations of bacteria, as well as other urban pollutants, are present in the Mill Race. The City of Springfield (City) is currently conducting a multi-phased restoration of the Mill Race to improve water quality and fish passage. The Mill Race discharges to the Willamette River at Island Park, approximately 0.5 miles downstream of the project area (Figures 1, 2 and 3).

In the Springfield area, the Willamette River is included on the 303(d) List as being water quality limited for the parameters of temperature and mercury. The City's SW management strategies are aimed at addressing temperature and mercury in addition to the pollutants of concern typically found through the urban drainage system (City of Springfield 2010 Stormwater Master Plan). The Mill Race project is one of several capital improvement projects aimed at addressing Total Maximum Daily Loads (TMDLs).

1.2.1 Proposed Action

The proposed project is intended to include open vegetative treatment for problematic pollutants in SW to improve water quality in the Mill Race and to provide detention for SW and enhanced planned public amenities in the area. Specific target pollutants are the bacterium *Escherichia coli*, iron, and total suspended solids (TSS). The Springfield Stormwater Facilities Master Plan (SWFMP) identified the Mill Race project goals to include providing water quality treatment and green-pipe, open-channel improvement. The City is proposing to construct a wet detention pond and bioswale to treat SW runoff prior to discharge to the Mill Race (Figure 4). These SW facilities will reduce TSS and pollutants through sedimentation and biological uptake.

There are five elements associated with the proposed project:

1. **Wet detention pond.** The proposed pond cover an area of 3.39 acres (ac) located primarily in upland areas with a depth occurring at an elevation of 455feet (ft) above mean sea level (msl) and a 5-ft high berm surrounding the pond (Figures 4, 5 and 6). Two small wetlands (i.e. Wetland 1 and Wetland 2) (Figure 5) will be excavated during construction of the proposed pond. The proposed pond will treat incoming SW runoff by allowing particulates to settle out of the water column. Nutrients in the SW will be taken up by vegetation in the pond. SW will be conveyed to the northeast corner of detention pond via a new 48-inch (in) diameter high density polyethylene (HDPE) pipe. The pipe outlet will be stabilized with a concrete headwall, concrete wing walls, and a rip-rap splash pad to dissipate high energy flows and prevent scour (Figure 5). All concrete will be cured prior to connecting. Incoming SW will be pretreated in a sediment forebay that will trap coarse particles and eliminate the need to dredge the entire pond during future maintenance activities. The detention pond has been designed to treat approximately 6.5 acre-ft (ac-ft). The pond is expected to hold 90% of a 24-hour water quality rain event before entering the bioswale. The southern edge of the pond will be planted with trees to shade the pond to reduce solar warming; however, the pond is expected to be dry during the warmest months of the year (i.e. July, August, and September). The pond size was optimized by using a 59-year continuous hydrologic model to simulate the back-to-back nature of real storm events. The characteristics of the pond geometry and outlet structures were designed such that treatment (considered to be runoff detained for at least four hours within the pond) was maximized. The continuous model showed that 63% of the total runoff would be treated.

The entire pond has a storage volume of 8.7 acre-ft, consisting of 5.3 ac-ft of active storage and 3.4 ac-ft of impounded water. The active storage portion of the pond is located below the overflow weir and will drain in a controlled manner through the pond outlet/orifice at the west end of the swale. Water located below the invert of the orifice will remain as a permanent pool. In addition to the orifice structure, an emergency spillway will be constructed at the northwest corner of the sediment forebay near the inlet pipe to prevent stormwater from backing up the inlet pipe during runoff events exceeding the capacity of the pond. The spillway will allow excess stormwater to flow over a concrete overflow weir into the bioswale that will be constructed adjacent to the pond. The wet detention pond is shown on Figures 4, 5, and 6.

2. **Stormwater bioswale.** A 20-ft wide grass-vegetated open channel will be constructed to convey and attenuate SW runoff from the pond outlet as well as the flows that cause the water level to exceed the elevation of the overflow weir (Figures 4, 5, 6, and 7). SW will be treated as it flows through vegetation growing in the bioswale, which will slow water velocity to allow sedimentation and filtering through the vegetation. The bioswale will discharge to the Mill Race at the southwest project boundary at an elevation of 455 ft msl, which is 1.6 ft below the Ordinary High Water Mark (OHWM) (Figures 4, 7, and 8). The bioswale connection to the Mill Race will be excavated approximately 1.6 ft below the OHWM (Figure 8). Erosion and/or scouring is not expected due to low discharge velocities from the bioswale.

   The bioswale will receive water from three locations:

   a. Treated water from the detention pond via a 5.76-in diameter HDPE discharge pipe with associated orifice and vault connecting the northwest corner of the pond to the south central side of the bioswale (Figure 6).

   b. Overflow during high-flow events via a concrete overflow weir constructed at the northeast side of the detention pond (Figure 6).

   c. SW from the existing SW main, via two existing area drains located in a low spot between the subject property and the Union Pacific Railroad property to the North. The existing stormwater main pipe will be cut back so flows are directed into the bioswale approximately 140 linear feet upstream of the Mill Race. A rip-rap splash pad will be constructed at this discharge to prevent scour (Figure 6).

3. **Mill Race path.** An approximately 2,350-ft pedestrian and bicycle path will be constructed North of the Mill Race and within the project area (Figures 4, 5, 6, and 7). The multi-use path will consist of a 10-ft wide asphalt path with 2-ft wide gravel shoulders. The path will cross the 20-ft wide bioswale using a Contech CON/SPAN® bridge system (Figures 4 and 7). The path will be constructed entirely in upland and the path will include a 2% cross-slope to direct SW towards the SW facility.

4. **Stormwater infrastructure.** SW infrastructure will be removed, modified, or constructed at the following locations:

a. A new vault will be constructed in the upland at the existing 48-in storm sewer main line located at the northeast corner of the project area. The vault will connect the existing 48-in storm sewer main with the new 48-in HDPE SW pipe that is directed towards the detention pond. The existing storm sewer pipe downstream of this connection will be closed by a installing a sluice gate that can be used to by-pass SW around the facility in the event of maintenance activities (Figure 5).

b. Approximately 235 ft of existing 48-in SW pipe are located in uplands at the northwest corner of the project area. This pipe formerly discharged directly to the Mill Race. One hundred and forty (140) feet of pipe located within the project grading footprint will be removed. The upstream end of the pipe will be cut so that SW drains into the bioswale (refer to Item 2c above) (Figures 7 and 8).

c. An abandoned 24-in corrugated metal pipe (CMP) located at the southwest corner of the project area will be removed within grading limits; this pipe was a remnant from the former log pond operations (Figure 7).

5. **Site grading.** Approximately 13.8 ac of upland grading, including 250,000 cubic yards of excavation, will be required in addition to that discussed above.

1.2.2 Construction Equipment

Either large hydraulic excavators or wheeled tractor scrapers will be used for the majority of the large upland excavation activities. On-road dump trucks will service the excavations activities as the majority of excavated soils will be transported for off-site disposal. Footings for structures will be excavated by large- to medium-sized excavators or backhoes. Other equipment to be used include: bull dozers, front loaders, compaction equipment/rollers, water trucks, service vehicles, asphalt pavers, spreaders, and hydroseeding equipment.

1.2.3 Construction Sequencing and Schedule

Initial construction activities include excavation of the SW facility pond and bioswale, which is anticipated to take 4 to 6 months, and could be the only activity that takes place during the initial construction season (June-October 2015). The next construction activity will include the installation of the concrete structures, bridge, orifice vault, weir, headwall, and wing walls. The access road and multi-use path will be completed next. Once the structures, path, and access road are completed, the majority of the site can be restored and vegetated. The diversion manhole will be one of the last structures completed. Once this work begins, SW flows will be pumped around and discharged into the existing pipe downstream. After completion of the new SW diversion vault, the existing SW flow will be redirected into the new SW facility by closing and opening sluice gates within the diversion vault. The existing outfall pipe will then be removed and cut back to drain into the new bioswale. The pipe will remain to drain a ditch on the adjacent railroad property, and will also serve as a maintenance bypass for conducting maintenance on the

stormwater facility and associated flow control structures. These tasks will require approximately 3 to 4 months to complete and may be conducted in the summer of 2016.

1.2.4 Impact Avoidance and Conservation Measures

The proposed project will implement measures to minimize and avoid environmental impacts. Best management practices (BMPs) that will be implemented during construction activities include:

1. All in-water work will be confined to the approved in-water work window;
2. The work area around the existing outlet and the proposed bioswale will be isolated from the Mill Race using sediment fencing and turbidity barriers;
3. All equipment will be staged out of the water, although equipment buckets are expected to come in contact with water of the Mill Race;
4. A designated equipment laydown area;
5. Placement of drip pans beneath heavy equipment when not in use;
6. Daily inspection of heavy equipment prior to use to insure that equipment is in proper running condition and that there are no leaks. Equipment with leaks or requiring maintenance will be repaired before going back into service;
7. An accidental spill prevention plan will be implemented when equipment is working near the Mill Race;
8. Routine turbidity monitoring in compliance with the National Pollutant Discharge Elimination System (NPDES) 1200C permit for this project;
9. Gravel construction entrances;
10. Wheel wash;
11. Prepare and implement an erosion and sediment control plan;
12. Sediment fence and/or barriers installed along the grading area perimeter;
13. Biobags for inlet protection at catch basins, area drains, and ditch inlets;
14. Gravel construction entrances;
15. Dust control measures (e.g. water spray, plastic sheeting, straw mulch, or other approved measures) at areas susceptible to wind erosion;
16. Perimeter fencing or high-visibility marking tape will be installed around wetlands and other sensitive areas, allowing for a 25-ft wide buffer zone. Heavy equipment and vehicles will not enter the buffer zone;
17. Exposed cut or fill areas will be stabilized through the use of temporary seeding and mulching, matting, mid-slope wattles, or other appropriate measures. Slopes exceeding 25% may require additional erosion control measures (e.g. wattles and/or mats);

18. Permanent vegetation cover will be established in accordance with the Revegetation Plan and will consist of:
    a. Grass vegetated bioswale: native sedge, rush, and grasses will be seeded or planted as plugs to provide filtration and water quality benefits in the bioswale.
    b. Detention pond: native aquatic and wetland obligate plants will be planted as plugs to provide water quality benefits in the pond.
    c. Transitional/upland buffer: Native trees will be planted along the southern perimeter of the detention pond to provide shading, habitat, and aesthetic value. An upland native seed mix will be applied to disturbed areas.
19. All slopes 3H:1V or steeper will receive jute/coir matting overtop and native seed mix. Straw wattles will also be installed on slopes to aid in erosion and sediment control, until vegetation is established; and
20. All project-generated waste and debris will be removed from the project area for off-site disposal in an approved disposal facility.

Long-term monitoring and maintenance of facilities will be performed. Expected monitoring and maintenance activities include sediment removal; debris/trash removal; sediment vacuum of manholes and vault structures; vegetation maintenance; erosion control monitoring and repair as needed; pest control and maintenance as needed; water quality monitoring, manhole or structure repair; and rock protection at inlet.

1.3 STUDY AREA AND ACTION AREA

The Action Area is defined as all areas to be affected directly and indirectly by the federal action and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] Part 17.11). The action area includes the geographic extent of physical, biological, and chemical impacts of the project, and therefore, is generally larger than the immediate work area. The proposed project could potentially impact nearby species due to wetland disturbances and increased levels of turbidity and/or noise generated by construction equipment. Therefore, for the purposes of this Biological Assessment (BA), the action area includes the work area and in-stream, wetland, and upland areas within 150 feet of the work area, as shown on Figure 9.

2.0 SPECIES AND HABITAT INFORMATION

A list of threatened and endangered (T&E) and proposed species, designated critical habitat, and candidate species that may occur in the project vicinity was prepared by the Oregon Biodiversity Information Center (ORBIC) on March 13, 2014, by the U.S. Fish and Wildlife Service (USFWS) on October 2, 2014, and NOAAs online species list obtain October 2, 2014. A total of 13 T&E species

were identified as having the potential to occur in the vicinity of the Action Area. Of these 13 species, recorded occurrences were reported by the ORBIC for two of the species [bull trout (*Salvelinus confluentus*) and Oregon chub (*Oregonichthys crameri*)]. A list of species with the potential to occur in the Site Vicinity is included in Table 1. AMEC reviewed the species, the species habitat requirements, and available habitat. A copy of the USFWS preliminary species list and the ORBIC report cover letter are included as Appendix B.

2.1 SPECIES INFORMATION

Table 1 summarizes the findings of the USFWS species occurrence list and the ORBIC report.

Table 1: Federally-Listed and Candidate Species with Potential to Occur in Site Vicinity

Species Name	Population	Status	Critical Habitat	Recorded Occurrence within 2-miles of Project Area[1]
Birds				
Northern spotted owl (*Strix occidentalis caurina*)	Entire	Threatened	Final designated; none within action area	No record
Streaked horned lark (*Eremophila alpestris strigata*)	Not specified	Threatened	Final designated; none within Action Area	No record
Yellow-billed cuckoo (*Coccyzus americanus*)	Western U.S. DPS	Proposed Threatened	Not designated	No record
Fishes				
Chinook salmon (*Oncorhynchus tshawytscha*)	Upper Willamette River (UWR) ESU	Threatened	Final designated; some primary constituent elements (PCEs) present in Action Area	No record
Steelhead trout (*Oncorhynchus mykiss*)	UWR ESU	Threatened	Final designated; some PCEs present in Action Area	No record
Bull trout (*Salvelinus confluentus*)	Lower 48 states	Threatened	Final designated; some PCEs present in Action Area	Historical record from pre-1990
Oregon chub (*Oregonichthys crameri*)	Entire	Threatened	Final designated; some PCEs may be present in Action Area	Historical record from 1894
Insects				
Fender's blue butterfly (*Icaricia icarioides fenderi*)	Not specified	Endangered	Final designated; none within Action Area	No record
Flowering Plants				
Bradshaw's desert-parsley (*Lomatium bradshawii*)	Not specified	Endangered	Not designated	No record
Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*)	Not specified	Threatened	Final designated; none within Action Area	No record
Nelson's checker-mallow (*Sidalcea nelsoniana*)	Not specified	Threatened	Not designated	No record
Water Howellia (*Howellia aquatilis*)	Not specified	Threatened	Not designated	No record
Willamette daisy (*Erigeron decumbens* var. *decumbens*)	Not specified	Endangered	Final designated; none within Action Area	No record

2.2 SURVEY RESULTS

AMEC conducted field surveys at the Study Area on April 17, 2013, June 7, 2013 and again on October 27, 2014. No Threatened or Endangered Species were observed during any of the field surveys (Table 2). The field surveys identified three general habitat types at the Study Area:

- Degraded ruderal upland habitat: The majority of the Study Area is dominated by invasive shrub, woody vine, and herbaceous species typical of disturbed areas. Dominant species include *Rubus armeniacus* (Himalayan blackberry), *Galium aparine* (sticky-silly), *Holcus lanatus* (common velvet grass), *and Phalaris arundinacea* (reed canarygrass). Native species observed at the ruderal upland habitat area include *Populus balsamifera* (black cottonwood) and *Pseudotsuga menziesii* (Douglas-fir).
- Palustrine emergent wetland: Approximately 0.06 of state jurisdictional wetland was identified within the Study Area including:
  - 0.02-acres of palustrine emergent wetland, identified as Wetland W1 (AMEC, 2013). This area is dominated by reed canarygrass, *Carex obnupta* (slough sedge), an unknown species of *Festuca* and an unknown species of grass *(cf. Lolium, cf Elymus*). This area appears to be planted and seeded with native materials and appears to be part of the Mill Race restoration efforts.
  - 0.04-acres is a palustrine emergent wetland identified as Wetland W2. Wetland W2 is dominated by *Juncus effusus* (common rush), and *Equisetum sp.* (horsetail). These hydrophytic species are typical of disturbed areas.

  Shrub-Scrub wetland: Approximately 0.06 of non-jurisdictional (state and federal) wetland were identified in two ditch features dominated with Pacific Willow.
- Perennial Riverine: Approximately 165 linear feet within the Study Area consists of Perennial Riverine habitat. The Mill Race flows generally in a northwesterly direction. The Mill Race was dug by hand in 1852, diverting flows of the Middle Fork Willamette River at Clearwater Park flowing northwest before rejoining the Middle Fork Willamette River at Island Park. In 2009, a restoration project for the Mill Race was initiated. The restoration included draining a logpond, creation of meander channels, creation of salmon rearing ponds, and installation of riparian and wetland plants.

Table 2: Survey Results

Species Name	Preferred Habitat	Potential to Occur at Action Area
Birds		
Northern spotted owl	Breeds in late-successional mixed coniferous forests, larger (more than 1,200 acre) stands are preferred. Nests are usually within 400 meters of small streams (Csuti, et al., 2001).	Unlikely, no forested habitat is available within action area or adjacent to action area.
Streaked horned lark	Require wide open landscapes of 300 acres or more with no trees and few or no shrubs (USFWS, 2013a).	Unlikely, open landscape context is not available within the action area or adjacent to the action area.
Yellow-billed cuckoo	Found in thick, closed-canopy riparian forests with an understory of dense brush. Patches of suitable habitat must be at least 37 acres in size and include over 7.5 acres of closed canopy riparian forest (Csuti, et al., 2001)	Unlikely; no forest habitat occurs within action area.
Fishes		
UWR Chinook salmon ESU	Found in both freshwater and at sea.	Potential to occur within the Action Area
Bull trout	Found in cold, clean, complex, and connected habitats.	Unlikely, the Mill Race is warm, lacking the deep pools, hanging banks, and large woody debris needed to support this species.
Oregon chub	Found in slack water off-channel habitats such as side channels, and low gradient tributaries.	Unlikely, very little aquatic vegetation within the Action Area.
Insects		
Fender's blue butterfly	Found in native upland prairies, dominated by red fescue and/or Idaho fescue (USFWS, 2009)	Unlikely, no upland native prairie habitat is available within or adjacent to the Action Area
Flowering Plants		
Bradshaw's desert-parsley	Found in native wetland prairie habitats with heavy, sticky clay soils or a dense clay later below the surface.	Unlikely; no wetland prairie habitat is available within the Action Area.
Kincaid's lupine	Found in native upland prairies, dominated by red fescue and/or Idaho fescue (USFWS, 2008a) with well drained soils.	Unlikely, no upland native prairie habitat is available within the action area.
Nelson's checker-mallow	Found in wet prairies and stream sides with soil textures varying from gravely well drained loams to poorly drained hydric clay soils.	Potential to occur within the Action Area.
Water Howelia	Found in small vernal freshwater wetlands.	Unlikely, habitat to support water Howelia is not available within the Action Area
Willamette daisy	Occurs on alluvial soils in the Wapato, Barshaw, and Mcalpin soil series (USFWS, 2008b).	Unlikely, suitable soil series are not present at the site.

No evidence of T&E or candidate species was observed during the field surveys. Habitat suitable to support listed species that are known to occur in the area is not present within the Action Area with the exception of the UWR Chinook salmon and the Nelson's checker-mallow. Both of these species are discussed further in Section 4.

3.0 EXISTING CONDITIONS AND EFFECTS OF THE ACTION

This section presents discussions of existing environmental conditions and temporary, permanent, direct, indirect, and net effects of the proposed action on existing environmental conditions.

3.1 WETLAND HABITAT

The proposed action will not affect any federal jurisdictional wetlands, but would remove 0.12 acres of federal non-jurisdictional wetland habitat in the Action Area.

3.2 WATER QUALITY

Water quality data for the Mill Race are currently unavailable; however, SW quality monitoring data were collected from the existing 48-in diameter discharge pipe before it enters the Mill Race. This discharge is permitted under the City's NPDES permit (MS 4 general NPDES permit number 102869). The agencies expressed particular concern about copper and zinc concentrations in SW discharge to the Mill Race. SW quality data for copper and zinc were collected during five discharge events from January 2014 through July 2014. These data are summarized in Table 3.

Table 3. Stormwater Outfall Water Quality Data

Sample ID	Date	DO (mg/L)	pH	Temp (°F)	Total Copper (µg/L)	Total Zinc (µg/L)	TSS mg/L
MR-01	01/07/14	9.93	6.82	55.5	2.74	8.66	<5.0
MR-02	01/29/14	7.9	6.90	49.8	5.30	36.1	7.0
MR-03	03/25/14	7.6	6.70	51.1	3.51	26.8	6.0
MR-04	04/17/14	7.4	6.60	64.9	12.8	73.6	83.0
MR-05	07/15/14	7.2	6.60	63.3	1.59	<4.0	5.0
NPDES Limit	NA	NA	5.5 - 9.0	NA	20	120	100

Abbreviations:
DO = dissolved oxygen
°F = degrees Fahrenheit
LRL = laboratory reporting limit
mg/L = milligrams per liter
µg/L = micrograms per liter
NA = not applicable
NPDES = National Pollutant Discharge Elimination System
TSS = total suspended solids

As can be seen from Table 3, the concentrations of all listed constituents are in compliance with the City's NPDES permit. The concentrations of copper and zinc are expressed as the total concentrations rather than the dissolved concentrations.

Regression analysis of copper and TSS concentrations and zinc and TSS concentrations indicate high correlation between concentrations of both metals and TSS (adjusted R^2 values of 0.88 and 0.94, respectively). Given the limitations of a very small data set, the data indicate that both copper and zinc may occur predominantly in the particulate-bound form.

The freshwater ambient water quality criteria (AWQC) for copper and zinc in Oregon are based on the total and dissolved fractions, respectively, and are affected by water hardness (ODEQ, 2014), a parameter that was not measured in the SW samples. The chronic AWQC for copper and zinc were calculated based on a range of hardness values (expressed as mg $CaCO_3$/L) from 25 mg/L to 100 mg/L and compared to copper and zinc concentrations summarized in Table 3 (Table 4).

Table 4. Chronic Ambient Water Quality Criteria (AWQC) for Copper and Zinc at Varying Hardness Concentrations Compared to Their Stormwater Concentrations

Sample ID	Concentration (µg/L)	Hardness-based Criteria (µg/L - hardness as mg $CaCO_3$/L)			
		25 mg/L	50 mg/L	75 mg/L	100 mg/L
Total Copper		Copper chronic AWQC expressed as total copper			
MR-01	2.74	3.6	6.5	9.2	12.0
MR-02	5.30				
MR-03	3.51				
MR-04	12.8				
MR-05	1.59				
Total Zinc		Zinc chronic AWQC expressed as dissolved zinc			
MR-01	8.66	36	66	93	118
MR-02	36.1				
MR-03	26.8				
MR-04	73.6				
MR-05	<LRL				

Abbreviations:

$CaCO_3$ = calcium carbonate
LRL = laboratory reporting limit
µg/L = micrograms per liter
mg/L = milligrams per liter

Notes:

Shaded cells indicate copper concentrations that exceeded one or more of the listed hardness-adjusted chronic criteria. A similar approach was not adopted for zinc because zinc concentrations are expressed as total zinc, whereas the listed hardness-adjusted zinc criteria are based on dissolved zinc. Regression analysis of zinc and total suspended solids concentrations indicate that zinc likely occurs predominantly in the particulate-bound form, but some zinc may also occur as the dissolved fraction. The extent to which dissolved zinc in the SW may exceed zinc's chronic criterion is unknown.

It can be seen from information provided in Table 4 that copper concentrations in SW may exceed its chronic criterion based on water hardness. At the lowest hardness concentration of 25 mg $CaCO_3$/L, copper exceeded its chronic criterion on two sampling occasions (01/29/14 and 04/17/14). Thereafter, only one event (04/17/14) exceeded the copper chronic criterion at all of the listed hardnesses.

Zinc concentrations are expressed as total zinc, whereas the listed hardness-adjusted zinc criteria in Table 4 are based on dissolved zinc, making comparisons between chronic zinc criteria and SW zinc concentrations difficult. Regression analysis of zinc and total suspended solids concentrations indicate that zinc likely occurs predominantly in the particulate-bound form, but some zinc may also occur as the dissolved fraction. The extent to which dissolved zinc in the SW may exceed zinc's chronic criterion is unknown. The only event where reported zinc concentrations may have exceeded the hardness-adjusted zinc criterion was on 04/17/14. It is possible that dissolved zinc concentrations could have been high enough to exceed the chronic criterion for a hardness of 25 mg $CaCO_3$/L.

The U.S. Environmental Protection Agency (EPA) in 2007 developed the biotic ligand model (BLM) for calculating the site-specific AWQC for copper. The BLM is a metal bioavailability model that uses receiving water characteristics and monitoring data to develop site-specific water quality criteria. Input data for the BLM include: temperature, pH, dissolved organic carbon (DOC), major cations (calcium, magnesium, sodium, & potassium), major anions (sulfate and chloride), alkalinity, and sulfide. Unfortunately, no receiving water chemistry data are available, so it is not possible to calculate the AWQC for copper in the receiving water (i.e., Mill Race) once the SW is discharged to the Mill Race.

Construction: Work will be performed in the dry season, when standing water is not expected to be present in the areas of direct impact. In addition, erosion control and other best management practices will be implemented during construction. Best Management practices are summarized in Section 1.2.4. Therefore, during construction activities the proposed action is not expected to affect water quality at the Action Area.

Operation: The project is proposed to improve water quality in the Mill Race. Specific target pollutants are the bacterium *Escherichia coli*, heavy metals, total suspended solids (TSS), and TMDL parameters and industrial pollutants. As described in the project description, the proposed wet detention pond and bioswale are designed to reduce TSS and water pollutants through sedimentation and biological uptake. Water quality is expected to be improved following completion of the project; therefore, the project is expected to result in a net beneficial effect to water quality in the Mill Race.

3.3 NON-NATIVE / INVASIVE SPECIES

The Action Area is currently dominated by invasive shrub, woody vine, and herbaceous species typical of disturbed areas. Dominant species include Himalayan blackberry, common velvet grass, and reed canarygrass. Best-management practices will be implemented during construction to minimize the spread of these species (i.e., use of clean fill only and hydroseeding with seeds of native species). The proposed action is expected to have a net beneficial effect by reducing or eliminating non-native / invasive species in the Action Area.

4.0 EFFECTS OF THE ACTION ON LISTED SPECIES

The proposed action may have both short- and long-term, direct and indirect effects on ESA-listed species and their critical habitats. The following is an analysis of long- and short-term direct, indirect effects of the proposed action on listed species and their critical habitats. Interrelated and interdependent actions and cumulative effects of the proposed action will also be addressed.

The ESA-listed species potentially occurring in the Action Area that could be affected by the proposed action are:

- UWR Chinook salmon; and
- Nelson's Checker Mallow

Other species, as identified in Tables 1 and 2, listed as potentially occurring in the Springfield area that are highly unlikely to be found near the project site, and are highly unlikely to be affected, either beneficially or negatively, by the proposed action will not be addressed further in this BA.

4.1 CHINOOK SALMON

4.1.1 Life History and Stock Status

During their life history, Chinook salmon occupy both marine and freshwater habitats. Juvenile Chinook salmon spend anywhere from 3 months to 2 years in freshwater before migrating to marine environments, remaining at sea from 1 to 6 years before migrating to their natal streams to spawn. There are different seasonal runs in the migration of Chinook salmon from freshwater to ocean, even within a single river system. The UWR Chinook ESU spring run is listed as Threated and has been observed in the vicinity of the project (NOAA 2014b).

The UWR Chinook salmon have been shown to be genetically differentiated from other distinct groups of Chinook salmon in the Columbia River Basin (ODFW and NMFS 2011). For adult Chinook salmon, Willamette Falls historically acted as an intermittent physical barrier to upstream migration (with the exception of high flows during the spring). At present, Chinook salmon ascend the falls via a fish ladder and migrate to upper portions of the subbasins. Spawning generally begins in late August and continues into early October with peak spawning in September.

The Middle Fork Willamette spring Chinook run comprised 21% of the spawning population above Willamette Falls prior to damn construction. Minimal natural production has taken place in the Middle Fork Willamette River since the dams were built. The Middle Fork Willamette River spring Chinook hatchery program was developed to mitigate for habitat loss when Dexter, Lookout Point, and Hill Creek dams were built (ODFW 2003). Hatchery stocks were included in the UWR Chinook ESU and are listed along with naturally produced fish (ODFW and NMFS 2011). The Middle Fork Willamette River Chinook salmon is a demographically independent population within the ESU (NOAA 2014). The Middle Fork Willamette spawning populations are of hatchery origin and these populations are likely not self-sustaining (NOAA 2014).

Adults are primarily piscivorous, while juveniles prey upon both terrestrial and aquatic insects, amphipods, and other crustaceans.

4.1.2 Critical Habitat

Critical habitat is present within the Action Area. The six primary constituent elements (PRCs) for UWR Chinook salmon critical habitat are as follows:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.

2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh-and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels, and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Of the listed PCEs, PCEs #2 and #3 occur in the Action Area.

4.1.3 Use of the Area

In 2009, the USACE, the City of Springfield, and Springfield Utility Board initiated a habitat restoration project just upstream from the Action Area. The restoration project included restoration and enhancement of off-channel habitat (i.e. the Mill Race) for Chinook salmon, which are expected to be present within the Action Area.

4.1.4 Effects of the Action

The following section discusses short- and long-term, direct and indirect effects on Chinook salmon attributable to project activities and concludes with an effects determination. This section discusses only attributes of Chinook salmon that are relevant to the project area and likely to be affected by the project. Appendix C addresses Essential Fish Habitat, describing habitat for federally managed commercial fish species, potential project impacts, and proposed conservation measures.

4.1.5 Effects of Determination

This section discusses long- and short-term, direct and indirect effects of the proposed action to UWR Chinook salmon and their critical habitat. An effects determination is then presented based on the results of those discussions.

Direct Effects

The long-term and short-term temporary and permanent direct effects of the proposed action on UWR Chinook salmon are described below.

Long-Term

The potential long-term direct effects attributable to the proposed project are:

- Water quality; and
- Entrainment within proposed SW facility.

Each of these potential impacts is addressed below.

Water Quality - The proposed SW treatment facility is expected to result in a net beneficial effect to water quality in the Mill Race by reducing TSS and associated pollutants. Currently, untreated SW is discharged directly to the Mill Race. Improved water quality is expected to have a long-term, direct beneficial effect on UWR Chinook salmon by reducing direct exposure to potential pollutants that may currently discharge to the Mill Race. The proposed action is also expected to have a net beneficial effect on UWR Chinook salmon critical habitat in the Mill Race by improving water quality compared to existing conditions.

Entrainment

1. Overflow Weir: AMEC hydraulic engineers performed a detailed hydraulic analysis to evaluate the average percent of time (per year) when flow depth over the weir is greater than 0.10 ft. The results of this analysis are illustrated in Figure 10 and Table 5. The data clearly illustrate that for only about 0.01 % of the time (1 hour per year) does flow over the weir exceed a depth of 0.4 ft. The duration of this event appears too insignificant to justify the construction and maintenance of a fish screen. Hydraulic analysis results also indicate that for only 0.21% of the time (18 hours per year) and 0.96% of the time (84 hours per year) does weir overflow depth exceed 0.2 ft and 0.1 ft, respectively. Considering the minimal weir overflow depth and the short duration of such events during the wet season and the fact that the distance from the weir to the Mill Race confluence is 1,950 linear feet, it is very unlikely that Chinook salmon in the Mill Race would enter the bioswale, swim the

1,950 ft to and enter the weir, and then become trapped in the facility above the weir. Therefore, based on the results of the hydraulic analysis, the decision was made not to install a fish screen at the weir. The decision not to incorporate a fish screen is not expected to have any long-term, direct effects on UWR Chinook salmon or their critical habitat.

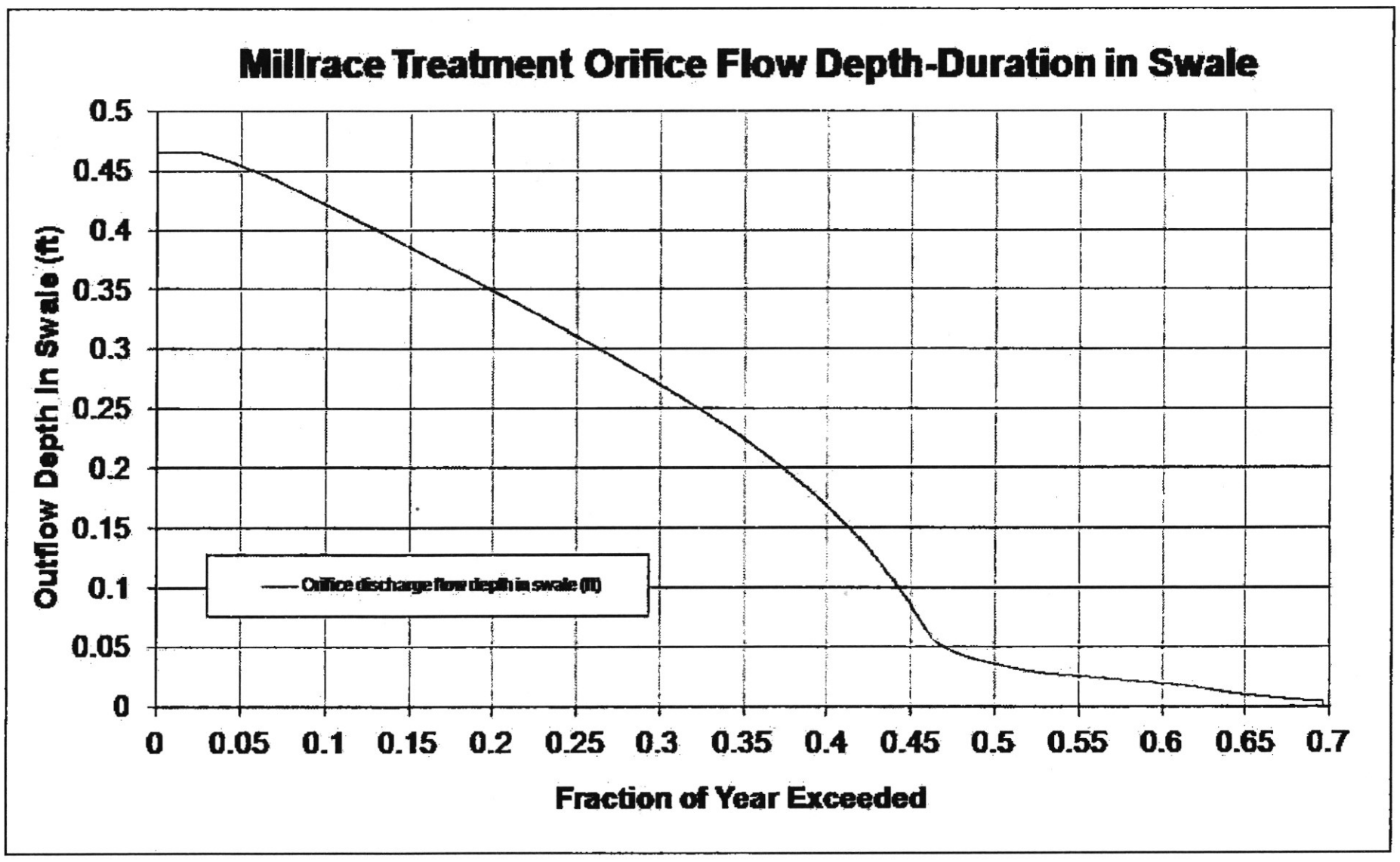
Table 5. Summary of Results of Hydraulic Analysis of Weir Overflows

Average Hours per Year	Percent of Time	Head Above Weir (feet)	Average Hours per Year	Percent of Time	Head Above Weir (feet)
0.017	0.00	0.47	36	0.41	0.16
1	0.01	0.39	48	0.55	0.14
2	0.02	0.34	60	0.68	0.13
3	0.03	0.31	72	0.82	0.11
4	0.05	0.29	84	0.96	0.10
5	0.06	0.28	96	1.10	0.09
6	0.07	0.27	108	1.23	0.08
9	0.10	0.24	120	1.37	0.07
12	0.14	0.23	132	1.51	0.06
15	0.17	0.21	144	1.64	0.05
18	0.21	0.20	156	1.78	0.04
21	0.24	0.19	168	1.92	0.03
24	0.27	0.19	180	2.05	0.02
27	0.31	0.18	192	2.19	0.01
30	0.34	0.17	201	2.29	0.00
33	0.38	0.17			

2. Orifice: AMEC hydraulic engineers performed a detailed hydraulic analysis to evaluate the flow durations that will discharge from the treatment facility through the orifice, and the expected depth in the downstream treatment swale. The orifice diameter is 5.77 inches with maximum hydraulic head of 2.04 ft. This results in a maximum outflow through the orifice of 1.25 cfs. The flow in the 12 inch diameter outflow pipe from the orifice to the swale will be about 4 inches deep; this flow then spreads across the 20-ft-wide bottom of the swale at a depth of about 0.47 ft (5.6 inches), reference Figure 1 below. The orifice flow-duration is about 1.25 cfs for 3 percent of the time; drops approximately linearly to 0.04 cfs at 46 percent; then gradually drops to 0 cfs at 70 percent. The design proposes to incorporate a

fish screen at the outlet of the orifice outflow pipe because the screening can be readily accommodated without adversely affecting treatment performance, and in order to avoid the appearance of adverse effects on UWR Chinook salmon or their critical habitat.

Figure 1. Flow Depth-Duration in Swale



Short-Term

Potential short-term, direct effects of the proposed action on UWR Chinook salmon and their critical habitat may be those associated with project construction: temporary impacts to water quality such as increased turbidity in the Mill Race during excavation below OHWM water quality or in the event of an accidental petroleum spill to the Mill Race.

Turbidity - A temporary and localized increase in turbidity may occur in the Mill Race during removal of the existing 48-in diameter outfall and excavation at both the existing outfall location and the proposed bioswale connection. While direct mortality of salmonids from extremely high concentrations of suspended sediment has been demonstrated in laboratory settings, these lethal concentrations of sediments far exceed those expected to be associated with the proposed action. Based on the results of several studies (Stober, et al., 1981; Salo, et al., 1980) investigating the effects of increased turbidity on dissolved oxygen concentrations associated with dredging

operations, the risk of direct mortality to salmonids from exposure to suspended sediments near dredging operations was reported to be negligible.

Other studies investigating the effects of increased turbidity on fish gills have reported that suspended solids alone may not cause gill damage in salmonids. In a study of the effects of sediments on the gill tissue of coho salmon (*O. kisutch*), at exposure levels of up to 3,100 mg/l, no damage to gill tissue was identified (Servizi and Matens, 1992). Similar results were found by Redding (1987).

Potential increases in turbidity during project construction could affect juvenile salmonids in the immediate project area through decreased visibility which could affect behaviors such as feeding and homing, territoriality, and avoidance responses. Duration, timing, and particle size and shape have been shown to influence the potential effect of increased turbidity on juvenile Pacific salmon, but there is little specific information on thresholds of physical, physiological, or behavioral tolerances for particular species. It is unknown what threshold of turbidity might exist that serves as a cue to fish to avoid light-reducing turbidity. The primary determinate of risk level for a particular species is likely to lie in the spatial and temporal overlap between the area of elevated turbidity, degree of turbidity elevation, occurrence of the fish, and options available to fish for carrying out the critical function of their particular life-history stage (Nightingale and Simenstad, 2001).

Construction-related turbidity associated with the proposed project would be significantly less than that associated with dredging operations, so that any temporary increase in turbidity associated with the proposed action is not expected to adversely affect UWR Chinook salmon or their critical habitat that could be present in the Action Area during construction. Any increases in turbidity are expected to be temporary, localized, and negligible.

Indirect Effects

The potential short- and long-term indirect effects of the proposed action to UWR Chinook salmon and their critical habitat are addressed below.

Long-Term

The only long-term, indirect effect of the proposed action will be that attributable to the expected improvement in water quality. It is possible that improved water and sediment quality downstream of the proposed bioswale discharge location may improve benthic habitat, possibly resulting in increased numbers of benthic invertebrates and increased foraging opportunities for juvenile UWR Chinook that may use this habitat as a nursery area and for foraging.

Short-Term

No project-related short-term indirect effects to UWR Chinook salmon or their critical habitat has been identified.

Effects Determination - UWR Chinook Salmon

Based on the above discussions, the effects determination for the proposed action for UWR Chinook salmon is as follows:

The proposed action **may affect** UWR Chinook Salmon because:

- Suitable habitat is available in the Action Area for migration and foraging;
- There is the potential for short-term adverse impacts to water quality impacts (i.e., turbidity and accidental spills), as well as long-term improvement to water quality when compared to existing conditions; and
- Potential entrainment of individuals.

The proposed action is **not likely to adversely affect** UWR Chinook salmon because:

- Construction-related turbidity will be localized and temporary. BMPs will be implemented during project construction to minimize and avoid project-related environmental impacts, such as increased turbidity in the Mill Race;
- In-water construction occurs only during the approved in-water work window;
- An hydraulic analysis has determined that entrainment of UWR Chinook salmon is very unlikely; and
- The proposed action is expected to result in a net beneficial effect to water quality by reducing TSS and associated pollutants in SW discharged to the Mill Race.

Therefore, the proposed action **may affect, but is not likely to adversely affect** UWR Chinook salmon.

Effects Determination - UWR Chinook Salmon Critical Habitat

Based on the above discussions, the effects determination for the proposed action for UWR Chinook salmon critical habitat is as follows:

The proposed action **may affect** UWR Chinook salmon critical habitat because:

- UWR Chinook salmon critical habitat PCEs #2 and #3 occur in the Action Area (see Section 4.1.2).

The proposed action is **not likely to adversely affect** UWR Chinook salmon critical habitat because:

- The proposed action is expected to have a net beneficial effect on water quality in the Mill Race; and
- The proposed action is not expected to interfere with the migration of adult or juvenile salmon through the Action Area.

Therefore, the proposed action **may affect, but is not likely to adversely affect** UWR Chinook salmon critical habitat in the Action Area.

4.2 NELSON'S CHECKER-MALLOW

4.2.1 Life History and Status

Nelson's checker-mallow is primarily found in Oregon ash (*Fraxinus latifolia*) swales and meadows with wet depressions or along streams. Some populations occur along roadsides at stream crossings where non-native species are also present. Plants reproduce vegetatively by seeds and rhizomes (USFWS 2014b).

The species is known to occur in the Willamette Valley in 62 distinct locations. One patch has been identified within Lane County more than 20 miles north of the project site and Action Area.

4.2.2 Occurrence in the Action Area

Nelson's checker-mallow has been identified in Lane County and can occur on streambanks. No known populations exist within the Action Area. Based on current population locations, it is unlikely that populations exist within the Action Area.

4.2.3 Effects of the Action

The Nelson's checker-mallow is unlikely to occur within the Action Area. The proposed Action is expected to have **no effect** to the Nelson's checker-mallow.

4.3 INTERDEPENDENT AND INTERRELATED ACTIONS AND CUMULATIVE EFFECTS

Interdependent actions are those from actions with no independent utility apart from the proposed action. Interrelated actions include those that are part of a larger action and depend on the larger

action for justification. Cumulative effects are those from state or private activities not involving activities of other federal agencies that are reasonably certain to occur within the area of the federal action subject to consultation (50 CFR 402.02 Definitions).

The proposed action, construction of a wet detention pond and bioswale to treat SW runoff prior to discharge to the Mill Race, will not result in the expansion of the SW drainage area being drained under existing conditions. The proposed action is not expected to affect usage in the drainage area or to affect the water quality of the SW entering the proposed facility prior to its discharge to the Mill Race. The proposed facility is expected to improve the quality of treated SW that is discharged to the Mill Race. Therefore, no interdependent or interrelated actions are expected as a result of the proposed action.

Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Endangered Species Act. Therefore, no cumulative effects are expected as a result of the proposed action.

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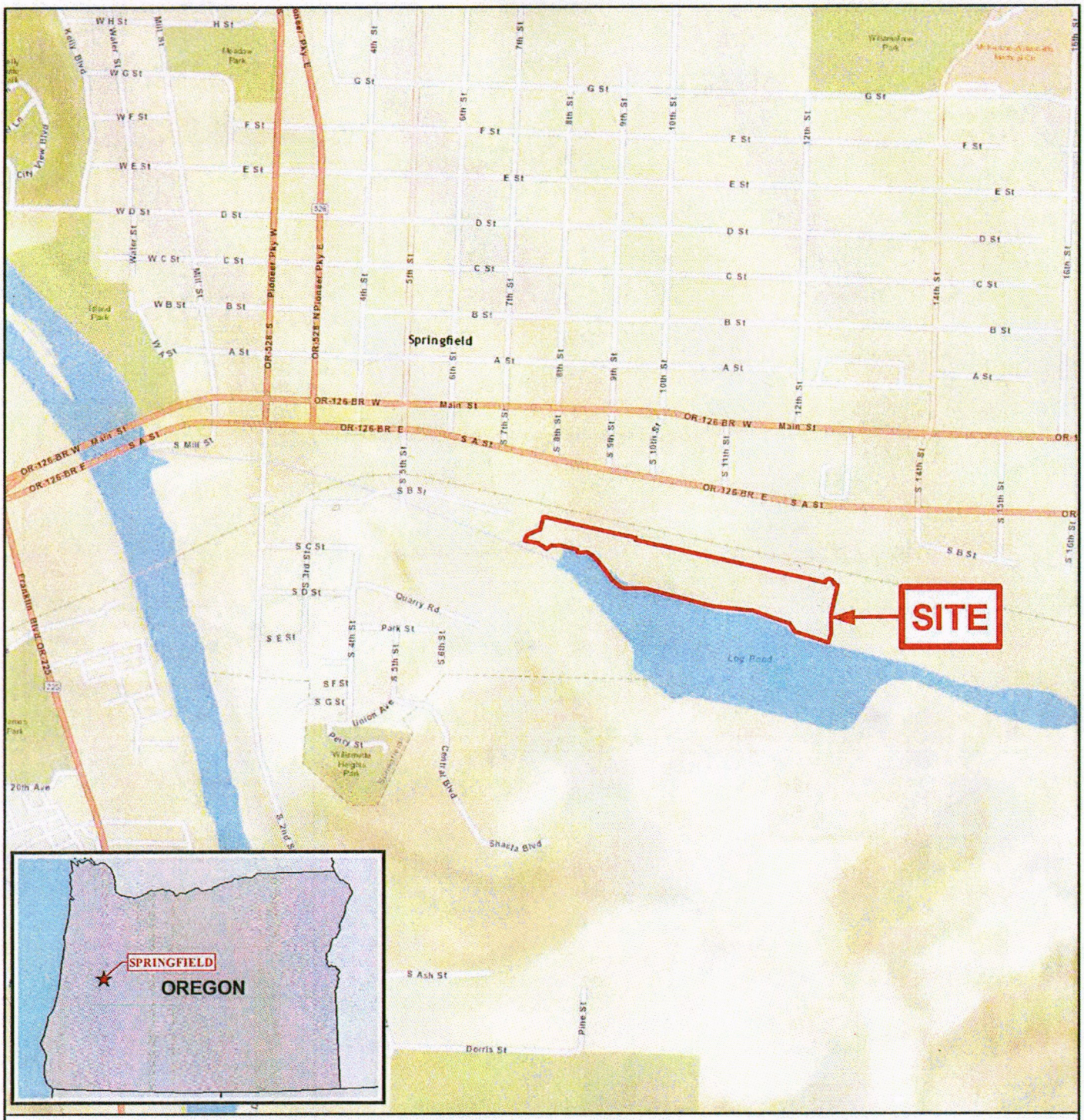
LIMITATIONS

This report was prepared exclusively for the City of Springfield by AMEC Environment & Infrastructure, Inc. The quality of information, conclusions, and estimates contained herein are consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Biological Assessment is intended to be used by the City of Springfield for tax lots 1703350000307 and 1703350000302 located in Springfield, Oregon, only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

The findings contained herein are relevant to the dates of the AMEC Site visit and should not be relied upon to represent conditions at later dates. In the event that changes in the nature, usage, or layout of the property or nearby properties are made, the conclusions and recommendations contained in this report may not be valid. If additional information becomes available, it should be provided to AMEC so that the original conclusions and recommendations can be modified as necessary.

amec

FIGURES



0 500 1,000 2,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD

TITLE: SITE LOCATION MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
	PROJECTION: OR SP S. Ft.	SCALE: 1 inch = 1,000 feet	FIGURE No.: 1

K:\12000\12700\12790\127901\dwg_Biological_Assessment\Figure 1 - Site Location Map.mxd - patrick.mccarthy - 12/3/2014 - 4:40:17 PM

0 1,000 2,000 4,000 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: U.S.G.S. TOPOGRPAHIC MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
	PROJECTION: OR SP S. Ft	SCALE: 1 inch = 2,000 feet	FIGURE No.: 2

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Attachment 4 to Addendum 1 Dated 06/16/15

0 300 600 1,200 Feet

N

AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD
TITLE: TAX LOT MAP	DWN BY: PM	DATUM: NAD83	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	CHK'D BY: EH	REV. NO.: -	PROJECT NO.: 3-61M-127900
	PROJECTION: OR SP S. Ft.	SCALE: 1 inch = 500 feet	FIGURE No.: FIGURE 3

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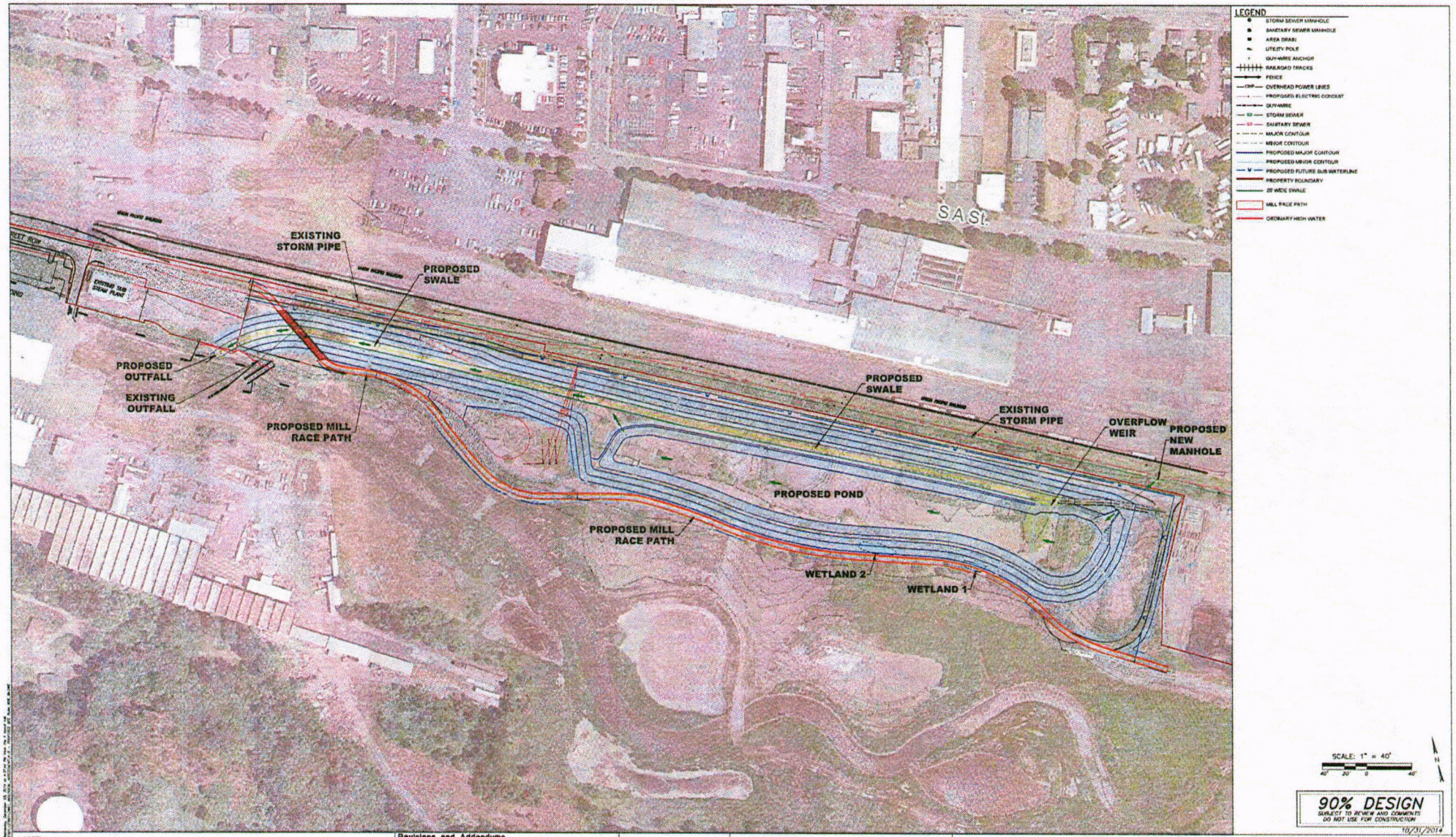


NOTE:

1. SURVEY OF EXISTING CONDITIONS PROVIDED BY THE CITY OF SPRINGFIELD, P31053 Mill Race Stormwater Facility REVISION 10 10/17/14.dwg DATED OCTOBER, 2014.

Revisions and Addendums			
Description	Date	No.	By
60% DESIGN	4/7/14	1	DS
REVISED 60% DESIGN	8/12/14	2	DS
90% DESIGN	10/31/14	2	DS

amec

SPRINGFIELD OREGON

THE CITY OF SPRINGFIELD
DEVELOPMENT & PUBLIC WORKS
225 FIFTH STREET
SPRINGFIELD, OREGON 97477
VOICE: 541-726-3753
FAX: 541-726-2309
WWW.SPRINGFIELD-OR.GOV

DESIGN: DS | DRAWN: PM | CHECK: HM | PROJ. NO: XXXX | BID ON:

SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH

PROJECT SITE OVERVIEW MAP

SHEET 4

THIS DRAWING IS FULL SIZE WHEN PLOTTED AT 22"x34".

OREGON BIODIVERSITY INFORMATION CENTER

Institute for Natural Resources
Portland State UNIVERSITY
Mail Stop: INR
Post Office Box 751
Portland, Oregon 97207
503.725.9950
http://orbic.pdx.edu

March 13, 2014

Erin E. Hale
AMEC Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, OR 97224

Dear Ms. Hale:

Thank you for requesting information from the Oregon Biodiversity Information Center (ORBIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Springfield Mill Race Facility Project in T17S R3W Sec 35, WM.

Twelve (12) element occurrence records were noted within a two-mile radius of your project and are included on the enclosed computer printout.

Please remember that a lack of rare element information from a given area does not necessarily indicate there are no significant elements present, only that there is no information known to us from the site. To ensure there are no significant elements present that may be affected by your project, you should inventory the site during the appropriate season.

Oregon chub (*Oregonichthys crameri*) was found within your data search. Due to the sensitivity of this species your report only includes general locational information for these records. If you need detailed locational information or have questions about Oregon chub in your project area, please contact Brian Bangs, Native Fish Investigations – Oregon chub, at Oregon Department of Fish and Wildlife: brian.bangs@oregonstate.edu or 541-757-4263 ext 224.

This data is confidential and for the specific purposes of your project and is **not to be distributed**. Please also note that as our database is continually updated, the data in this report should be considered current for a maximum of one year from the date it was generated and should not be cited thereafter.

Please forward the included invoice to the appropriate party in your organization for payment.

If you need additional information or have any further questions, please do not hesitate to contact me.

Sincerely,

Lindsey Wise

Lindsey Wise
Biodiversity Data Manager
lindsey.wise@pdx.edu
503.725.9951

encl.: **invoice (H-031314-LKW8)**
computer printout and data key

Attachment 4 to Addendum 1 Dated 06/16/15

coral, [no common name] (*Porites napopora*)	2014	T (F)	n/a	no
coral, [no common name] (*Seriatopora aculeata*)	2014	T	no	no
coral, boulder star (*Orbicella franksi*)	2014	T	no	no
coral, elkhorn (*Acropora palmata*)	2006	T	**final**	**draft**
coral, lobed star (*Orbicella annularis*)	2014	T	no	no
coral, mountainous star (*Orbicella faveolata*)	2014	T	no	no
coral, pillar (*Dendrogyra cylindrus*)	2014	T	no	no
coral, rough cactus (*Mycetophyllia ferox*)	2014	T	no	no
coral, staghorn (*Acropora cervicornis*)	2006	T	**final**	**draft**

Marine Plants (1 listed "species")

(E = "endangered"; T = "threatened"; F = "foreign"; n/a = not applicable)

Species	Year Listed	Status	Critical Habitat*	Recovery Plan*
Johnson's seagrass (*Halophila johnsonii*)	1999	T	final	final

*** NOTE:** Critical habitat cannot be designated in foreign waters; critical habitat is also not required for species listed prior to the 1978 ESA amendments that added critical habitat provisions. Recovery plans for sea turtles are developed and implemented by NMFS and USFWS; the plans have been written separately for turtles in the Atlantic and Pacific oceans (and East Pacific for the green turtle) rather than for each listed species. Bowhead whales are exempt from recovery planning.

Endangered and Threatened Species Under NMFS' Jurisdiction:

- All Endangered and Threatened Species under NMFS Jurisdiction
  - » Marine Mammals
  - » Sea Turtles
  - » Fish (Marine & Anadromous)
  - » Marine Invertebrates & Plants

Additional Species:

- Species Petitioned for Listing under the ESA (awaiting 90-day findings)
- Candidates for ESA Listing
- Species Proposed for ESA Listing
- Species with "Not Warranted" 12-month findings (we reviewed the status, but determined that listing was not warranted)
- Delisted Species

Updated: September 30, 2014

Attachment 1 to Addendum 1 Dated 06/16/15

◦ Central California coast	1997**	T	final	in process
◦ Snake River Basin	1997**	T	final	in process
◦ Upper Columbia River *original listing -* *change in status -* *court reinstated status -*	2009+ 1997** 2006** 2007+	T E T E	final	final
+ reinstated to endangered status per U.S. District Court decision in June 2007;reclassified to threatened [pdf] per U.S. District Court order in June 2009				
◦ Southern California	1997**	E	final	final
◦ Middle Columbia River	1999**	T	final	final
◦ Middle Columbia River	2013	XN	n/a	
◦ Lower Columbia River	1998**	T	final	final
◦ Upper Willamette River	1999**	T	final	final
◦ Northern California	2000**	T	final	in process
◦ South-Central California coast	1997**	T	final	final
◦ California Central Valley	1998**	T	final	final

** All Pacific salmonid listings were revisited in 2005 and 2006. Only the salmonids whose status changed as a result of the review will show the revised date; for all others, only the original listing date is shown. For more information on the listing history, please click on the link for each ESU/DPS.

Marine Invertebrates (24 listed "species")

(E = "endangered"; T = "threatened"; F = "foreign"; n/a = not applicable)

Species	Year Listed	Status	Critical Habitat*	Recovery Plan*
Abalone				
abalone, black (*Haliotis cracherodii*)	2009	E	final	no
abalone, white (*Haliotis sorenseni*)	2001	E	not prudent [pdf]	final
Corals				
coral, [no common name] (*Acropora globiceps*)	2014	T	no	no
coral, [no common name] (*Acropora jacquelineae*)	2014	T	no	no
coral, [no common name] (*Acropora lokani*)	2014	T (F)	n/a	no
coral, [no common name] (*Acropora pharaonis*)	2014	T (F)	n/a	no
coral, [no common name] (*Acropora retusa*)	2014	T	no	no
coral, [no common name] (*Acropora rudis*)	2014	T	no	no
coral, [no common name] (*Acropora speciosa*)	2014	T	no	no
coral, [no common name] (*Acropora tenella*)	2014	T (F)	n/a	no
coral, [no common name] (*Acropora spinosa*)	2014	T (F)	n/a	no
coral, [no common name] (*Euphyllia paradivisa*)	2014	T	no	no
coral, [no common name] (*Isopora crateriformis*)	2014	T	no	no
coral, [no common name] (*Montipora australiensis*)	2014	T (F)	n/a	no
coral, [no common name] (*Pavona diffluens*)	2014	T	no	no

Attachment 4 to Addendum 1 Dated 06/16/15

salmon, chum (2 listed ESUs) (*Oncorhynchus keta*)				
• Columbia River	1999**	T	final	final
• Hood Canal summer-run	1999**	T	final	final
salmon, coho (4 listed ESUs) (*Oncorhynchus kisutch*)				
• Central California coast	2005** 1996**	E T	final	final
• Lower Columbia River	2005**	T	proposed	final
• Oregon coast	2008	T	final	in process
• Southern Oregon & Northern California coasts (SONCC)	1997**	T	final	final
salmon, sockeye (2 listed ESUs) (*Oncorhynchus nerka*)				
• Ozette Lake	1999**	T	final	final
• Snake River	1991**	E	final	draft
sawfish, largetooth (*Pristis perotteti*)	2011	E	no	no
sawfish, smalltooth (1 listed DPS) (*Pristis pectinata*)				
• U.S. portion of range	2003	E	final	final
shark, scalloped hammerhead (4 listed DPSs) (*Sphyrna lewini*)				
• Central & Southwest Atlantic	2014	T	no	no
• Eastern Atlantic	2014	E (F)	no	no
• Eastern Pacific	2014	E	no	no
• Indo-West Pacific	2014	T	no	no
sturgeon, Adriatic (*Acipenser naccarii*)	2014	E (F)	n/a	no
sturgeon, Atlantic (5 listed DPSs) (*Acipenser oxyrinchus oxyrinchus*)				
• Gulf of Maine	2012	T	no	no
• New York Bight	2012	E	no	no
• Chesapeake Bay	2012	E	no	no
• Carolina	2012	E	no	no
• South Atlantic	2012	E	no	no
sturgeon, Chinese (*Acipenser sinensis*)	2014	E (F)	n/a	no
sturgeon, European (*Acipenser sturio*)	2014	E (F)	n/a	no
sturgeon, green (1 listed DPS) (*Acipenser medirostris*)				
• Southern DPS	2006	T	final	in process
sturgeon, Gulf (*Acipenser oxyrinchus desotoi*)	1991	T	final	final
sturgeon, Kaluga (*Huso dauricus*)	2014	E (F)	n/a	no
sturgeon, Sakhalin (*Acipenser mikadoi*)	2014	E (F)	n/a	no
sturgeon, shortnose (*Acipenser brevirostrum*)	1967	E	n/a	final
totoaba (*Totoaba macdonaldi*)	1979	E (F)	n/a	n/a
trout, steelhead (11 listed DPSs & 1 XN) (*Oncorhynchus mykiss*)				
• Puget Sound	2007	T	in process	no

Attachment 1 Dated 05/06/15

loggerhead turtle (9 listed DPSs) (*Caretta caretta*) » *original listing - 1978*				
• Mediterranean Sea	2011	E (F)	n/a	n/a
• North Indian Ocean	2011	E (F)	n/a	n/a
• North Pacific Ocean	2011	E	no	final
• Northeast Atlantic Ocean	2011	E (F)	n/a	n/a
• Northwest Atlantic Ocean	2011	T	final	final
• South Atlantic Ocean	2011	T (F)	n/a	n/a
• South Pacific Ocean	2011	E (F)	n/a	n/a
• Southeast Indo-Pacific Ocean	2011	T (F)	n/a	n/a
• Southwest Indian Ocean	2011	T (F)	n/a	n/a
olive ridley turtle (2 listed populations^) (*Lepidochelys olivacea*)				
• Mexico's Pacific coast breeding colonies	1978	E	n/a	final
• all other areas	1978	T	n/a	final

^ These populations were listed before the 1978 ESA amendments that restricted population listings to "distinct population segments of vertebrate species."

Fish (Marine & Anadromous) (53 listed "species")

(E = "endangered"; T = "threatened"; F = "foreign"; XN = "nonessential experimental population"; n/a = not applicable)

Species	Year Listed	Status	Critical Habitat*	Recovery Plan*
bocaccio (1 listed DPS) (*Sebastes paucispinis*)				
• Puget Sound/ Georgia Basin	2010	E	no	no
eulachon, Pacific / smelt (1 listed DPS) (*Thaleichthys pacificus*)				
• Southern DPS	2010	T	final	no
rockfish, canary (1 listed DPS) (*Sebastes pinniger*)				
• Puget Sound/ Georgia Basin	2010	T	no	no
rockfish, yelloweye (1 listed DPS) (*Sebastes ruberrimus*)				
• Puget Sound/ Georgia Basin	2010	T	no	no
salmon, Atlantic (1 listed DPS) (*Salmo salar*)				
• Gulf of Maine *original listing -*	2009 (expanded) 2000	E	final	final
salmon, Chinook (9 listed ESUs & 1 XN) (*Oncorhynchus tshawytscha*)				
• California coastal	1999**	T	final	in process
• Central Valley spring-run	1999**	T	final	final
• Central Valley spring-run in the San Joaquin River, CA	2013	XN	n/a	-
• Lower Columbia River	1999**	T	final	final
• Upper Columbia River spring-run	1999**	E	final	final
• Puget Sound	1999**	T	final	final
• Sacramento River winter-run	1994**	E	final	final
• Snake River fall-run	1992**	T	final	in process
• Snake River spring/ summer-run	1992**	T	final	in process
• Upper Willamette River	1999**	T	final	final

Attachment 4 to Addendum 1 Dated 06/16/15

whale, Southern right whale (*Eubalaena australis*)	1970	E (F)	n/a	n/a
whale, sperm (*Physeter macrocephalus*)	1970	E	n/a	**final**
Pinnipeds				
sea lion, Steller (1 listed DPS) (*Eumetopias jubatus*)				
◦ Western	1997	E	**final**	**final**
original listing -	1990	T		
seal, bearded (2 listed DPSs) (*Erignathus barbatus*)				
◦ Beringia	2012	T	no	no
◦ Okhotsk	2012	T (F)	no	no
seal, Guadalupe fur (*Arctocephalus townsendi*)	1985	T	n/a	n/a
seal, Hawaiian monk (*Monachus schauinslandi*)	1976	E	**final**	**final**
seal, ringed (5 listed subspecies) (*Phoca hispida*)				
◦ Arctic (*Phoca hispida hispida*)	2012	T	no	no
◦ Baltic (*Phoca hispida botnica*)	2012	T (F)	no	no
◦ Okhotsk (*Phoca hispida ochotensis*)	2012	T (F)	no	no
◦ Ladoga (*Phoca hispida ladogensis*)	2012	E (F)	no	no
◦ Saimaa (*Phoca hispida saimensis*)	1993	E (F)	n/a	n/a
seal, Mediterranean monk (*Monachus monachus*)	1970	E (F)	n/a	n/a
seal, spotted (1 listed DPS) (*Phoca largha*)				
◦ Southern	2010	T (F)	n/a	n/a

Sea Turtles (16 listed "species")

(E = "endangered"; T = "threatened"; F = "foreign"; n/a = not applicable)

Species	Year Listed	Status	Critical Habitat*	Recovery Plan*
green turtle (2 listed populations^) (*Chelonia mydas*)				
◦ Florida & Mexico's Pacific coast breeding colonies	1978	E	**final**	**final**
◦ all other areas » Hawaii population under review for delisting	1978	T	**final**	**final**
hawksbill turtle (*Eretmochelys imbricata*)	1970	E	**final**	**final**
Kemp's ridley turtle (*Lepidochelys kempii*)	1970	E	n/a	**final**
leatherback turtle (*Dermochelys coriacea*)	1970	E	**final**	**final**
			no	*final*

Attachment 4 under NMFS' Jurisdiction 05/06/15

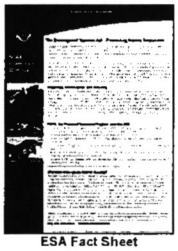
National Seafood Month
Fresh Facts, Smart Seafood
#seafoodmonth

Endangered and Threatened Marine Species under NMFS' Jurisdiction

Approximately 2,180 species are listed as endangered or threatened under the ESA. Of these species, about 625 are foreign species, found only in areas outside of the U.S. and our waters.

We have jurisdiction over 122 endangered and threatened marine species, including 32 foreign species. We work with U.S. Fish and Wildlife Service (USFWS) to manage ESA-listed species. Generally, we manage marine species, while USFWS manages land and freshwater species.

- Marine Mammals
- Sea Turtles
- Fish (Marine and Anadromous)
- Marine Invertebrates and Plants



ESA Fact Sheet

» How does the ESA define "species"?

Marine Mammals (28 listed "species")

Manatees and sea otters are also listed under the ESA, but fall under the jurisdiction of the U.S. Fish and Wildlife Service.

(E = "endangered"; T = "threatened"; F = "foreign"; n/a = not applicable)

Species	Year Listed	Status	Critical Habitat*	Recovery Plan*
Cetaceans				
dolphin, Chinese River / baiji (*Lipotes vexillifer*)	1989	E (F)	n/a	n/a
dolphin, Indus River (*Platanista minor*)	1991	E (F)	n/a	n/a
porpoise, Gulf of California harbor / vaquita (*Phocoena sinus*)	1985	E (F)	n/a	n/a
whale, beluga (1 listed DPS) (*Delphinapterus leucas*)				
• Cook Inlet	2008	E	final	in process
whale, blue (*Balaenoptera musculus*)	1970	E	n/a	final
whale, bowhead (*Balaena mysticetus*)	1970	E	n/a	n/a
whale, false killer (1 listed DPS) (*Pseudorca crassidens*)				
• Main Hawaiian Islands Insular	2012	E	no	no
whale, fin (*Balaenoptera physalus*)	1970	E	n/a	final
whale, gray (1 listed DPS) (*Eschrichtius robustus*)				
• Western North Pacific	1970	E (F)	n/a	n/a
whale, humpback (*Megaptera novaeangliae*)	1970	E	n/a	final
whale, killer (1 listed DPS) (*Orcinus orca*)				
• Southern Resident	2005	E	final	final
whale, North Atlantic right (*Eubalaena glacialis*)	2008	E	final	final
original listing as "northern right whale" -	1970	E		
whale, North Pacific right (*Eubalaena japonica*)	2008	E	final	final
original listing as "northern right whale" -	1970	E		
whale, sei (*Balaenoptera borealis*)	1970	E	n/a	final

APPENDIX B

USFWS Official Species List

APPENDIX A

PHOTOGRAPHS

Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

Photo 5 Looking down at water within the Mill Race

Photo 6 Looking downstream at stormwater outfall discharging to the Mill Race

APPENDIX A

PHOTOGRAPHS

Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

Photo 3 Looking downstream at Mill Race where it passes beneath bridge and parking lot

Photo 4 Looking upstream at Mill Race

APPENDIX A

PHOTOGRAPHS

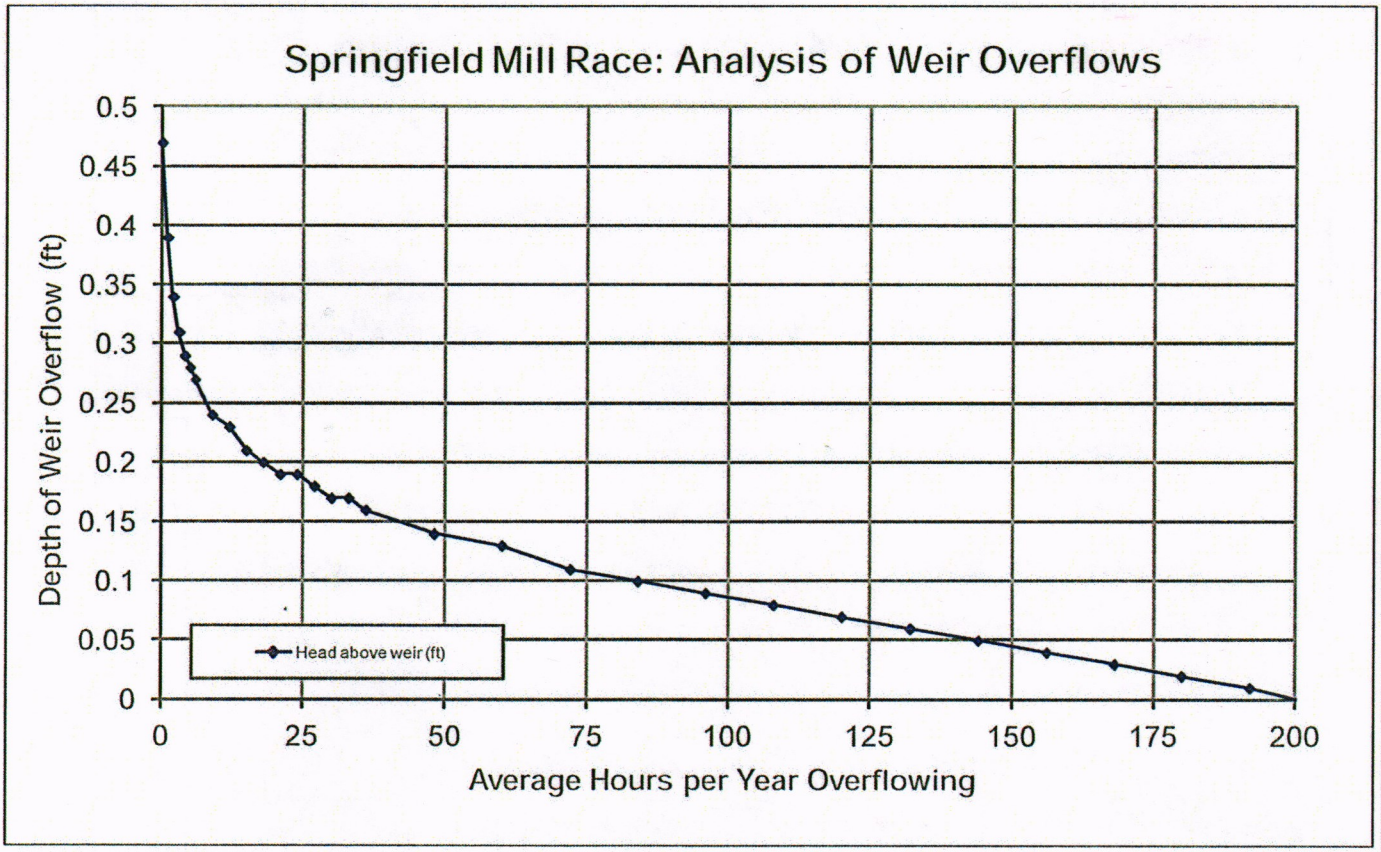
Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

Photo 1 Looking East and upstream at the Mill Race

Photo 2 Looking northeast at shoreline along the Mill Race

APPENDIX A

Photograph Log



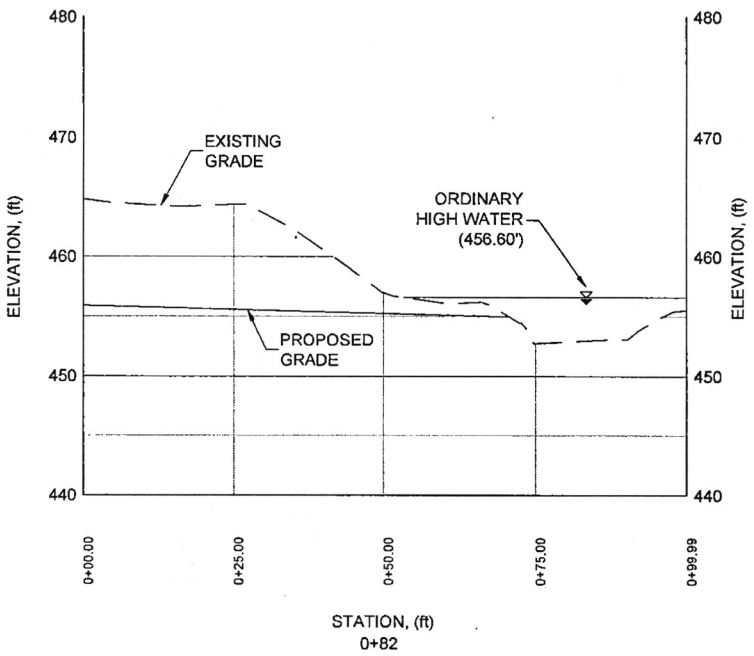
AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	amec		CLIENT: CITY OF SPRINGFIELD	
TITLE: ANALYSIS OF WEIR OVERFLOWS		DWN BY: PM	DATUM: -	DATE: DECEMBER 2014
PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH		CHK'D BY: EH	REV. NO.: 1	PROJECT NO.: 461M12790
		PROJECTION: -	SCALE:	FIGURE No.: 10

K:\12000\12700\12790\127901\dwg_Biological_Assessment\Figure 10 - Analysis of Weir.mxd - patrick.mccarthy - 12/3/2014 - 4:38.57 PM

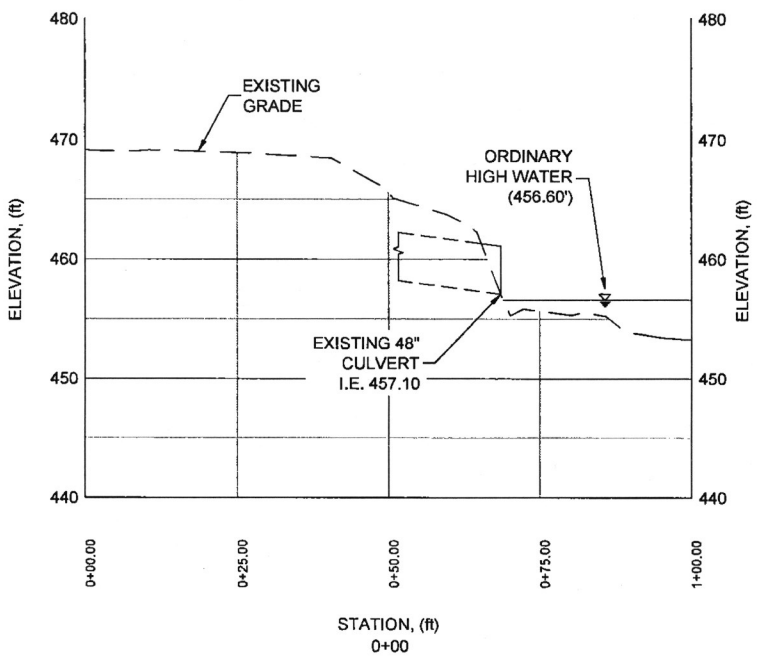
Attachment 4 to Addendum 1 Dated 06/16/15

CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH	DATE: DECEMBER 2014
	CHK'D BY: EH		PROJECT NO.: 3-61M-127900
AMEC, 7376 SW Durham Road, Portland, OR, U.S.A. 97224 — amec	DATUM: NAD83	TITLE: ACTION AREA	REV. NO.: X
	PROJECTION: HARN OR SP.S. Int. Ft.		FIGURE NO.: 9
	SCALE: 1 inch = 200 feet		

K:\12000\12700\12790\127901\dwg_Biological_Assessment\Figure 9 - Action Area.mxd - patrick.mccarthy - 12/3/2014 - 4:36:47 PM



PROPOSED BIOSWALE CROSS SECTION (A / 6)
H: 1" = 20' V: 1" = 10'



EXISTING CULVERT CROSS SECTION (B / 6)
H: 1" = 20' V: 1" = 10'

0' 10' 20' 30'
1" = 20'
HORIZONTAL SCALE

0' 5' 10' 15'
1" = 5'
VERTICAL SCALE

CLIENT:	CITY OF SPRINGFIELD
DWN BY:	PM
CHK'D BY:	DS
DATUM:	-
PROJECTION:	-
SCALE:	AS SHOWN
PROJECT	SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH
TITLE	CROSS SECTIONS
DATE:	NOVEMBER 2014
PROJECT NO:	3-61M-127900
REV. NO.:	A
FIGURE No.	6

AMEC
7376 S.W. Durham Road
Portland, OR. U.S.A. 97224

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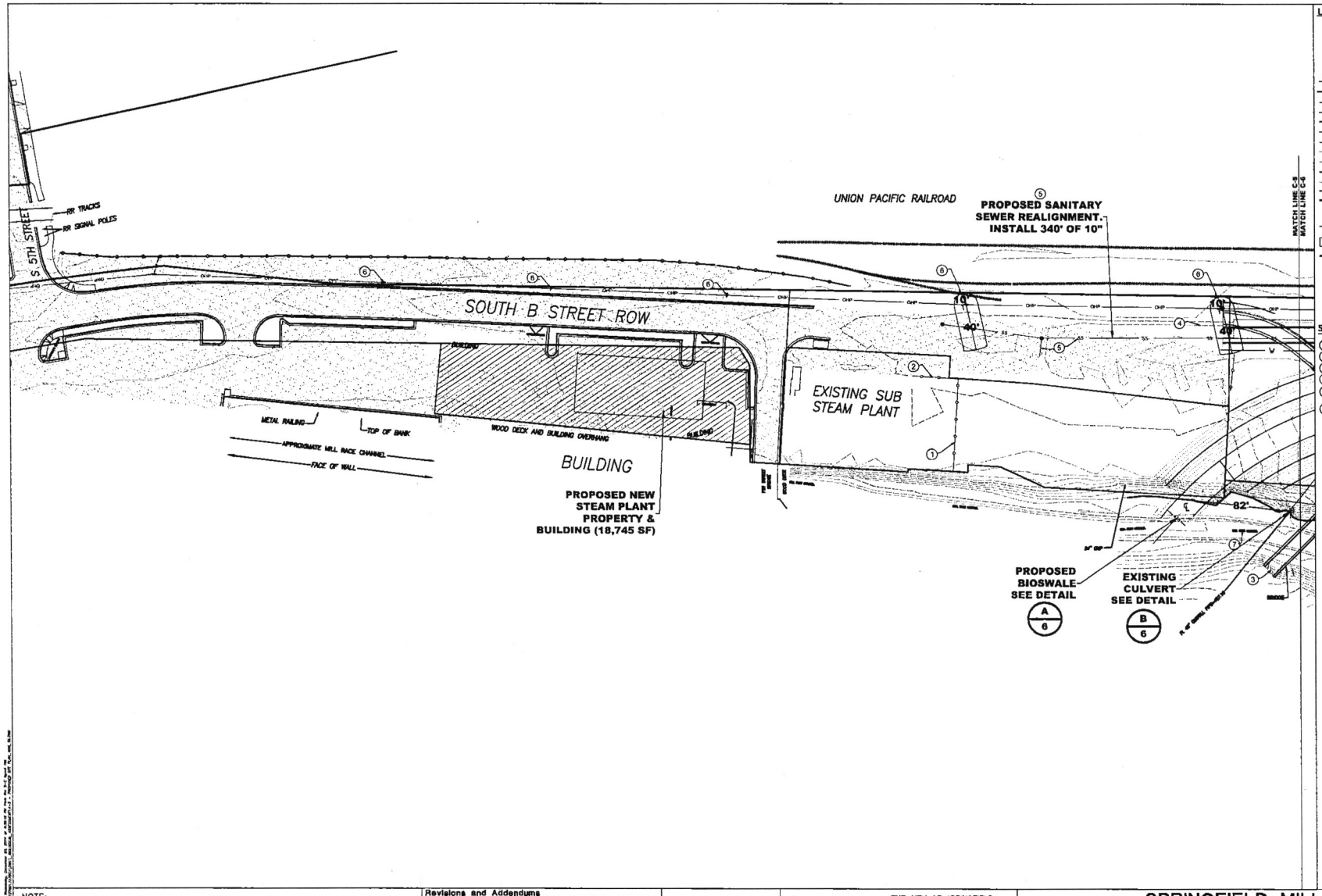
Attachment 4 to Addendum 1 Dated 06/16/15



LEGEND

- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- AREA DRAIN
- UTILITY POLE
- GUY-WIRE ANCHOR
- CONSTRUCTION NOTES
- RAILROAD TRACKS
- FENCE
- OHP — OVERHEAD POWER LINES
- PROPOSED ELECTRIC CONDUIT
- GUY-WIRE
- SD — STORM SEWER
- SS — SANITARY SEWER
- MAJOR CONTOUR
- MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- W — PROPOSED FUTURE SUB WATERLINE
- PROPERTY BOUNDARY
- BUFFER AROUND UTILITY POLES AND GUY-WIRES
- 20' WIDE SWALE
- MILL RACE PATH
- ORDINARY HIGH WATER

SITE PLAN NOTES

1. INSTALL FENCE. RE-USE FENCE REMOVED ON SHEET C-2
2. INSTALL GATE. REUSE GATE REMOVED ON SHEET C-2
3. EXISTING BRIDGE TO REMAIN
4. CONSTRUCTION ENTRANCE. SEE DETAIL SHEET C-16
5. INSTALL ~340' OF NEW 10" SS LINE. CONFIRM LOCATION OF LATERAL TO SUB BUILDING
6. RELOCATED OVERHEAD POWER POLE BY OTHERS (SUB)

SCALE: 1" = 40'

N

90% DESIGN
SUBJECT TO REVIEW AND COMMENTS
DO NOT USE FOR CONSTRUCTION

10/31/2014

NOTE:

1. SURVEY OF EXISTING CONDITIONS PROVIDED BY THE CITY OF SPRINGFIELD. P21052 Mill Race Stormwater Facility REVISION 10 10314.dwg. DATED OCTOBER, 2014.

Revisions and Addendums

Description	Date	No.	By
60% DESIGN	4/7/14	1	DS
REVISED 60% DESIGN	9/12/14	2	DS
90% DESIGN	10/31/14	2	DS

amec

SPRINGFIELD OREGON

THE CITY OF SPRINGFIELD
DEVELOPMENT & PUBLIC WORKS
225 FIFTH STREET
SPRINGFIELD, OREGON 97477
VOICE: 541-726-3753
FAX: 541-726-2309
WWW.SPRINGFIELD-OR.GOV

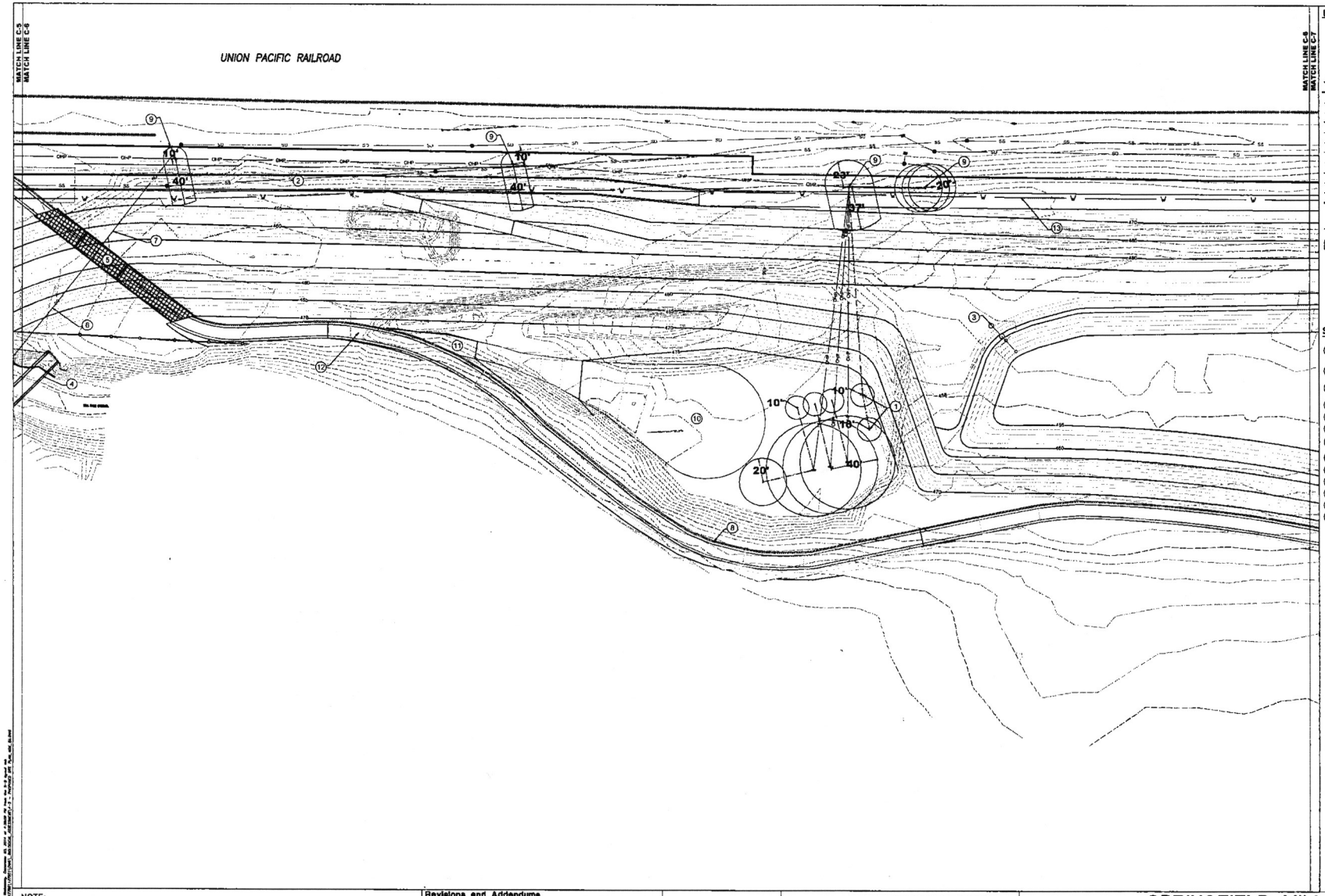
DESIGN: DS | DRAWN: PM | CHECK: HM | PROJ. NO XXXX | BID ON:

SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH

PROPOSED SITE PLAN - WEST

SHEET 5-C

THIS DRAWING IS FULL SIZE WHEN PLOTTED AT 22"x34".



LEGEND

- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- AREA DRAIN
- UTILITY POLE
- GUY-WIRE ANCHOR
- CONSTRUCTION NOTES
- RAILROAD TRACKS
- FENCE
- OHP — OVERHEAD POWER LINES
- PROPOSED ELECTRIC CONDUIT
- GUY-WIRE
- SD — STORM SEWER
- SS — SANITARY SEWER
- MAJOR CONTOUR
- MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED FUTURE SUB WATERLINE
- PROPERTY BOUNDARY
- BUFFER AROUND UTILITY POLES AND GUY-WIRES
- 20' WIDE SWALE
- MILL RACE PATH

SITE PLAN NOTES

1. APPROXIMATE LOCATION OF NEW STUB POLE AND GUY-WIRE. WORK TO BE PERFORMED BY SPRINGFIELD UTILITY BOARD (SUB). CONTRACTOR TO VERIFY ACTUAL LOCATION.
2. NEW ACCESS ROAD, 12' WIDE WITH 1' WIDE GRAVEL SHOULDERS, 6" GRAVEL OVER 12" CRUSHED ROCK.
3. ORIFICE MANHOLE, 1 FISH RACK, AND HDPE DISCHARGE PIPE. I.E. IN 468.59', I.E. OUT 464.20', ORIFICE 5.75" IN DIAMETER.
4. PROTECT EXISTING BRIDGE AND ABUTMENTS.
5. CONTECH CONSPAN BRIDGE, SEE DETAIL ON SHEET C-10.
6. REMOVE EXISTING 48" HDPE STORM PIPE.
7. CUT 48" PIPE AT SWALE TO MAINTAIN DRAINAGE OF SR PROPERTY, PROVIDE RIP-RAP SPLASH PAD AT NEW OUTFALL. INVERT APPROXIMATELY 467.36'.
8. INSTALL 2" PVC CONDUIT ALONG PATH SHOULDER FOR FUTURE USE.
9. RELOCATED OVERHEAD POWER POLE BY OTHERS (SUB). INCLUDING GUYS.
10. GRAVEL ACCESS ROAD AND TURN AROUND TO SUB 3-POLE STRUCTURE.
11. 20' ASPHALT TRANSITION.
12. MILL RACE PATH. SEE DETAIL X ON SHEET C-X.
13. NEW 24" WATERLINE INSTALLED BY OTHERS (SUB).

SCALE: 1" = 40'

40' 20' 0 40'

N

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DO NOT USE FOR CONSTRUCTION
10/31/2014

NOTE:

1. SURVEY OF EXISTING CONDITIONS PROVIDED BY THE CITY OF SPRINGFIELD, P21052 Mill Race Stormwater Facility REVISION 10 102114.dwg, DATED OCTOBER, 2014.

Revisions and Addendums

Description	Date	No.	By
60% DESIGN	4/7/14	1	DS
REVISED 60% DESIGN	9/12/14	2	DS
90% DESIGN	10/31/14	3	DS

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SPRINGFIELD OREGON

THE CITY OF SPRINGFIELD
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225 FIFTH STREET
SPRINGFIELD, OREGON 97477
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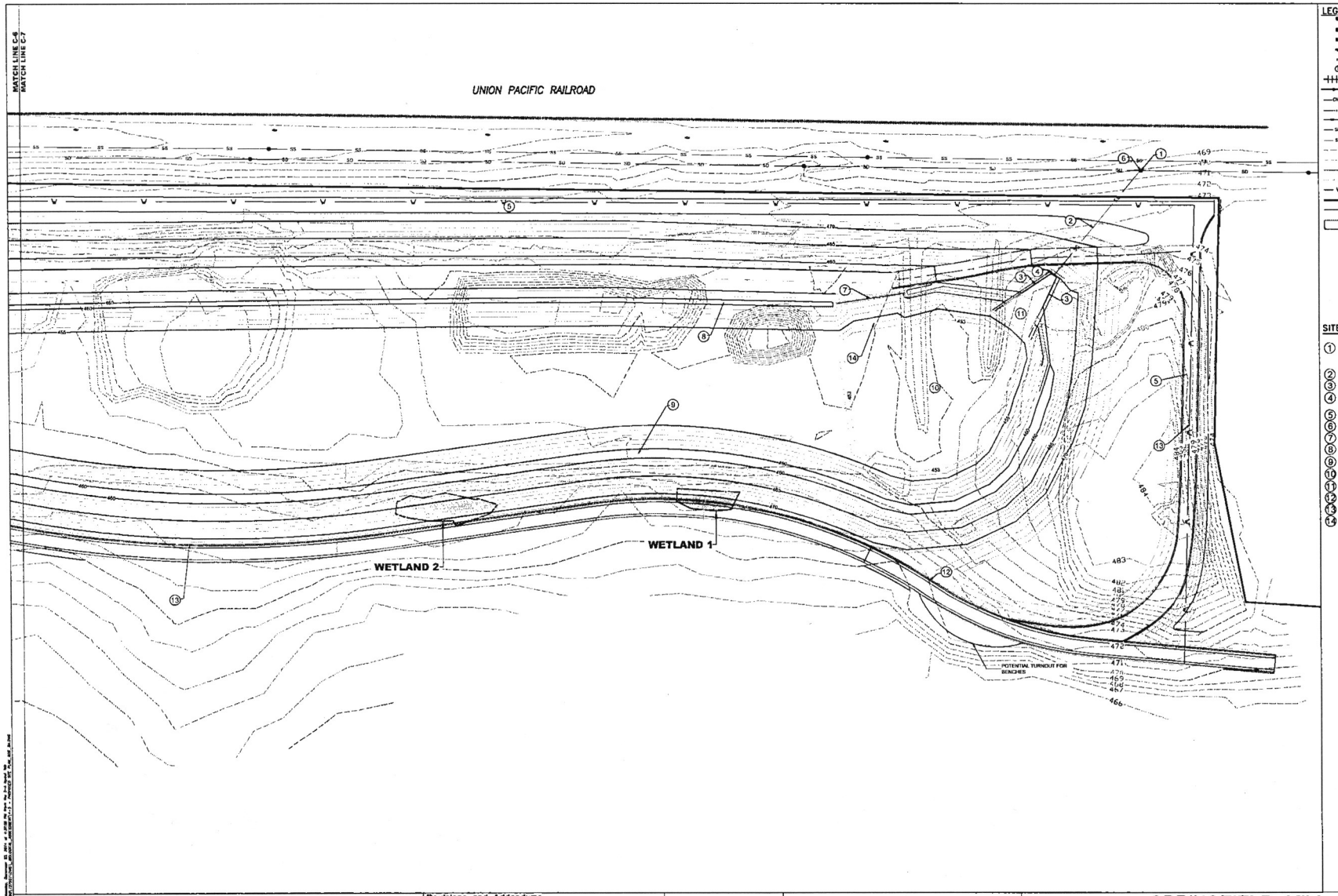
SPRINGFIELD MILL RACE STORMWATER FACILITY AND PATH

PROPOSED SITE PLAN - CENTRAL

SHEET 5-B

THIS DRAWING IS FULL SIZE WHEN PLOTTED AT 22"x34".

Attachment 4 to Addendum 1 Dated 06/16/15



LEGEND

- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- AREA DRAIN
- UTILITY POLE
- GUY-WIRE ANCHOR
- CONSTRUCTION NOTES
- RAILROAD TRACKS
- FENCE
- OHP — OVERHEAD POWER LINES
- PROPOSED ELECTRIC CONDUIT
- GUY-WIRE
- SD — STORM SEWER
- SS — SANITARY SEWER
- MAJOR CONTOUR
- MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- V — PROPOSED FUTURE SUB WATERLINE
- PROPERTY BOUNDARY
- 20' WIDE SWALE
- MILL RACE PATH

SITE PLAN NOTES

1. CONSTRUCT 84" DIAMETER MANHOLE. VERIFY INVERT AND TIE TO EXISTING 48" STORM SEWER AND NEW 48" STORM SEWER. I.E. FOR NEW STORMWATER APPROX. 468.87. VERIFY I.E. WITH ENGINEER. MUST MAINTAIN 0.10' DROP ACROSS MANHOLE. VERIFY ELEV. DOES NOT CONFLICT WITH OUTFALL I.E..
2. INSTALL 48" HDPE PIPE.
3. CONCRETE WING WALL. SEE DETAIL ON SHEET X.X.
4. CONSTRUCT CONCRETE HEADWALL. NEW OUTFALL I.E. @ 458.87. VERIFY ELEVATION IS LOWER THAN I.E. AT NOTE 1.
5. PROPOSED NEW ACCESS ROAD.
6. GROUT AND PLUG DOWNSTREAM STORM SEWER PIPE.
7. CONCRETE OVERFLOW WEIR, ELEV. 458.63 MUST MATCH OUTFALL I.E. INTO POND.
8. 4' FLAT TOP BERM.
9. 8' BENCH FOR PLANTING SHADE TREES FOR POND.
10. FOREBAY
11. RIP-RAP SPLASH PAD
12. INSTALL 2" PVC CONDUIT ALONG PATH SHOULDER FOR FUTURE USE.
13. NEW 24" WATERLINE. INSTALLED BY OTHERS (SUB).
14. 5H:1V SLOPE FOR MAINTENANCE ACCESS INTO SW FACILITY.

SCALE: 1" = 40'

40' 20' 0 40'

N

90% DESIGN
SUBJECT TO REVIEW AND COMMENTS
DO NOT USE FOR CONSTRUCTION

10/31/2014

NOTE:

1. SURVEY OF EXISTING CONDITIONS PROVIDED BY THE CITY OF SPRINGFIELD, P21052 MB Race Stormwater Facility REVISION 10 102114.dwg, DATED OCTOBER, 2014.

Revisions and Addendums

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FAX: 541-726-2309
WWW.SPRINGFIELD-OR.GOV

DESIGN: DS | DRAWN: PM | CHECK: HM | PROJ. NO: XXXX | BID ON:

SPRINGFIELD MILL RACE
STORMWATER FACILITY AND PATH
PROPOSED SITE PLAN - EAST

SHEET 5-A

THIS DRAWING IS FULL SIZE WHEN PLOTTED AT 22"x34".

U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

Oregon Fish and Wildlife Office
2600 SOUTHEAST 98TH AVENUE, SUITE 100
PORTLAND, OR 97266
(503) 231-6179
http://www.fws.gov/oregonfwo/Species/Lists/RequestList.asp

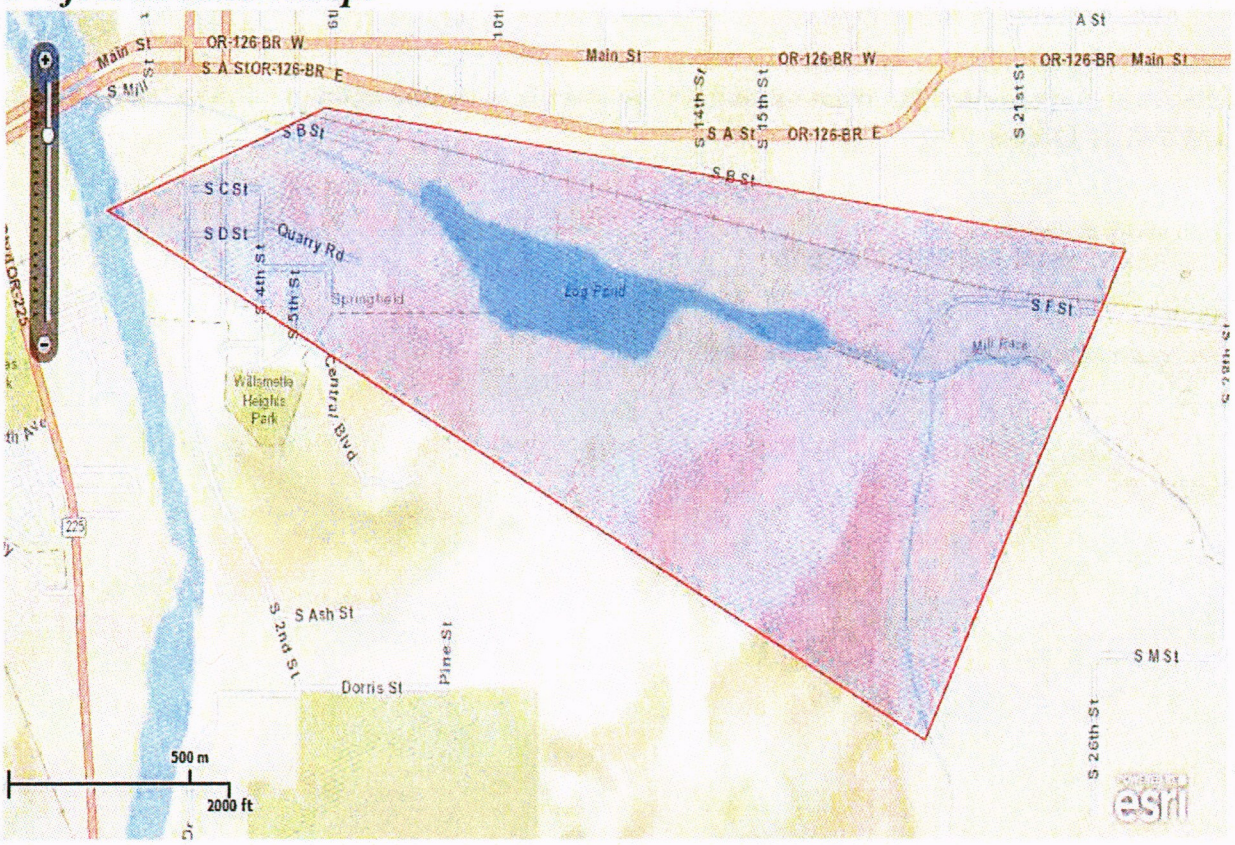
Project Name:

USFW

U.S. Fish and Wildlife Service

Trust Resources List

Project Location Map:



Project Counties:

Lane, OR

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-123.0185502 44.0449181, -122.990741 44.0422035, -122.9976247 44.0328247, -123.0261033 44.0429439, -123.0185502 44.0449181)))

Project Type:

Water Quality Modification

U.S. Fish and Wildlife Service

Trust Resources List

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of **11** threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

Birds	Status		Has Critical Habitat	Contact
Northern Spotted owl (*Strix occidentalis caurina*) Population: Entire	Threatened	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Streaked Horned lark (*Eremophila alpestris strigata*) Population:	Threatened	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Yellow-Billed Cuckoo (*Coccyzus americanus*) Population: Western U.S. DPS	Proposed Threatened	species info	Proposed critical habitat	Oregon Fish And Wildlife Office
Fishes				
Bull Trout (*Salvelinus confluentus*) Population: U.S.A., conterminous, lower 48 states	Threatened	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Oregon chub (*Oregonichthys crameri*) Population: Entire	Threatened	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Flowering Plants				
Bradshaw's desert-parsley (*Lomatium bradshawii*)	Endangered	species info		Oregon Fish And Wildlife Office
Kincaid's Lupine (*Lupinus sulphureus ssp. kincaidii*)	Threatened	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Nelson's checker-mallow (*Sidalcea nelsoniana*)	Threatened	species info		Oregon Fish And Wildlife Office

U.S. Fish and Wildlife Service

Trust Resources List

Water howellia (*Howellia aquatilis*)	Threatened	species info		Oregon Fish And Wildlife Office
Willamette daisy (*Erigeron decumbens var. decumbens*)	Endangered	species info	Final designated critical habitat	Oregon Fish And Wildlife Office
Insects				
Fender's Blue butterfly (*Icaricia icarioides fenderi*)	Endangered	species info	Final designated critical habitat	Oregon Fish And Wildlife Office

Critical habitats within your project area: (View all critical habitats within your project area on one map)

The following critical habitats lie fully or partially within your project area.

Fishes	Critical Habitat Type
Chinook salmon (*Oncorhynchus tshawytscha*) Population: Upper Willamette River ESU	Final designated critical habitat

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds (USFWS Migratory Bird Program).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see: http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without

U.S. Fish and Wildlife Service

Trust Resources List

additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tool links in the Bird Conservation Tools section at: http://www.fws.gov/migratorybirds/CCMB2.htm.

For information about conservation measures that help avoid or minimize impacts to birds, please visit: http://www.fws.gov/migratorybirds/CCMB2.htm.

Migratory birds of concern that may be affected by your project:
There are **7** birds on your Migratory birds of concern list. The underlying data layers used to generate the migratory bird list of concern will continue to be updated regularly as new and better information is obtained. User feedback is one method of identifying any needed improvements. Therefore, users are encouraged to submit comments about any questions regarding species ranges (e.g., a bird on the USFWS BCC list you know does not occur in the specified location appears on the list, or a BCC species that you know does occur there is not appearing on the list). Comments should be sent to the ECOS Help Desk.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
Bald eagle (*Haliaeetus leucocephalus*)	Yes	species info	Year-round
Calliope Hummingbird (*Stellula calliope*)	Yes	species info	Breeding
Fox Sparrow (*Passerella liaca*)	Yes	species info	Breeding
Olive-Sided flycatcher (*Contopus cooperi*)	Yes	species info	Breeding
Purple Finch (*Carpodacus purpureus*)	Yes	species info	Year-round
Rufous hummingbird (*selasphorus rufus*)	Yes	species info	Breeding
Willow Flycatcher (*Empidonax traillii*)	Yes	species info	Breeding

U.S. Fish and Wildlife Service

Trust Resources List

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions
The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local

U.S. Fish and Wildlife Service

Trust Resources List

government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Emergent Wetland	PEMC	2.5474
Freshwater Forested/Shrub Wetland	PSSC	5.5528
Freshwater Pond	PUBFx	1.1424
Freshwater Pond	PUBHx	0.5595
Lake	L1UBHx	32.0666
Riverine	R2UBH	9279.688

APPENDIX C

Essential Fish Habitat Assessment

ESSENTIAL FISH HABITAT ASSESSMENT

Springfield Mill Race Stormwater Facility and Path
Springfield, Oregon

ACTION AGENCY

U.S. Army Corps of Engineers, Portland District

LOCATION

Mill Race, Springfield, Lane County, Oregon, Township 17S, Range 3W, Section 35

PROJECT NAME

Springfield Mill Race Stormwater Facility and Path

ESSENTIAL FISH HABITAT BACKGROUND

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NOAA-Fisheries) on activities that may adversely affect Essential Fish Habitat (EFH). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters" include "aquatic areas and their associated physical, chemical, and biological properties that are used by fish." They may include aquatic areas historically used by fish. "Substrate" includes "sediment, hard bottom, structures underlying the waters, and associated biological communities" (NMFS, 1999).

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within and outside of EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA-Fisheries is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location.

This assessment evaluates the impacts of the proposed project to determine whether it "may adversely affect" designated EFH for federally managed fisheries species in the proposed action area. The assessment also describes conservation measures to avoid, minimize, or otherwise offset potential adverse effects of the proposed action on designated EFH.

IDENTIFICATION OF EFH

The Pacific Fishery Management Council (PFMC) has designated EFH for federally managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish (PFMC, 1998a; Casillas et al., 1998) and coastal pelagic species (PFMC, 1998b) encompasses all waters from the mean high water line and upriver extent of salt water to the boundary of the United States exclusive economic zones (370.4 kilometers [km]) (PFMC, 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, California, and Idaho, except areas upstream of certain impassable manmade barriers (as identified by the PFMC), and longstanding, naturally impassable barriers (e.g., natural waterfalls in existence for several hundred years) (PFMC, 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception, to the Canadian Border (PFMC, 1999).

Of those species with EFH designation, only Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) occur in the Action Area (Table 1). Refer to the relevant EFH designations (Casillas et al., 1998; PFMC, 1998a, 1998b, 1999) for life-history stages of these species that may occur in the project vicinity. Assessment of the impacts to these species' EFH from the proposed project is based on this information.

DETAILED DESCRIPTION OF THE PROPOSED PROJECT

The proposed action will construct a wet detention pond and bioswale to treat stormwater runoff prior to discharge to the Mill Race, a man-made channel connecting the middle fork and main stem Willamette River.

For a more detailed project description, please refer to Section 1.2 of the biological assessment (BA).

POTENTIAL ADVERSE EFFECTS OF PROPOSED PROJECT

The EFH designation for the Pacific salmon fishery includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassible barriers identified by the PFMC (1999). In estuarine and marine areas, proposed designated EFH for salmon extends from nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Point Conception (PFMC, 1999).

The Pacific salmon management unit includes Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*), both of which may use the Mill Race for adult migration, juvenile outmigration, and rearing where suitable habitat is present.

The EFH designation for groundfishes and coastal pelagics is defined as those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery. The marine extent of groundfish and coastal pelagic EFH includes those waters from the nearshore and tidal submerged environment within Washington, Oregon, and California state territorial waters out to the exclusive economic zone (370.4 km [231.5 miles]) offshore between Canada and the Mexican border. The Willamette River basin does not support groundfishes or coastal pelagics; therefore, the proposed action will not affect EFH for these groups of fish.

EFH for Pacific salmon is present in the Action Area, as defined in the BA. The proposed action may result in the following long- and short-term impacts to Pacific salmon EFH:

- Short-term and localized increases in turbidity during project construction; and
- Long-term improvement in the quality of stormwater discharged to the Mill Race through the proposed stormwater treatment system by reducing total suspended solids and associated pollutants.

The proposed action is expected to have a long-term, net beneficial effect on Pacific salmon EFH, primarily through improved water quality. No permanent adverse effects to Pacific salmon EFH, or their prey species, will result from the proposed action.

CONSERVATION MEASURES

Implementing the best management practices specified in Section 1.2.4 of the BA will help to avoid and minimize any potential effects of the proposed project on Pacific salmon EFH.

CONCLUSION

The proposed action is expected to have a long-term, net beneficial effect on Pacific salmon EFH, primarily through improvements to water quality in the Mill Race. No permanent adverse effects to Pacific salmon EFH, or their prey species, will result from the proposed action. Therefore, the project will not adversely affect Pacific salmon EFH.

REFERENCES

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amec

TABLE 1

FISH SPECIES WITH DESIGNATED ESSENTIAL FISH HABITAT IN THE ACTION AREA

Springfield Stormwater Facility and Path
Springfield, Oregon

Common Name	Scientific Name
Salmonid Species	
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*O. kisutch*

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ATTACHMENT G

HGM Assessment

SHEET FOR AUTOMATIC CALCULATION OF FUNCTION SCORES - revised June 2008

Slope or Flats subclass

Site Name: Mill Race Wetland 1 **Date: 11/3/14**

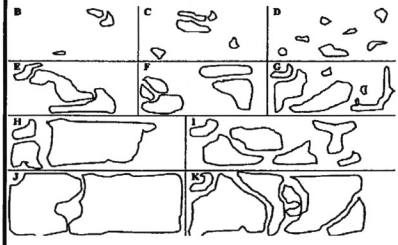
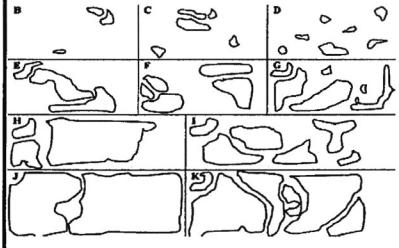
It is recommended to do a "Save As" from this blank spreadsheet for each use, assigning different file names. This will help reduce the chance of accidentally confusing new data with previously entered data.
For reference, the function(s) addressed by each indicator are noted in column E. Codes are shown below next to the function names. The capital letter in the code (e.g., sp-**B**) in column E refers to the code for the indicator in the published Volume IA.
HFR= scaled to highest functioning site of this subclass found by DSL; **LAR**= scaled to least-altered site of this subclass found by DSL Scores greater than 1 indicate the capacity of the function at the site you assessed may be greater than in all sites of this subclass assessed by the DSL team during model calibration.
Data **must** be entered for every indicator, unless the scale block for this subclass is shaded. Each value in column D must be less than or equal to 1.

Function:	Calculated Function Capacity for SF sites if HFR:	if LAR:
Water Storage & Delay (ws)	0.00	0.00
Sediment Stabilization & Phosphorus Retention (sp)	0.51	0.54
Nitrogen Removal (n)	0.41	0.48
Primary Production (pp)	0.43	0.43
Invertebrate Habitat Support (i)	0.10	0.10
Amphibian & Turtle Habitat (at)	0.40	0.53
Breeding Waterbird Support (bw)	0.00	0.00
Wintering & Migrating Waterbird Support (ww)	0.43	0.49
Songbird Habitat Support (sb)	0.19	0.29
Support of Characteristic Vegetation (v)	0.21	0.22

Note 1: Models and scores for ws, sp, n, and pp intentionally do not account for the **area** of the wetland, an especially important factor for these functions.
Note 2: This method should be applied to an entire contiguous wetland, not just to the portion affected directly by a planned alteration or restoration.

Indicator	*Raw Datum*	*Scale for SF sites*	*Scaled Datum*	*Function*
Presence of permanent surface water (water year-round during most years)? (p. 82)	0	absent = 0 present = 1.0	0	sb-P rf-X
Percent of permanent zone that is open water (i.e., lacking emergent and underwater plants) (p. 79) (Answer "0" if no permanent zone is present)	0	100 =.1 80-99 =.8 60-80 = 1.0 40-60 =.8 20-40 =.4 0-20 =.2	0	at-M
Percent of site that is inundated only seasonally (i.e., watermarks, moss lines, debris lines, etc.) (p. 81)	100	none = 0 1-10 =.1 10-25 =.6 25-50 =.8 > 50 = 1.0	1	i-B n-A ws-A
		none = 0 1-20 =.5 20-40 =.7 40-60 =.8 60-80 =.9 >80 = 1.0	1	ww-A
At least 0.5 acre of surface water persists until at least July 1 and water is mostly wider than 10 ft?	no	Yes = 1 No = 0	0	bw-X

Predominant water depth during biennial low water (p. 82)	only contains water during rain events	0" = 0 1-2" =.6 2-24" = 1.0 2-6 ft =.8 >6 ft =.6	0	bw-D
		0 =.1 1-2" = 1.0 2-24" =.8 >24" =.2	0.1	i-D
Percent of site occupied by the most extensive depth category at this site during biennial low water. (p. 81). (Delimit the low water zone first, then break into these depth categories, then identify the category that predominates horizontally). (Possible categories are: 0 inches; 1-2 inches; 2-24 inches; 2-6 feet; < 6 feet)	95	100 = 0 80-100 =.1 50-80 =.4 30-50 =.8 <30 = 1.0	0.1	bw-B
Difference between the predominating biennial high and low water levels (p. 71) 0) = No change 1) = Difference of 1 class 2) = Difference of 2 classes 3) = Difference of 3 classes 4) = Difference of 4 classes Class 1 = 0 inches Class 2 = 1-2 inches Class 3 = 2-24 inches Class 4 = 2-6 feet Class 5 = > 6 feet	1 inch	0) = 0 1) =.3 2) =.5 3) =.8 4) = 1.0	0.3	n-B at-E bw-E
		0) = 0 1) = .25 2) = .5 3) = .75 4) = 1.0	0.25	ww-F
Predominant vertical increase in surface water level (ft) in most of the seasonal zone (i.e., water marks, moss lines, debris lines, etc. Look at the highest point for 2 year flood and measure the difference from biennial low)	0	0 = 0 .1 - .4 =.25 .5- 1.0 =.5 1 - 2 =.75 >2 = 1.0	0	ws-B
Number of depth categories during biennial high water. (p. 77) Categories are: ___ 1 - 2 inches ___ 2 - 24 inches ___ 2 – 6 ft > 6 ft	1	1 = 0 2 =.3 3 =.6 4 = 1.0	0	bw-C
		1 = .1 2 = .3 3 = .6 4 = 1.0	0.1	ww-E

Percent & distribution of pools during biennial high water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None 	B	A = 0 B =.6 C =.65 D =.7 E,F =.75 K =.8 H =.85 I =.9 J =.95 G = 1.0	0.6 0.6	sp-C ww-D i-E, at-A
Percent & distribution of pools during biennial low water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None 	B	A = 0 B =.6 C =.65 D =.7 E,F =.75 J =.8 H =.85 I =.9 K =.95 G = 1.0	0.6 0.6	bw-A, pp-E, n 1
Percent of the site occupied by hummocks (p. 74, 75)	none	none = 0 1-10 =.6 10-90 =.8 >90 = 1.0	0	at-B ww-C sb-M sp-B pp-C n-G i-F

Maximum annual extent of vernal pools/ shorebird scrapes and mudflats: (p. 76) A = none B = 1 – 100 sq. ft. C = 100-1000 sq. ft. D = 1000 – 10,000 sq. ft. E = >10,000 sq. ft Must meet ALL of the following: a) herbs are generally < 4" and comprise < 80% ground cover during winter or early spring b) topography is basically flat c) inundated to a depth of < 6" for 2 or more continuous weeks d) never shaded by trees, shrubs, or buildings	none	A = 0 B =.6 C =.7 D =.8 E = 1.0	0	ww-B
Presence of logs or boulders that extend above the surface of permanent water (p. 84)	absent	absent = 0 present = 1.0	0	at-G
Predominant soil texture: (p 83) GC= gravel or cobble SA=sand, sandy loam, or loamy sand L= loam, silty loam, gravelly loam C= clay, sandy clay, silty clay, clay loam, silty clay loam O= organic particles<1mm Guidance: 1. Soil remains in a ball when squeezed YES…Go to 3; NO …Go to 2 2. > 50% of the particles (by weight) are > 1 mm YES…"GC"; NO …"SA" 3. Squeezed soil forms an even ribbon YES…Go to 4; NO …"SA" 4. Soil ribbon extended > 1" without breaking YES…"C/O"; NO …Go to 5 5. Soils feels very gritty YES... "SA"; NO…"L"	C	GC =.1 SA =.2 L =.8 C/O = 1.0	1	sp-D
Presence of some mottling and/or other features that indicate oxygen deficits, or, permanent water is present	yes	absent = 0 present = 1.0	1	n-X
Mapped soil series is hydric (not simply a hydric inclusion). See county soil map and p. 75.	no	1= yes 0= no	0	v-C at-D ww-G i-I
Percent of site that was constructed on former uplands (non-hydric soil) (p. 81): 6) = recent, >90% of site 5) = recent, 10-90% of site 4) = recent, 1-10% of site 3) = >5 years ago, >90% of site 2) = >5 years ago, 10-90% of site 1) = >5 years ago, 1-10% of site 0) = none	storically uplar	6) = 0 5) = .1 4) = .2 3) = .3 2) = .4 1) = .5 0) = 1.0	0.3	i-J at-K v-K n-D

Tally the percent of surrounding land cover (exclude the site itself) as exists during a typical May. Answer each row independently. They do not necessarily sum to 100%.

within 200 ft of the site boundary:

a. % Water, wetland =	1
b. % Grassland, water, wetland =	1
c. % Grassland, row crops =	0
d. % Wooded =	0
e. % Natural (not lawn, crops, paved, building)=	4

within 1000 ft:

f. % Water, wetland =	1
g. % Grassland, water, wetland =	1
h. % Grassland, row crops =	0
i. % Wooded =	5
j. % Natural =	8

within 5,280 ft:

k. % Water, wetland =	1
l. % Grassland, row crops =	1
m. % Wooded =	5

In column D, enter the scaled value for the number in column B. (= a), above)	1	0 = 0 1–10 =.4 10-20 =.8 >20 = 1.0	0.4	bw-I ww-I
In column D, enter the scaled value for the number in column B. (=(b), above)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-N
In column D, enter the scaled value for the number in column B. (=(c), above)	0	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	ww-K
In column D, enter the scaled value for the number in column B. (=(d), above)	0	0 = 0 1-10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0	sb-I
In column D, enter the scaled value for the number in column B. (=(e), above)	4	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	i-L at-O v-R
In column D, enter the scaled value for the number in column B. (=(a+f+k)/3), above)	1	none = 0 1 – 10 =.4 10-20 =.8 >20 = 1.0	0.4	ww-H bw-J

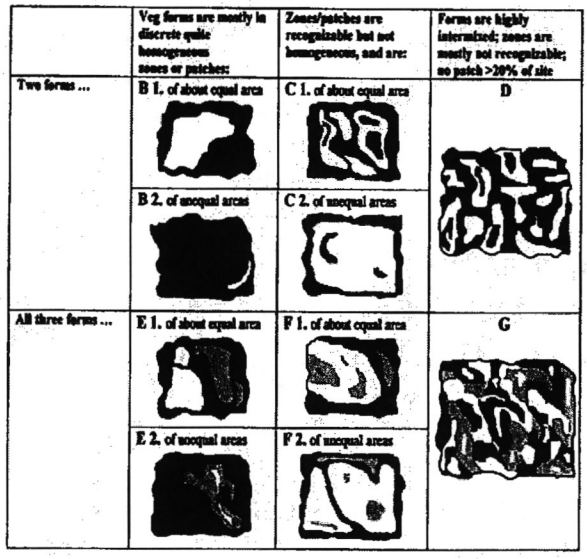
In column D, enter the scaled value for the number in column B. (=(c+h+l)/3), above)	0	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	ww-J
In column D, enter the scaled value for the number in column B. (= (d+i+m)/3), above)	3.333333333	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-J
In column D, enter the scaled value for the number in column B. (= (e+j)/2), above)	6	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	bw-K
In column D, enter the scaled value for the number in column B. (= (b+g)/2), above)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-O
Percent of land cover within 200 ft (but only in the contributing watershed) that is "natural" – that is, NOT cropland, lawns, pavement, or buildings (p. 79)	0	<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-100 = 1.0	0	pp-F
		<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-99 =.9 100 = 1.0	0	i-M v-Q
Percent woodland divided by percent grassland-crops within 200 ft of the site (p. 71)	0	<.1 =.1 0.1-0.8 =.6 0.8-1.2 = 1.0 1.2 –2.0 =.6 >2.0 =.1	0.1	at-P
Distance (ft) to nearest busy road (p. 71) This includes a) any road or parking lot in a develop area that contains >4 buildings per acre, b) any road with a maximum traffic rate of > 6 vehicles per minute, during an average day during the summer	0	<100 = 0 100-300 =.3 300-600 =.5 600-1200 =.7 1200-2400 =.8 2400-4800 =.9 >4800 = 1.0	0	bw-G at-N v-P sb-R

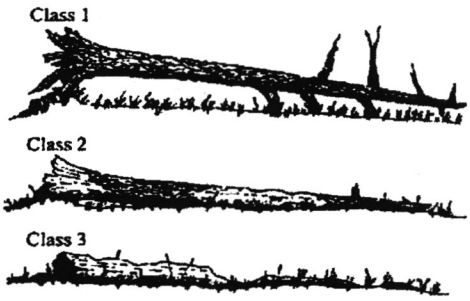
Note: The following 5 rows must sum to 100%. The **number** of visitors is immaterial.

Percent of site including 100-ft buffer that is visited 365 days a year or almost so =	5
Percent of site including 100-ft buffer that is visited more than 80 days a year (>20% of year), but less than daily =	5
Percent of site including 100-ft buffer that is visited 20-80 days a year (e.g., about once a week) =	45
Percent of site including 100-ft buffer that is visited just a few days a year =	5
Percent of site including 100-ft buffer that is almost never visited =	40

Scale the calculated value in the box on the right (sum of the above 5 rows) and enter the scaled value in column D (p. 72)	370	100-200 = 0 200-300 =.3 300-400 =.7 400-500 =1.0	0.7	bw-H v-O sb-Q
Percent of site affected by soil leveling (i.e., portion previously leveled by equipment for farming)	95	100 =.1 10-99 =.3 1-10 =.6 0 = 1.0	0	at-C i-G pp-D sp-F n-H
Percent of site currently affected by soil compaction: (i.e., by equipment, vehicles, livestock, humans, fill) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	6	5/6) =.1 4) =.2 3) =.4 2) =.6 1) =.8 0) = 1.0	0.1	sp-G v-M sb-K
Percent of site's vegetation that is mowed or subject to extreme grazing at least annually (p. 81)	0	>90 = 0 10-90 =.2 1-10 =.4 none = 1.0	1	sb-L v-N
Most of site is burned, or harvested for hay or timber, at least biennially? (p. 72)	no	no = 0 yes = 1.0	0	n-J
Percent of site currently affected by soil mixing (plowing, excavation, bulldozing, etc.): (p. 81) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	60	5 or 6 =.1 4 =.2 3 =.4 2 =.6 1 =.8 0 = 1.0	0.1	at-f i-H v-L pp-A n-C sp-E
Percent of the site that is vegetated (including submersed aquatics) (p. 82)	<10	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-A v-A

Percent of site with woody vegetation (p. 82)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-b
Percent of seasonal zone that is bare during most of the dry season. (i.e., devoid of vegetation, except trees) (Answer "0" if no seasonal zone)	5	>80 = 0 60-80 =.2 40-60 =.4 20-40 =.6 1-20 =.8 0 = 1.0	0.8	pp-G sp-H
Percent of site that is inundated permanently and contains emergent, floating, or submersed plants (p. 72)	<1	0 = 0 1-10 =.9 >10 = 1.0	0	i-A
		0 = 0 1-10 =.4 10-30 =.8 30-60 = 1.0 60-90 =.9 >90 =.6	0	bw-F
Percent cover of herbs within the seasonal zone (p. 72)	90	0 = 0 1-30 =.1 30-50 =.6 50-70 =.75 70-100 = 1.0	1	at-L
Percent of whole site that has closed canopy (p. 80)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-C
Percent understory shrub & vine cover beneath the drip line of trees (p. 82) (Answer "0" if no wooded areas)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-D

Number & distribution of vegetation forms --- herbs, shrubs, trees. If only one form, answer "A". To count, the patch must comprise >0.5 acre or >5% of vegetated area. See p. 77 for enlargement of diagram.  	B2	A = 0 B2 =.60 C2 =.65 B1 =.70 C1,D =.75 E2 =.80 F2 =.85 E1 =.90 F1 =.95 G = 1.0	0.6	pp-B v-B at-J i-K sb-H
Number of woody species (p. 82)	1	unwooded= 0 1-2 =.1 3-4 =.25 5-6 =.5 7-9 =.75 10-18 =.9 >18 = 1.0	0.1	sb-E
Number of native woody species (p. 78)	1	0 = 0 1 =.1 2-3 =.25 4-5 =.5 6-9 =.75 10-13 =.9 >14 = 1.0	0.1	v-F
Percent of woody species list consisting of species that are native (p. 78)	100	0 = 0 1-57 =.1 58-66 =.25 67-74 =.5 75-79 =.75 80-99 =.9 100 = 1.0	0	v-g
Percent of woody cover within stratum that is comprised of non-native species (p. 82) (Use the greater of the tree, understory shrub, or open shrub stratum's percent)	<1	100 = 0 80-99 =.1 30-79 =.25 10-29 =.5 5-9 =.75 1-4 =.9 0 = 1.0	1	v-H
Spatial predominance of non-native herbs (p. 84) A = Non-natives predominate B = Cannot determine (about equal) C = Natives predominate	a	A = 0 B =.5 C = 1.0	0	v-D

Percent of herb species list comprised of species that are non-native (p. 80)		100 = 0 80-99 =.1 67-79 =.25 60-66 =.5 25-59 =.75 1-24 =.9 0 = 1.0	0.1	v-E
Average diameter (inches) of the 3 largest trees. (p. 71)		none = 0 1-5 =.1 6-9 =.25 10-17 =.5 18-25 =.75 26-35 =.9 >35 = 1.0	0.5	sb-G v-J at-I n-F
Number of deadwood types. Potentially 12 types: (p. 77) ___ Class 1: freshly fallen, have bark & branches, 4-8" ___ Class 1: freshly fallen, have bark & branches, 8-20" ___ Class 1: freshly fallen, have bark & branches, >20" ___ Class 2: mildly rotted and mostly on ground: 4-8" ___ Class 2: mildly rotted and mostly on ground: 8-20" ___ Class 2: mildly rotted and mostly on ground: >20" ___ Class 3: well rotted, losing shape: 4-8" ___ Class 3: well rotted, losing shape: 8-20" ___ Class 3: well rotted, losing shape: >20" ___ Standing stumps/snags: 4-8" ___ Standing stumps/snags: 8-20" ___ Standing stumps/snags: >20" ___ Artificial debris – check only if no others present  	none	0 = 0 1 =.1 2 =.25 3-4 =.5 5-7 =.75 >7 = 1.0	0	sb-F v-I n-E at-H
Land cover in the vicinity of the site in the 1850's was wooded?	yes	1 = Yes 0 = No	1	n-K pp-H at-R sb-S v-S

SHEET FOR AUTOMATIC CALCULATION OF FUNCTION SCORES - revised June 2008

Slope or Flats subclass

Site Name: Mill Race Wetland 2 **Date: 11/3/14**

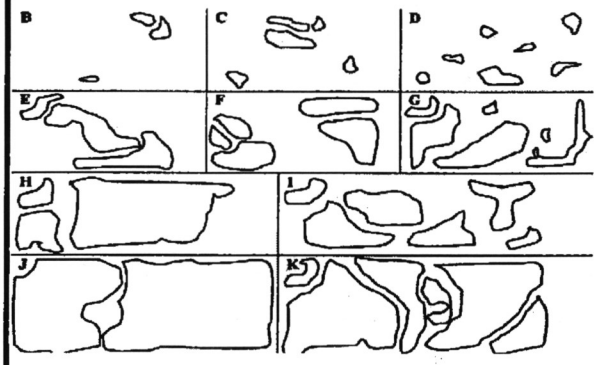
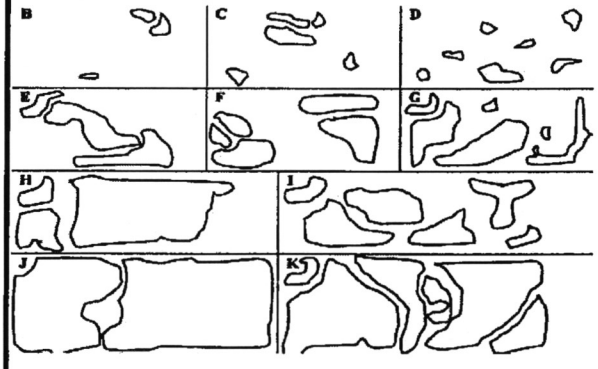
It is recommended to do a "Save As" from this blank spreadsheet for each use, assigning different file names. This will help reduce the chance of accidentally confusing new data with previously entered data.
For reference, the function(s) addressed by each indicator are noted in column E. Codes are shown below next to the function names. The capital letter in the code (e.g., sp-**B**) in column E refers to the code for the indicator in the published Volume IA.
HFR= scaled to highest functioning site of this subclass found by DSL; **LAR**= scaled to least-altered site of this subclass found by DSL Scores greater than 1 indicate the capacity of the function at the site you assessed may be greater than in all sites of this subclass assessed by the DSL team during model calibration.
Data **must** be entered for every indicator, unless the scale block for this subclass is shaded. Each value in column D must be less than or equal to 1.

Function:	Calculated Function Capacity for SF sites if HFR:	if LAR:
Water Storage & Delay (ws)	0.00	0.00
Sediment Stabilization & Phosphorus Retention (sp)	0.51	0.54
Nitrogen Removal (n)	0.41	0.48
Primary Production (pp)	0.43	0.43
Invertebrate Habitat Support (i)	0.10	0.10
Amphibian & Turtle Habitat (at)	0.40	0.53
Breeding Waterbird Support (bw)	0.00	0.00
Wintering & Migrating Waterbird Support (ww)	0.43	0.49
Songbird Habitat Support (sb)	0.19	0.29
Support of Characteristic Vegetation (v)	0.21	0.22

Note 1: Models and scores for ws, sp, n, and pp intentionally do not account for the **area** of the wetland, an especially important factor for these functions.
Note 2: This method should be applied to an entire contiguous wetland, not just to the portion affected directly by a planned alteration or restoration.

Indicator	*Raw Datum*	*Scale for SF sites*	*Scaled Datum*	*Function*
Presence of permanent surface water (water year-round during most years)? (p. 82)	0	absent = 0 present = 1.0	0	sb-P rf-X
Percent of permanent zone that is open water (i.e., lacking emergent and underwater plants) (p. 79) (Answer "0" if no permanent zone is present)	0	100 =.1 80-99 =.8 60-80 = 1.0 40-60 =.8 20-40 =.4 0-20 =.2	0	at-M
Percent of site that is inundated only seasonally (i.e., watermarks, moss lines, debris lines, etc.) (p. 81)	100	none = 0 1-10 =.1 10-25 =.6 25-50 =.8 > 50 = 1.0	1	i-B n-A ws-A
		none = 0 1-20 =.5 20-40 =.7 40-60 =.8 60-80 =.9 >80 = 1.0	1	ww-A
At least 0.5 acre of surface water persists until at least July 1 and water is mostly wider than 10 ft?	no	Yes = 1 No = 0	0	bw-X

Predominant water depth during biennial low water (p. 82)	only contains water during rain events	0" = 0 1-2" =.6 2-24" = 1.0 2-6 ft =.8 >6 ft =.6	0	bw-D
		0 =.1 1-2" = 1.0 2-24" =.8 >24" =.2	0.1	i-D
Percent of site occupied by the most extensive depth category at this site during biennial low water. (p. 81). (Delimit the low water zone first, then break into these depth categories, then identify the category that predominates horizontally). (Possible categories are: 0 inches; 1-2 inches; 2-24 inches; 2-6 feet; < 6 feet)	95	100 = 0 80-100 =.1 50-80 =.4 30-50 =.8 <30 = 1.0	0.1	bw-B
Difference between the predominating biennial high and low water levels (p. 71) 0) = No change 1) = Difference of 1 class 2) = Difference of 2 classes 3) = Difference of 3 classes 4) = Difference of 4 classes Class 1 = 0 inches Class 2 = 1-2 inches Class 3 = 2-24 inches Class 4 = 2-6 feet Class 5 = > 6 feet	1 inch	0) = 0 1) =.3 2) =.5 3) =.8 4) = 1.0	0.3	n-B at-E bw-E
		0) = 0 1) = .25 2) = .5 3) = .75 4) = 1.0	0.25	ww-F
Predominant vertical increase in surface water level (ft) in most of the seasonal zone (i.e., water marks, moss lines, debris lines, etc. Look at the highest point for 2 year flood and measure the difference from biennial low)	0	0 = 0 .1 - .4 =.25 .5- 1.0 =.5 1 - 2 =.75 >2 = 1.0	0	ws-B
Number of depth categories during biennial high water. (p. 77) Categories are: ___ 1 - 2 inches ___ 2 - 24 inches ___ 2 – 6 ft > 6 ft	1	1 = 0 2 =.3 3 =.6 4 = 1.0	0	bw-C
		1 = .1 2 = .3 3 = .6 4 = 1.0	0.1	ww-E

Percent & distribution of pools during biennial high water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None 	B	A = 0 B =.6 C =.65 D =.7 E,F =.75 K =.8 H =.85 I =.9 J =.95 G = 1.0	0.6 0.6	sp-C ww-D i-E, at-A
Percent & distribution of pools during biennial low water. (p. 80) (Note: if site is > 1 acre, select the condition that predominates in 1 acre sub-units of the site.) A = None 	B	A = 0 B =.6 C =.65 D =.7 E,F =.75 J =.8 H =.85 I =.9 K =.95 G = 1.0	0.6 0.6	bw-A, pp-E, n 1
Percent of the site occupied by hummocks (p. 74, 75)	none	none = 0 1-10 =.6 10-90 =.8 >90 = 1.0	0	at-B ww-C sb-M sp-B pp-C n-G i-F

Maximum annual extent of vernal pools/ shorebird scrapes and mudflats: (p. 76) A = none B = 1 – 100 sq. ft. C = 100-1000 sq. ft. D = 1000 – 10,000 sq. ft. E = >10,000 sq. ft Must meet ALL of the following: a) herbs are generally < 4" and comprise < 80% ground cover during winter or early spring b) topography is basically flat c) inundated to a depth of < 6" for 2 or more continuous weeks d) never shaded by trees, shrubs, or buildings	none	A = 0 B =.6 C =.7 D =.8 E = 1.0	0	ww-B
Presence of logs or boulders that extend above the surface of permanent water (p. 84)	absent	absent = 0 present = 1.0	0	at-G
Predominant soil texture: (p 83) GC= gravel or cobble SA=sand, sandy loam, or loamy sand L= loam, silty loam, gravelly loam C= clay, sandy clay, silty clay, clay loam, silty clay loam O= organic particles<1mm Guidance: 1. Soil remains in a ball when squeezed YES…Go to 3; NO …Go to 2 2. > 50% of the particles (by weight) are > 1 mm YES…"GC"; NO …"SA" 3. Squeezed soil forms an even ribbon YES…Go to 4; NO …"SA" 4. Soil ribbon extended > 1" without breaking YES…"C/O"; NO …Go to 5 5. Soils feels very gritty YES... "SA"; NO…"L"	C	GC =.1 SA =.2 L =.8 C/O = 1.0	1	sp-D
Presence of some mottling and/or other features that indicate oxygen deficits, or, permanent water is present	yes	absent = 0 present = 1.0	1	n-X
Mapped soil series is hydric (not simply a hydric inclusion). See county soil map and p. 75.	no	1= yes 0= no	0	v-C at-D ww-G i-I
Percent of site that was constructed on former uplands (non-hydric soil) (p. 81): 6) = recent, >90% of site 5) = recent, 10-90% of site 4) = recent, 1-10% of site 3) = >5 years ago, >90% of site 2) = >5 years ago, 10-90% of site 1) = >5 years ago, 1-10% of site 0) = none	storically uplar	6) = 0 5) = .1 4) = .2 3) = .3 2) = .4 1) = .5 0) = 1.0	0.3	i-J at-K v-K n-D

Tally the percent of surrounding land cover (exclude the site itself) as exists during a typical May. Answer each row independently. They do not necessarily sum to 100%.

within 200 ft of the site boundary:

a. % Water, wetland =	1
b. % Grassland, water, wetland =	1
c. % Grassland, row crops =	0
d. % Wooded =	0
e. % Natural (not lawn, crops, paved, building)=	4

within 1000 ft:

f. % Water, wetland =	1
g. % Grassland, water, wetland =	1
h. % Grassland, row crops =	0
i. % Wooded =	5
j. % Natural =	8

within 5,280 ft:

k. % Water, wetland =	1
l. % Grassland, row crops =	1
m. % Wooded =	5

In column D, enter the scaled value for the number in column B. (= a), above)	1	0 = 0 1–10 =.4 10-20 =.8 >20 = 1.0	0.4	bw-I ww-I
In column D, enter the scaled value for the number in column B. (=(b), above)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-N
In column D, enter the scaled value for the number in column B. (=(c), above)	0	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	ww-K
In column D, enter the scaled value for the number in column B. (=(d), above)	0	0 = 0 1-10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0	sb-I
In column D, enter the scaled value for the number in column B. (=(e), above)	4	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	i-L at-O v-R
In column D, enter the scaled value for the number in column B. (=(a+f+k)/3), above)	1	none = 0 1 – 10 =.4 10-20 =.8 >20 = 1.0	0.4	ww-H bw-J

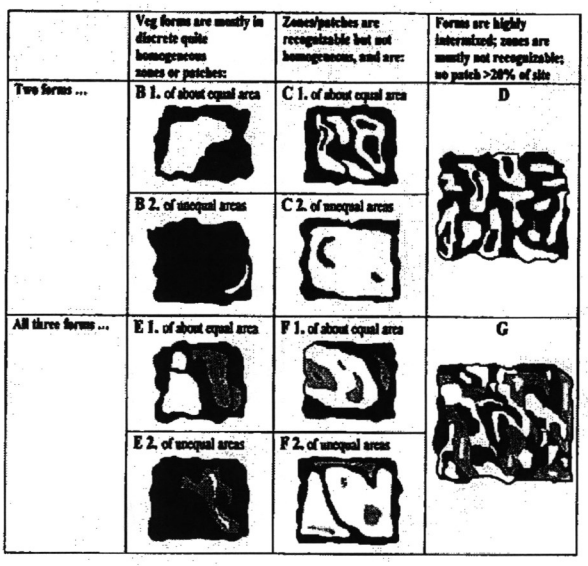
In column D, enter the scaled value for the number in column B. (=(c+h+l)/3), above)	0	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	ww-J
In column D, enter the scaled value for the number in column B. (= (d+i+m)/3), above)	3.333333333	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-J
In column D, enter the scaled value for the number in column B. (= (e+j)/2), above)	6	<10 = 0 10-20 = .1 20-40 = .3 40-80 = .5 80-90 = .7 90-100 = 1.0	0	bw-K
In column D, enter the scaled value for the number in column B. (= (b+g)/2), above)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-O
Percent of land cover within 200 ft (but only in the contributing watershed) that is "natural" – that is, NOT cropland, lawns, pavement, or buildings (p. 79)	0	<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-100 = 1.0	0	pp-F
		<10 = 0 10-20 =.1 20-40 =.3 40-90 =.5 90-99 =.9 100 = 1.0	0	i-M v-Q
Percent woodland divided by percent grassland-crops within 200 ft of the site (p. 71)	0	<.1 =.1 0.1-0.8 =.6 0.8-1.2 = 1.0 1.2 –2.0 =.6 >2.0 =.1	0.1	at-P
Distance (ft) to nearest busy road (p. 71) This includes a) any road or parking lot in a develop area that contains >4 buildings per acre, b) any road with a maximum traffic rate of > 6 vehicles per minute, during an average day during the summer	0	<100 = 0 100-300 =.3 300-600 =.5 600-1200 =.7 1200-2400 =.8 2400-4800 =.9 >4800 = 1.0	0	bw-G at-N v-P sb-R

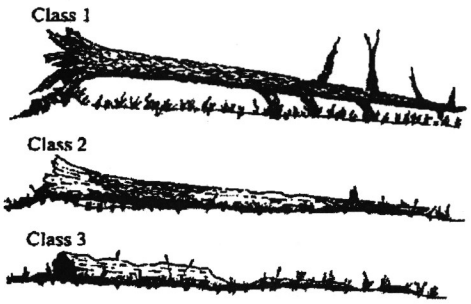
Note: The following 5 rows must sum to 100%. The **number** of visitors is immaterial.

Percent of site including 100-ft buffer that is visited 365 days a year or almost so =	5
Percent of site including 100-ft buffer that is visited more than 80 days a year (>20% of year), but less than daily =	5
Percent of site including 100-ft buffer that is visited 20-80 days a year (e.g., about once a week) =	45
Percent of site including 100-ft buffer that is visited just a few days a year =	5
Percent of site including 100-ft buffer that is almost never visited =	40

Scale the calculated value in the box on the right (sum of the above 5 rows) and enter the scaled value in column D (p. 72)	370	100-200 = 0 200-300 =.3 300-400 =.7 400-500 =1.0	0.7	bw-H v-O sb-Q
Percent of site affected by soil leveling (i.e., portion previously leveled by equipment for farming)	95	100 =.1 10-99 =.3 1-10 =.6 0 = 1.0	0	at-C i-G pp-D sp-F n-H
Percent of site currently affected by soil compaction: (i.e., by equipment, vehicles, livestock, humans, fill) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	6	5/6) =.1 4) =.2 3) =.4 2) =.6 1) =.8 0) = 1.0	0.1	sp-G v-M sb-K
Percent of site's vegetation that is mowed or subject to extreme grazing at least annually (p. 81)	0	>90 = 0 10-90 =.2 1-10 =.4 none = 1.0	1	sb-L v-N
Most of site is burned, or harvested for hay or timber, at least biennially? (p. 72)	no	no = 0 yes = 1.0	0	n-J
Percent of site currently affected by soil mixing (plowing, excavation, bulldozing, etc.): (p. 81) 6 = recent, at >90% of site 5 = recent, at 10-90% of site 4 = recent, at 1-10% of site 3 = >5 years ago, >90% of site 2 = >5 years ago, 10-90% of site 1 = >5 years ago, 1-10% of site 0 = none	60	5 or 6 =.1 4 =.2 3 =.4 2 =.6 1 =.8 0 = 1.0	0.1	at-f i-H v-L pp-A n-C sp-E
Percent of the site that is vegetated (including submersed aquatics) (p. 82)	<10	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-A v-A

Percent of site with woody vegetation (p. 82)	1	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-b
Percent of seasonal zone that is bare during most of the dry season. (i.e., devoid of vegetation, except trees) (Answer "0" if no seasonal zone)	5	>80 = 0 60-80 =.2 40-60 =.4 20-40 =.6 1-20 =.8 0 = 1.0	0.8	pp-G sp-H
Percent of site that is inundated permanently and contains emergent, floating, or submersed plants (p. 72)	<1	0 = 0 1-10 =.9 >10 = 1.0	0	i-A
		0 = 0 1-10 =.4 10-30 =.8 30-60 = 1.0 60-90 =.9 >90 =.6	0	bw-F
Percent cover of herbs within the seasonal zone (p. 72)	90	0 = 0 1-30 =.1 30-50 =.6 50-70 =.75 70-100 = 1.0	1	at-L
Percent of whole site that has closed canopy (p. 80)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-C
Percent understory shrub & vine cover beneath the drip line of trees (p. 82) (Answer "0" if no wooded areas)	0	<10 =.1 10-20 =.2 20-40 =.4 40-60 =.6 60-80 =.8 >80 = 1.0	0.1	sb-D

Number & distribution of vegetation forms --- herbs, shrubs, trees. If only one form, answer "A". To count, the patch must comprise >0.5 acre or >5% of vegetated area. See p. 77 for enlargement of diagram.  	B2	A = 0 B2 =.60 C2 =.65 B1 =.70 C1,D =.75 E2 =.80 F2 =.85 E1 =.90 F1 =.95 G = 1.0	0.6	pp-B v-B at-J i-K sb-H
Number of woody species (p. 82)	1	unwooded= 0 1-2 =.1 3-4 =.25 5-6 =.5 7-9 =.75 10-18 =.9 >18 = 1.0	0.1	sb-E
Number of native woody species (p. 78)	1	0 = 0 1 =.1 2-3 =.25 4-5 =.5 6-9 =.75 10-13 =.9 >14 = 1.0	0.1	v-F
Percent of woody species list consisting of species that are native (p. 78)	100	0 = 0 1-57 =.1 58-66 =.25 67-74 =.5 75-79 =.75 80-99 =.9 100 = 1.0	0	v-g
Percent of woody cover within stratum that is comprised of non-native species (p. 82) (Use the greater of the tree, understory shrub, or open shrub stratum's percent)	<1	100 = 0 80-99 =.1 30-79 =.25 10-29 =.5 5-9 =.75 1-4 =.9 0 = 1.0	1	v-H
Spatial predominance of non-native herbs (p. 84) A = Non-natives predominate B = Cannot determine (about equal) C = Natives predominate	a	A = 0 B =.5 C = 1.0	0	v-D

Percent of herb species list comprised of species that are non-native (p. 80)		100 = 0 80-99 =.1 67-79 =.25 60-66 =.5 25-59 =.75 1-24 =.9 0 = 1.0	0.1	v-E
Average diameter (inches) of the 3 largest trees. (p. 71)		none = 0 1-5 =.1 6-9 =.25 10-17 =.5 18-25 =.75 26-35 =.9 >35 = 1.0	0.5	sb-G v-J at-I n-F
Number of deadwood types. Potentially 12 types: (p. 77) ___ Class 1: freshly fallen, have bark & branches, 4-8" ___ Class 1: freshly fallen, have bark & branches, 8-20" ___ Class 1: freshly fallen, have bark & branches, >20" ___ Class 2: mildly rotted and mostly on ground: 4-8" ___ Class 2: mildly rotted and mostly on ground: 8-20" ___ Class 2: mildly rotted and mostly on ground: >20" ___ Class 3: well rotted, losing shape: 4-8" ___ Class 3: well rotted, losing shape: 8-20" ___ Class 3: well rotted, losing shape: >20" ___ Standing stumps/snags: 4-8" ___ Standing stumps/snags: 8-20" ___ Standing stumps/snags: >20" ___ Artificial debris – check only if no others present  	none	0 = 0 1 =.1 2 =.25 3-4 =.5 5-7 =.75 >7 = 1.0	0	sb-F v-I n-E at-H
Land cover in the vicinity of the site in the 1850's was wooded?	yes	1 = Yes 0 = No	1	n-K pp-H at-R sb-S v-S

GEOTECHNICAL REPORT

Pedestrian Bridge Mill Race Path

Springfield, Oregon

Prepared for:

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Prepared by:

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December 23, 2014

Project No. 4-61M-127902

GEOTECHNICAL REPORT
Mill Race Path
Springfield, Oregon

1.0 SITE AND PROJECT DESCRIPTION

Development plans call for constructing a stormwater treatment facility at the project site. The proposed treatment facility would include a stormwater treatment pond, overflow swale, inlet weir, and outflow structures. A trail system is to be developed as part of the project, which will include a pedestrian bridge spanning the swale area. This bridge is anticipated to be a single span. The enclosed *Geotechnical Field Exploration Plan* (Figure 1) illustrates the area of the planned bridge crossing in relation to other nearby features. The precise location and orientation of the bridge is not known at this time, but is generally to be located in the vicinity of borings B-1-Path and B-2- Path.

The conclusions and recommendations contained in this report are based on our understanding of the currently proposed utilization of the project site, as derived from layout drawings, written information, and verbal information supplied to us. Consequently, if any changes are made in the currently proposed project, we may need to modify our conclusions and recommendations contained herein to reflect those changes.

2.0 EXPLORATORY METHODS

We explored surface and subsurface conditions at the project site on March 6, 2014. Our exploration and testing program comprised the following elements:

- A visual surface reconnaissance of the site;
- Two borings (designated B-1-Path and B-2-Path), advanced at strategic locations on the site;
- A review of previous borings and test pit explorations made at the site; and
- A review of published geologic and seismologic maps and literature.

Figure 1 depicts the approximate locations of recent AMEC explorations and previous explorations completed for the pond design. The specific number, locations, and depths of our explorations were selected in relation to the existing and proposed site features, under the constraints of surface access, underground utility conflicts, and budget considerations. The location and ground surface elevation of each exploration was determined by hand-held GPS methods. Consequently, the locations depicted on Figure 1 and elevations presented in this report should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

It should be realized that the explorations performed and utilized for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

Our exploratory borings were advanced through the soil using a truck-mounted drill rig operated by an independent drilling firm working under subcontract to AMEC. The upper portion of each boring was advanced using hollow stem auger methods, so that the depth to groundwater could be measured during drilling. The driller switched to mud rotary methods below the observed water table to reduce the risk of heave and sample disturbance. A geotechnical engineer from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our office for further visual examination. After each boring was completed, the borehole was backfilled with a mixture of bentonite chips and soil cuttings.

Throughout the drilling operation, soil samples were obtained at 2½- to 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM:D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

The enclosed *Boring Logs* describe the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our previous laboratory testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted.

3.0 SITE CONDITIONS

The following sections of text present our observations, measurements, findings, and interpretations regarding surface, soil, groundwater, and seismic conditions at the project site.

3.1 SURFACE CONDITIONS

The surface of the site was fairly flat-lying, and generally covered by gravelly fill. No surface water was observed at the time of our field work.

3.2 SOIL CONDITIONS

According to published geologic information, regional geology consists of Willamette and McKenzie River alluvium overlying marine sediments of siltstone and sandstone and basaltic material from the Little Butte volcanic series. The alluvium is estimated to be about 50 feet thick locally. The alluvium consists of interbedded sands and gravels with some layers of silt and clay.

Previous on-site explorations revealed somewhat variable near-surface soil conditions but confirmed the mapped stratigraphy. In general, these explorations encountered a gravelly fill layer overlying clays and sandy gravels. In our two recent borings, the fill ranged from 2 to 4 feet thick and was comprised of dense, sandy gravel with cobbles, some silt and trace organic woody debris. The near surface fill was underlain by a 17- to 19-foot thick sequence of native, soft to medium stiff, silty clay. Beneath the clay at a depth of about 20 feet, the borings encountered dense gravel. The gravel was underlain by siltstone bedrock at a depth of 37 to 40 feet below ground surface.

The enclosed exploration logs provide a detailed description of the soil strata encountered in our subsurface explorations. Table 1 summarizes the approximate thicknesses, depths, and elevations three of selected soil layers.

Table 1 Approximate Thicknesses, Depths, and Elevations Three of Soil Layers Encountered in Explorations

Exploration	Thickness of Gravel Fill (feet)	Thickness of Clay (feet)	Depth of Native Gravel (feet)	Elevation of Native Gravel (feet)
B-1-Path	3	17	19.5	448.8
B-2-Path	4	16	20	449.4

Elevation datum: NAVD 88.

3.3 GROUNDWATER CONDITIONS

At time of the recent explorations (March 6th, 2014), groundwater was encountered at 16.5 feet below ground surface in boring B-1-Path (elevation 451.5 feet), and at 19.5 feet below ground surface in

boring B-2-Path (elevation 449.5 feet). As mentioned, these borings were advanced with hollow stem auger methods to identify this first occurrence of groundwater. These groundwater levels were monitored and allowed to equilibrate for approximately ½ hour. The drilling method was then switched over to mud rotary to avoid sample disturbance and heaving when drilling below the groundwater table. We interpreted this groundwater to be perched within or atop the clay unit. Similar perched groundwater was encountered in previous explorations for the pond to the east, as high as elevation 464 feet.

The clay unit is underlain by sandy gravel, which is interpreted to be water bearing, at least locally confined. The gravel in previous boring B-2 was encountered at 20 feet below ground surface; however, the water level in this boring rose to 16.4 feet below ground surface.

Because our explorations were performed during an extended period of generally alternating dry and wet weather (due to a generally relatively dry January), the groundwater conditions present at that time may closely represent the average levels; somewhat lower levels probably occur during the summer and early fall months, whereas higher levels probably occur during a normal, non-drought winter and early spring months. Throughout the year, groundwater levels would likely fluctuate in response to changing precipitation patterns, construction activities, and site utilization.

3.4 SEISMIC CONSIDERATIONS

Based on our analysis of subsurface exploration logs and our review of published geologic maps, we interpret the on-site soil conditions to correspond to a seismic Site Class D, as defined by the 2012 American Association of State Highway and Transportation Officials (AASHTO) Guide Specifications for LRFD Seismic Bridge Design. Seismic design parameters were determined for this site latitude and longitude using an earthquake ground motion with a 7.5% probability of exceedance in 75 years (a 1,000-year return interval). The results are as follows:

Table 1 AASHTO LRFD Seismic Parameters

Design Parameter	Recommended Value
Site Class	D
PGA	0.176g
S_s	0.425
S_1	0.198
F_{PGA}	1.448
F_A	1.460
F_V	2.008

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 BRIDGE OPTIONS

We understand development plans call for construction of a pedestrian bridge across the pond area. We considered three basic foundation support options, depending on the span length of the pedestrian bridge. These are illustrated in Figure 2, and discussed below.

Suitable Bearing Horizon: The foundations for the bridge will need to penetrate through the upper clay soils, and gain support from the dense gravel at depth, encountered at elevation 448 to 449 feet in our two borings.

Long Span Bridge/ Deep Foundation: For a long span bridge, with abutments at or near top of slope, the dense gravel bearing horizon would be 20 feet or more below grade. A deep foundation system would be required to support the bridge abutments. The deep foundation would typically consist of a group of driven piles or drilled shafts that penetrate several feet into the gravel bearing stratum.

Intermediate Span Bridge/ Intermediate Foundation: For a bridge of intermediate span length, with abutments located in a mid-slope location, the depth to the suitable bearing stratum would be about 8 to 20 feet. For this intermediate case, it will typically be more economical to improve/ reinforce the soft clay by installation of an array of aggregate piers, and then constructing a shallow foundation atop the improved ground.

Short Span Bridge (or Culvert)/ Shallow Foundation: For a shorter span near the base of the slope, the depth to suitable bearing would be less than 8 feet. In this case, it is typically more economical to over excavate the remaining soft, unsuitable clay beneath the foundation. The foundation is either extended down to bear directly on the native dense gravel, or a shallow foundation is constructed on a bearing pad of compacted structural fill. When considering a shorter span, a buried culvert can be considered as an alternative to a bridge.

Recommended Option: For this site, a short span bridge or culvert with shallow foundation is recommended.

4.2 CULVERT DESIGN RECOMMENDATIONS

Bearing Subgrades: The clayey soils underlying most of the site are not well-suited for supporting spread footings for the bridge/ culvert directly, due to their variable density, and moisture sensitivity which could lead to disturbance and softening. Instead, we recommend foundations bear directly upon the dense gravel stratum at depth, encountered at elevation 448 to 449 feet, or upon a compacted structural backfill bearing pad placed directly above the dense gravel layer. Before any bearing pads

are placed, the overexcavation subgrades should be lightly compacted with a static roller to a firm, unyielding condition.

Bearing Pad Materials: We recommend that bearing pads for all footings be composed of well-graded sands and gravels, such as “Selected Granular Material” per ODOT 00330.14, or a partially crushed rock clean aggregate such as “Open-Graded Aggregate” per ODOT 02630.11. All bearing pad soil should be compacted to at least 95 percent of the Standard Proctor maximum dry density (based on ASTM:D-698).

Bearing Pad Dimensions: The thickness of bearing pads will vary, depending on the required overexcavation depth. Because foundation stresses are transferred outward as well as downward into the bearing soils, all bearing pads composed of structural fill soil should extend horizontally outward from the edge of each footing a distance equal to the bearing pad thickness. Therefore, an overexcavation that extends 12 inches below the footing base should also extend 12 inches outward from the footing edges.

Footing Depths and Widths: For frost protection, the bottoms of all footings should bear at least 18 inches below adjacent grades. The top of all foundations should be buried at least 12 inches below grade. In addition, greater embedment may be required to prevent undermining due to scour.

Culvert Design Considerations: For precast culvert design with strip footings bearing upon the dense native gravel or a compacted bearing pad constructed above the native gravel, we recommend using the following AASHTO Load Resistance Factor Design (LRFD) soil design parameters presented in Table 2. The lateral pressures acting on a culvert or bridge abutment will depend on the backfill type. We have provided parameters in Table 2 for use of on-site clay as backfill, assuming compaction to at least 90 percent of ASTM: D 698 compaction can be achieved. Per AASHTO, no dynamic surcharge (expressed as Kae) acts on the wall with clay backfill, owing to the cohesive strength of the clay during short-term seismic loading.

We have also provided parameters for an imported granular (sand) backfill compacted to 90 percent density.

Table 2 AASHTO LRFD Soil Design Parameters for Bridge/ Culvert

Design Parameter	Recommended Value
Backfill Soil Density (pcf) (clay backfill)	110
Coefficient of active earth pressure Ka (clay backfill)	0.35
Coefficient of at-rest earth pressure Ko (clay backfill)	0.52
Coefficient of dynamic active earth pressure Kae (clay)	0.0
Backfill Soil Density (pcf) (sand backfill)	125
Coefficient of active earth pressure Ka (sand backfill)	0.24
Coefficient of at-rest earth pressure Ko (sand backfill)	0.38
Coefficient of dynamic active earth pressure Kae (sand)	0.37[1]
Strength Limit bearing resistance (psf) on gravel[3]	23,000
Service Limit bearing resistance (psf) on gravel[4]	14,000
Strength Limit bearing resistance (psf) on bearing pad[5]	16,500
Service Limit bearing resistance (psf) on bearing pad	5,300
Resistance factor – bearing on gravel	0.45[2]
Ultimate coefficient of friction, gravel to cast-in-place concrete	0.55
Ultimate coefficient of friction, gravel to precast concrete	0.50
Resistance factor – sliding, gravel to cast-in-place concrete	0.80[2]
Resistance factor – sliding, gravel to precast concrete	0.90[2]

1 Assumes level backslope using one half of the peak ground acceleration (1000-year) = 0.09g, where g is the acceleration due to gravity.
2 These factors apply to strength limit state – use 1.0 for service limit state.
3 Bearing on native gravel – footing width of 4 feet.
4 Service Limit for 1 inch settlement
5 On a bearing pad above native gravel equal to or greater than 4 feet thick.

<u>Subgrade preparation for pre-cast culvert foundations:</u> For a culvert base comprised of pre-cast segments, we understand it is critical that the prepared surface is flat with minimal undulations (a maximum tolerance of 0.01 foot was recommended on a previous project). If pre-cast segments are used which require this greater tolerance, we would recommend the following additional measures:

- The upper few inches of backfill should be comprised of a fine crushed rock leveling course. The Contractor may also elect to place an additional layer of clean sand atop the fine crushed surfacing course, to assist in achieving the final grade tolerances. Screed boards may need to be installed parallel to the length of the culvert to level out the surface to meet grade tolerances. The surface to receive the precast segments should be tamped with lightweight compaction equipment, such as small self-propelled smooth drum rollers, or walk-behind plate compactors.
- As an alternative to preparation of the subgrade surface with finer gravel and sand, it would be acceptable to instead place a layer of Controlled Density Fill (CDF) or lean mix concrete above a firm and non-yielding backfill subgrade. The CDF or lean mix concrete may also need to be placed using screed boards to serve as forms and to achieve grade tolerances.

Temporary Dewatering: Temporary construction dewatering may be required using sumps and pumps outside the footprint of the foundations, so that any seepage entering the excavation can be removed and so that the surface of the bearing pad is maintained in a dry condition.

4.3 REINFORCED SOIL WALLS

Reinforced Soil Walls: In our opinion, a reinforced soil wall (also known as a mechanically stabilized earth or MSE wall) can be used for retaining walls along the approaches to each bridge abutment. We offer the following comments and recommendations concerning these walls.

Wall Types: MSE walls consist of structural fill lifts interlayered with reinforcing grids or strips and supported at the face by a reinforcing material or segmental (modular) concrete facade. Suitable options include the proprietary systems produced by Allan Block, Hilfiker, Keystone, Pisa, Stonewall, and VSL, all which are available with decorative segmental concrete facades. If appearance is not a criterion, the Hilfiker grid-face system, which uses welded-wire mesh for the horizontal and facing reinforcement materials will be suitable.

Wall Layout: The wall is to support a 16-foot wide path extending outward from the culvert/ bridge. This will result in “back-to-back” MSE walls. Because this wall is to be constructed across a 3H:1V slope, the MSE wall height will be greatest adjacent to the culvert/ bridge foundation (approximately 15 feet). To limit excavation, it is assumed a stepped or terraced wall foundation would be constructed across the slope, to meet upland areas on each end at approximately elevation 470 feet. The width of each terrace would be determined by the wall designer.

Subgrade Preparation: The entire area beneath the new reinforced soil zone should be stripped of all vegetation and organic soils. All subgrade soils should then be compacted to a firm, unyielding

condition. To provide a stable foundation for the wall, we recommend that the upper 12 inches of subgrade soils beneath the reinforced soil zone be over excavated and replaced with a bearing pad of well-graded sands and gravels, such as “Selected Granular Material” per ODOT 00330.14, or a partially crushed rock clean aggregate such as “Open-Graded Aggregate” per ODOT 02630.11. All bearing pad soil should be compacted to at least 95 percent of the Standard Proctor maximum dry density (based on ASTM:D-698).

Fill Soils: All fill soils located within the reinforced backfill and retained backfill zones should consist a well-graded sand and gravel, meeting the gradation presented in Table 3.

Table 3 MSE Wall Granular Backfill

Sieve Size	Percent Passing
1-1/4 inch	99-100
1 inch	90-100
US No. 4	50-80
US No. 40	30 max.
US No. 200	7.0 max.

All percentages are by weight.

Design Values: Reinforced soil walls with proprietary facades (either segmental concrete or welded-wire mesh) are typically designed by the wall supplier or a specialty consultant, using design values provided by the geotechnical engineer. These design values include soil density, internal friction angle, cohesion, and allowable bearing capacities, as well as seismic acceleration. Table 4 summarizes our recommended design values for the various soils involved in the wall construction, based on our explorations and subsequent interpretations.

Table 4 Soil Design Parameters for MSE Wall

Soil	Unit weight (pcf)	Friction angle Φ (degrees)	Cohesion, c (psf)	Allowable bearing pressure (psf)
MSE Granular Backfill	125	38	0	3,000
Retained Soil (Clay)	110	0	500	1,500
Subgrade Soil (Clay)[1]	110	0	500	1,500
Subgrade Soil (Gravel)	135	42	0	5,000

Bearing Pad Soil over clay or gravel (greater than 1 foot)	130	40	0	2,500

1 Assumes a 1-foot thick layer of bearing pad soil is placed above the clay subgrade.

External Stability: We have checked the external stability of the MSE wall based on the design parameters in Table 3. For MSE wall heights greater than or equal to 12 feet, the foundation should bear directly on the native gravel, or upon a structural fill bearing pad placed directly on the native gravel. For wall heights less than 12 feet, the MSE wall can be founded on the clay subgrade (with a 1 foot thick bearing pad as described previously).

Fill Placement and Compaction: All soils located within the reinforced backfill and retained backfill zones should be placed and compacted in accordance with our recommendations given in the Structural Fill section of this report. Specifically, we recommend that all fill be compacted to a uniform density of at least 90 percent (based on ASTM D-698) and that the upper 2 feet of fill located below future asphaltic pavements be compacted to at least 95 percent.

5.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Consequently, we recommend the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design;
- Prepare a letter summarizing all review comments (if required by the City of Springfield);
- Attend a pre-construction conference with the design team and contractor to discuss important geotechnically related construction issues;
- Provide on-call consultation and review field inspection and testing reports as required;; and
- Prepare a post-construction letter summarizing our review of pertinent field observations, inspections, and test results (if required by the City).

Upon request, we could submit a proposal for providing some or all of these construction monitoring, inspection, and testing services. Such a proposal is best prepared after the project plans and specifications have been approved for construction.

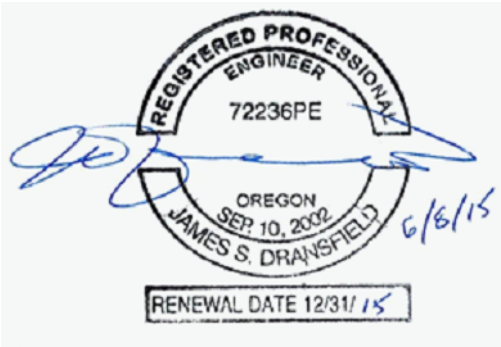
6.0 CLOSURE

The conclusions and recommendations presented in this report are based, in part, on the explorations that we performed for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. AMEC is available to provide geotechnical monitoring, soils testing, and other services throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Sincerely,

AMEC Environment & Infrastructure, Inc.

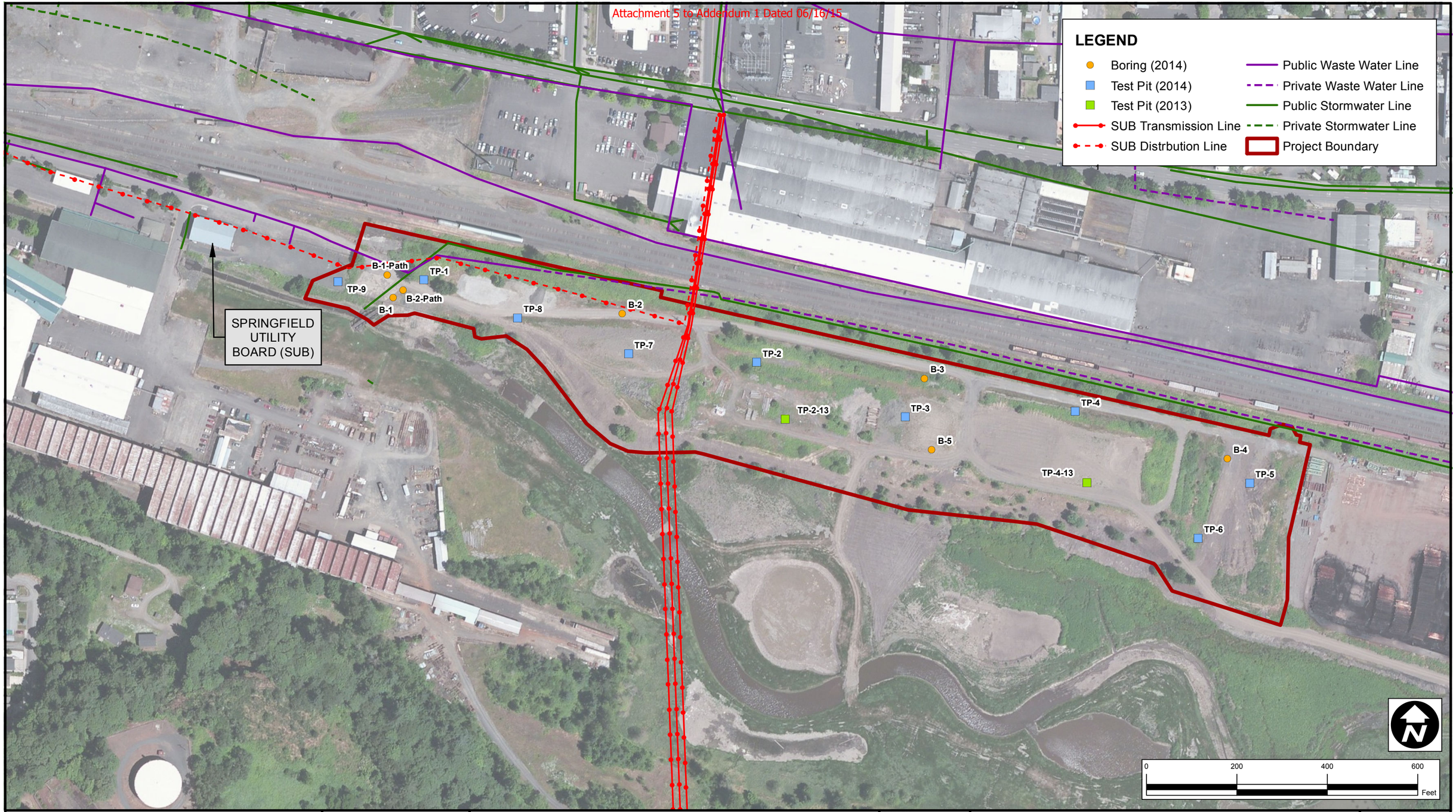


James S. Dransfield, P.E.
Principal Geotechnical Engineer

Reviewed by: Todd D. Wentworth, P.E., L.G.

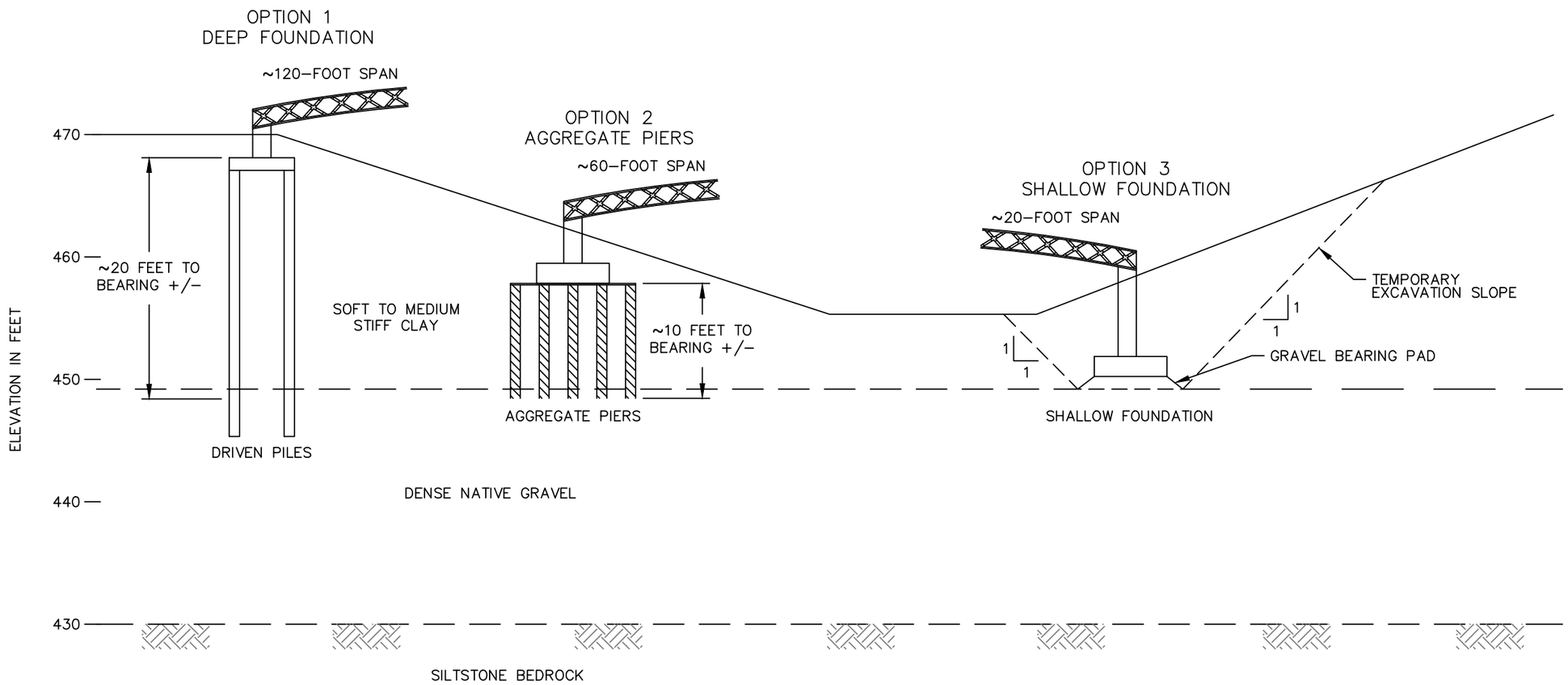
Enclosures: Figure 1 — Geotechnical Field Exploration Plan
Figure 2 — Bridge Options

Boring Logs (4 sheets)



CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: MILL RACE STORMWATER FACILITY	DATE: OCTOBER 2014
	CHK'D BY: DS		PROJECT NO.: 3-61M-12790
AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	DATUM: NAD83	TITLE: GEOTECHNICAL FIELD EXPLORATION PLAN	REV. NO.: X
	PROJECTION: OR SP S. Ft.		FIGURE NO.: 1
	SCALE: 1 inch = 200 feet		

K:\12000\12700\12790\127901\dwg_Geotech_Samples_Testpits_2014\Final Geotechnical Field Exploration Map.mxd - patrick.mccarthy - 10/15/2014 - 2:14:47 PM



OPTION 1: LONG SPAN BRIDGE
FOR ABUTMENTS >20 FEET ABOVE BEARING LAYER, DRIVEN PILE OR DRILLED SHAFTS LIKELY REQUIRED.

OPTION 2: MODERATE SPAN BRIDGE
FOR ABUTMENTS ~8–20 FEET ABOVE BEARING LAYER, IN–SITU GROUND IMPROVEMENT (AGGREGATE PIERS), TO SUPPORT SHALLOW FOUNDATION.

OPTION 3: SHORT SPAN BRIDGE OR CULVERT
FOR ABUTMENTS <8 FEET ABOVE BEARING LAYER, OVEREXCAVATION AND REPLACEMENT WITH GRANULAR BEARING PAD WOULD BE MORE ECONOMICAL. CONSTRUCT SHALLOW FOUNDATION ON DENSE NATIVE GRAVEL, OR BEARING PAD PLACED ABOVE NATIVE GRAVEL.

NOT TO SCALE

CLIENT LOGO	CLIENT:	DWN BY: JRS	PROJECT: SPRINGFIELD PATH BRIDGE	DATE: APRIL 2014
		CHK'D BY: JD		PROJECT NO: 4-61M-12790-2
	AMEC Environment & Infrastructure 11810 North Creek Parkway North Bothell, WA, U.S.A. 98011-8201	DATUM: NONE	TITLE: BRIDGE FOUNDATION OPTIONS	REV. NO.:
		PROJECTION: NONE		FIGURE No. 2
		SCALE: NOT TO SCALE		

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-1-Path*

Location:
Approximate ground surface elevation: 468 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
0	2-inch asphalt covering: Medium dense, moist, sandy, fine GRAVEL with some silt (Fill) GP-GM						
	contact by drilling change						
	Soft, moist, gray, gravelly CLAY with trace sand. Low plasticity (Native) CL						
5			27%	S-1		4	
10	becomes CLAY. Medium plasticity		67%	S-2		4	
15	becomes gray with brown mottles		100%	S-3	P ATD	3	
	contact by gravelly drilling						
20	Dense, wet, gray, sandy, fine to coarse GRAVEL with trace silt/clay (Native) GW		50%	S-4		42	
	caving of hole noted to 25 feet						
25	becomes very dense		33%	S-5		68	
30							

Page 1 of 2

PENETRATION RESISTANCE: ▲ Standard; ## Blows over inches; △ Other; Blows per foot 0 10 20 30 40 50

MOISTURE CONTENT: 0 20 40 60 80 100; Plastic Limit; Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- No Recovery
- P ATD — Perched water level at time of drilling

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O B1-B2.GPJ BOTHELL GEO 2010 B&TP.GDT 4/1/14

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-1-Path*

Location:
Approximate ground surface elevation: 468 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
30	becomes trace fines to clean		70%	S-6		72	
35			33%	S-7		51	
	contact by drilling change SILTSTONE, light gray, weak (friable) unweathered, massive- no apparent structure						
40			100%	S-8		50/5	
45			100%	S-9		50/4	
50				S-10		50/5	
	Boring terminated at approximately 50.4 feet						
55							
60							

Scale: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 (Plastic Limit – Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- No Recovery
- P / ATD — Perched water level at time of drilling

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O B1-B2.GPJ BOTHELL GEO 2010 B&TP.GDT 4/1/14

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-2-Path*

Location:
Approximate ground surface elevation: 469 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard ▲; Blows over inches ##; Other △; Blows per foot)	TESTING
0	Dense, moist GRAVEL with some sand and silt (Fill) GP						
5	Medium stiff, moist, mottled reddish brown and gray, silty CLAY. High plasticity (Native) CH		33%	S-1		6	
10	becomes soft, gray CLAY, medium plasticity		100%	S-2		4	
15	becomes medium stiff		100%	S-3		7	
20	contact by drilling change, becomes gravelly Very dense, wet, gray, fine to coarse GRAVEL with some sand and trace silt. Sub-angular to rounded, well graded. (Native) GW		67%	S-4	P ATD	68	
25			67%	S-5		54	
30							

Page 1 of 2

0 10 20 30 40 50

0 20 40 60 80 100
Plastic Limit MOISTURE CONTENT Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

P ATD Perched water level at time of drilling

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-2-Path*

Location:
Approximate ground surface elevation: 469 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
30	sand fraction of sample becomes coarse		67%	S-6		60	
35	sand fraction of sample becomes well graded		67%	S-7		59	
40	contact by drilling change SILTSTONE, light gray, fresh, unweathered, weak, massive - no apparent structure		100%	S-8		50/6	
45			100%	S-9		50/3	
50	Boring terminated at approximately 50.4 feet		100%	S-10		50/4	
55							
60							

PENETRATION RESISTANCE: ▲ Standard; ##/## Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit — Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

P ATD — Perched water level at time of drilling

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

GEOTECHNICAL ENGINEERING REPORT

City of Springfield Mill Race Stormwater Facility

Springfield, Oregon

Prepared for:

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Prepared by:

AMEC Environment & Infrastructure, Inc.
7376 SW Durham Road
Portland, Oregon 97224

October 16, 2014

Project No. 4-61M-127901

October 16, 2014
4-61M-127901

City of Springfield
225 Fifth Street
Springfield, Oregon 97477

Attention: Molly Markarian, and Jesse Jones, PE

Subject: Geotechnical Engineering Report
Mill Race Stormwater Facility
Springfield, Oregon

Dear Molly and Jesse:

AMEC Environment & Infrastructure, Inc. (AMEC) is pleased to submit this report describing our geotechnical engineering evaluation for the above-referenced project. The purpose of our evaluation was to derive design conclusions and recommendations concerning site preparation, excavations, temporary and permanent slope stability, foundations for storm drainage utilities and structures, and protection of the completed surface from erosion. AMEC previously completed a memo discussing geotechnical considerations as Attachment E in the Springfield Mill Race Stormwater Feasibility Study (3-61M-127900) dated June, 17, 2013.

This report has been prepared for the exclusive use of City of Springfield and their consultants, for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

Sincerely,

AMEC Environment & Infrastructure, Inc.

James S. Dransfield, P.E.
Principal Geotechnical Engineer

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FIGURES

Figure 1 Geotechnical Field Exploration Map

APPENDICES

Appendix A Subsurface Exploration Procedures and Logs
Appendix B Laboratory Testing Procedures and Results

GEOTECHNICAL ENGINEERING REPORT
City of Springfield Mill Race
Springfield, Oregon

1.0 SUMMARY

The following summary of project geotechnical considerations is presented for introductory purposes and, as such, should be used only in conjunction with the full text of this report.

Project Description: Development plans call for constructing a stormwater treatment facility at the project site. The proposed treatment facility would include a stormwater treatment pond, swale, and inlet and outflow structures. This will require cuts on the order of 20 feet alongside existing railroad tracks to the north. The majority of cut and fill slopes will be inclined at 3H:1V (Horizontal: Vertical). There are localized areas where the slope will be as steep as 2H:1V. In the pond area, slopes of 4H:1V are planned.

Exploratory Methods: We explored subsurface conditions by means of five borings and ten test pits advanced at strategic locations across the project site, to depths ranging from about 12 to 27 feet below existing grades. Two of the deep test pits were previously conducted by AMEC in 2013 during our preliminary geotechnical evaluation of the site.

Site History: Based on review of historic air photos dating back to 1944, the site was almost entirely occupied by a former mill pond. There was evidence of separation dikes or access roads in a few locations. The mill pond was subsequently dewatered and backfilled.

Soil Conditions: Soils underlying the subject site generally consisted of gravelly fill overlying a soft to medium stiff clay fill, both with intermixed wood debris, with a combined thickness of about 20 to 25 feet. In some portions of the site, the fill was absent, and a medium stiff clay was encountered. Below the fill and clay, the underlying native soils were typically a dense sand or gravel.

Groundwater Conditions: Groundwater was encountered at depths of about 25 feet below grade in most but not all explorations. Perched groundwater was encountered at a variety of depths and locations throughout the fill.

On-site Soil Considerations: Because the on-site soils are moisture-sensitive and would be readily disturbed when wet, the contractor should install appropriate temporary drainage systems at the construction site and should minimize traffic over exposed subgrades. Ideally, earthwork would be scheduled for the summer and fall months, when drier weather will maximize the potential for reusing on-site soils and when groundwater levels will likely be at their seasonal low.

2.0 SITE AND PROJECT DESCRIPTION

The Springfield Mill Race Stormwater Facility is an undeveloped 14.3 acre parcel located south side of downtown Springfield, Oregon. This parcel consists of a roughly rectangular parcel that measures about 2,100 by 300 feet overall. The Site has been used primarily for storing logs and fill material. Historical aerial photos show the Site was used as a log pond from 1944 through at least 1968. Based on review of historic aerial photos, the pond that formerly occupied the Site had been dewatered and backfilled by 1979. Since acquiring the site in 2005, the Site has been used by the City to store fill materials, and several soil stockpiles are currently scattered throughout the Site. No buildings are currently located on the Site, however there are transmission tower foundations in the central portion of the Site. Site boundaries are generally delineated by Union Pacific rail line to north, an active log yard to the east, the Springfield Mill Race to the south and a Springfield Utility Board (SUB) facility to the west. The enclosed *Geotechnical Field Exploration Map* (Figure 1) illustrates these site boundaries and adjacent existing features.

Development plans call for constructing a stormwater treatment facility at the project site. The proposed treatment facility would include a stormwater treatment pond, swale, as well as inlet and outflow structures. This development will require cuts on the order of 20 feet. Permanent cut and fill slopes inclined at 2H:1V to 3H:1V (Horizontal: Vertical) are planned. Within the proposed pond area, slopes would be flatter, inclined at 4H:1V.

The conclusions and recommendations contained in this report are based on our understanding of the currently proposed utilization of the project site, as derived from layout drawings, written information, and verbal information supplied to us. Consequently, if any changes are made in the currently proposed project, we may need to modify our conclusions and recommendations contained herein to reflect those changes.

3.0 EXPLORATORY METHODS

AMEC explored surface and subsurface conditions at the project site during January 15th and 16th, 2014. An additional test pit (TP-9) was excavated on June 19, 2014. Our exploration and testing program comprised the following elements:

- A visual surface reconnaissance of the site;
- Five borings (designated B-1 through B-5) with Standard Penetration Tests, advanced at strategic locations across the site;
- Nine test pits (designated TP-1 through TP-9), advanced at strategic locations and near the stormwater pond inlet and outlet;
- A review of the logs of two previous deep test pits (TP-2-2013 and TP-4-2013) advanced on the Site for the feasibility study;
- A review of two recent deep borings (B-1-Path and B-2-Path) made at the west end of the Site for a proposed pedestrian bridge;
- Six grain-size analyses (ASTM D422), performed on selected soil samples from beneath the Site. Hydrometer analyses were also conducted on three of these samples;
- Five Atterberg limit determinations (ASTM D4318), performed on selected samples of cohesive soil obtained from beneath the Site;
- Two modified Proctor tests (ASTM D1557), performed on primary soil units encountered across the Site;
- Three unconfined compression tests (ASTM D2166), performed on relatively undisturbed samples of cohesive soil obtained from beneath the Site, including measurement of density (ASTM D2937); and
- A review of published geologic and seismologic maps and literature.

Table 1 summarizes the approximate locations, surface elevations, and termination depths of all pertinent subsurface explorations, and Figure 1 depicts their locations. Appendix A of this report describes our field exploration procedures, and Appendix B describes our laboratory testing procedures.

Table 1 Approximate Locations, Elevations, and Depths of Explorations

Exploration	Location	Surface Elevation (feet)	Termination Depth (feet)
B-1	Near proposed outlet location	465.4	15
B-2	Western portion of Site – proposed overflow swale	469.6	20
B-3	Central portion of Site – proposed overflow swale	475.2	4 (refusal)
B-4	Northeast corner of Site at proposed inlet weir	474.6	3 (refusal)
B-5	Central portion of Site - proposed pond bottom	476.4	25
TP-1	Near proposed outlet location	467.4	14
TP-2	Western portion of Site – proposed overflow swale	478.9	25
TP-3	Central portion of Site - proposed pond slope	475.1	12
TP-4	Eastern portion of Site – proposed access road	469.0	16.5
TP-5	Northeast corner of Site at proposed inlet weir	476.5	23.5
TP-6	Southeast portion of Site - proposed pond slope	475.2	17
TP-7	Western portion of Site - proposed pond slope	474.3	20
TP-8	Western portion - proposed outflow channel slope	469.5	16
TP-9	Western portion - proposed outflow channel slopeSouth slope west end of proposed pond	465	19
TP-2-13	South slope east end of proposed pond	474.2	24.5
TP-4-13	Proposed bridge, near proposed outlet location	474.4	23.5
B-1-Path	Proposed bridge, near proposed outlet location	468	50.4
B-2-Path		469	50.4

Elevation datum: NAVD 88, elevations measured using DGPS relative to National Geodetic Survey bench mark W 94 with elevation of 462.79 feet. Correction of +75.89 applied to GPS reading at exploration each location.

The specific number, locations, and depths of our explorations were selected by AMEC and the City of Springfield. The locations were field-adjusted by AMEC in relation to the existing and proposed site features, under the constraints of surface access, underground utility conflicts, and budget considerations. The location and ground surface elevation of each exploration was determined by hand-held GPS methods. Consequently, the locations depicted on Figure 1 and elevations presented in this report should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

It should be noted that the explorations performed and used for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other locations could vary. Furthermore, the nature and extent of these variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

4.0 SITE CONDITIONS

The following sections of text present our observations, measurements, findings, and interpretations regarding surface, soil, groundwater, and seismic conditions at the project site.

4.1 SURFACE CONDITIONS

The site is currently undeveloped. The surface of the Site is generally covered by gravelly fill. A small area covered by asphalt pavement is located to the west of B-1. There are numerous soil stockpiles across the site. Based on the site plans supplied to us and on surface markings provided by utility locating specialists, the area is traversed by underground sanitary sewer and stormwater lines located near the northern property boundary. The stormwater line crosses the Site near B-1 and TP-1 and leads to the existing outfall at the Mill Race. There are also overhead transmission lines with associated tower foundations in a north- south orientation that traverse the central portion of the site.

4.2 SOIL CONDITIONS

According to published geologic information, regional geology consists of Willamette and McKenzie River alluvium overlying marine sediments of siltstone and sandstone and basaltic material from the Little Butte volcanic series. The alluvium is estimated to be about 50 feet locally, and is described to consist of interbedded sands and gravels with some layers of silt and clay. On-site explorations revealed somewhat variable near-surface soil conditions but confirmed the mapped stratigraphy. In general, these explorations encountered a gravelly fill layer overlying clays and sandy gravels. Deeper borings encountered the siltstone bedrock. A more detailed description of the major soil layers follows.

Gravelly Fill: The gravelly fill ranged from 2 to 4 feet thick in most of our explorations and was comprised of dense, sandy gravel with cobbles, some silt and trace organic woody debris. Exceptions were test pits TP-1, TP-2 and boring B-5, where the gravelly fill thickness was 8 to 10 feet. Borings B-3 and B-4 met refusal within the gravel fill at 3 to 4 feet below grade, so that a total thickness could not be determined. The near surface gravelly fill layer has been noted to contain cobbles, boulders and concrete debris up to three feet in diameter and wood debris (wood chips, branches, logs, and dimensional lumber) in some areas on the Site. The fines (silt and clay) content in the gravelly fill also varies across the Site.

Clay Fill: The near surface gravelly fill was underlain by medium stiff to stiff, silty clay with trace to abundant wood debris, interpreted to be a fill, based on the presence of intermixed wood debris, wood fibers, rock layers, building materials or metal debris. The clay fill unit varied between 16 and 18 feet in thickness where it was fully penetrated. Based on SPT results, the clay is soft to medium stiff.

Native Clay: No evidence of debris was encountered in the clay unit within test pits TP-4 and TP-8, and at depth in TP-7, suggesting that areas around the former mill pond on the Site were underlain by native clay. A historic air photo indicates there may have been separation berms between pond cells where the underlying clay was not removed during original pond excavation. The native clay otherwise appeared similar in composition to the clay fill.

Native Gravel: The clay unit is underlain by a sandy gravel with varying amounts of silt. The top of this layer was encountered at or a few feet below the planned deepest pond excavations.

Bedrock: Deeper borings made for the pedestrian bridge encountered a siltstone bedrock at approximately elevation 430 feet, roughly 25 feet below pond bottom. The siltstone was moderately weathered and friable.

The enclosed exploration logs provide a detailed description of the soil strata encountered in our subsurface explorations. Table 2 summarizes the approximate thicknesses, depths, and elevations three of selected soil layers.

Table 2 Approximate Thicknesses, Depths, and Elevations of Soil Layers Encountered in Explorations

Exploration	Thickness of Gravel Fill (feet)	Thickness of Clay (Fill or native) (feet)	Depth of Native Gravel (feet)	Elevation of Native Gravel (feet)
B-1	4	>15	N/E	N/E
B-2	4	16	20	449.6
B-3	>4	N/E	N/E	N/E
B-4	>3	N/E	N/E	N/E
B-5	8	17	25	451.4
TP-1	8.5	>5.5	N/E	N/E
TP-2	10	>15	N/E	N/E
TP-3	2.5	>8.5	N/E	N/E
TP-4	3.5	>12.5	N/E	N/E
TP-5	4	18	22	454.54
TP-6	6	>9	N/E	N/E
TP-7	8	>12	N/E	N/E
TP-8	3	>13	N/E	N/E
TP-9	5	12	17	448
TP-2-2013	2	20	22	452.2
TP-4-2013	4	17	21	453.4
B-1-Path	3	16.5	19.5	448.5
B-2-Path	4	16	20	449

Elevation datum: NAVD 88, elevations measured using DGPS relative to National Geodetic Survey bench mark W 94 with elevation of 462.79 feet. Correction of +75.89 applied to GPS reading at exploration each location.

N/E = not encountered within depth of exploration but likely present at greater depth.

Our geotechnical laboratory tests are summarized in Table 3. The upper gravelly soils had highly variable gradation. Testing of the clay fill (which comprised the majority of soils that will be encountered in the site excavation) indicated unconfined compressive strengths ranging from 1,410 to 2,570 psf, indicative of a medium stiff to stiff consistency.

The moist unit weights for the clay fill ranged from 108 to 113 pounds per cubic foot (pcf). There was less variation in moisture content within the native clay soils than the fill soils, but otherwise soil properties of the native and fill clays were found to be similar. Atterberg limits from the clays were measured with the liquid limit ranging from 53 to 73 percent, plastic limit between 23 and 31 percent, and plasticity index in the range of 24 to 42 percent. A Proctor moisture-density determination was performed on a bulk sample of the clay, which indicated an optimum moisture content of 20 percent with a maximum dry density of 101.5 pcf. The natural moisture content of the clay was between 23 to 55 percent, and we interpret the clay to be above the optimum moisture content required to achieve compaction if placed as fill.

The enclosed laboratory testing sheets in Appendix B graphically present our test results, and Table 3 summarizes these results.

Table 3 Summary of Laboratory Test Results

Soil Type and Source	Moisture Content (percent)	Gravel Content (percent)	Sand Content (percent)	Silt+Clay Content (percent)	Clay Content (percent)
Gravelly fill	8-10	63-70	14-20	16-17	N/T
Clay (fill)	23-55	0-35	0-41	24-100	N/T
Clay (native)	34-45	0	8-9	91-94	36-38
Gravel (native)	10-24	76	14	10-26	N/T

N/T not tested

4.3 GROUNDWATER CONDITIONS

At time of the explorations (January 15th and 16th, 2014), groundwater or seepage zones were noted in five test pits (TP-2, TP-3, TP-5, TP-6, and TP-8) and one boring (B-2) at depths ranging from 4 to 20 feet below ground surface (bgs) and at elevations ranging from 472.6 to 453.2 feet. Seepage was observed in test pit TP-9 (excavated on June 19, 2014) at 18 feet bgs, elevation 447 feet. We interpret this groundwater to be perched within or atop the clay unit in four of the test pits where groundwater was encountered. Laterally discontinuous gravel layers within the clay unit that contained significant quantities of perched groundwater were encountered at 11 feet in TP-3 and 14 feet in TP-6. Localized perched groundwater was also encountered in wood debris layers within the clay unit or atop the clay unit in TP-2 and TP-7. The clay unit is underlain by a water-bearing sandy

gravel at 17 to 25 feet bgs (elevation from 448 to 454.5 feet). This water bearing zone appears to be at least locally confined. The gravel in B-2 was encountered at 20 feet bgs; however, the water level in this boring rose to 16.4 feet bgs in the borehole after approximately ten minutes. Table 4 summarizes the approximate depths where groundwater was encountered in our explorations.

Because our explorations were performed during an extended period of generally alternating dry and wet weather (due to a generally relatively dry January), the groundwater conditions present at that time may closely represent the average levels; somewhat lower levels probably occur during the summer and early fall months, whereas higher levels probably occur during a normal, non-drought winter and early spring months. Perched groundwater probably forms atop the clay horizon during periods of heavy rainfall. Perched groundwater develops when the vertical infiltration of water through a shallow, more permeable soil is slowed by a deeper, less permeable soil. Throughout the year, groundwater levels would likely fluctuate in response to changing precipitation patterns, construction activities, and site utilization.

Table 4 Approximate Depths and Elevations of Groundwater Encountered in Explorations

Exploration	Depth of Groundwater (feet)	Elevation of Groundwater (feet)	Date of Measurement
B-2	16.4	453.2	1/15/2014
TP-2	4	474.9	1/16/2014
TP-3	2.5	472.6	1/16/2014
TP-3	11	464.1	1/16/2014
TP-5	20	456.5	1/16/2014
TP-6	14	461.2	1/16/2014
TP-7	10	464.3	1/16/2014
TP-8	14	469.5	1/16/2014
TP-9	18	447	6/19/2014

Note – these observations were made at time of drilling/ excavation. No wells were installed.

4.4 SEISMIC CONDITIONS

The soils beneath the site consist of soft to medium stiff clays over dense sands and gravels, all underlain by siltstone bedrock at depth. In accordance with the 2009 *International Building Code*, we recommend using Site Class D. The soils are not likely to liquefy during an earthquake due to the fine grained nature of the upper silt/clay soils, and the higher density of the sands and gravels at depth. Based on review of IBC maps and more detailed USGS hazard mapping[1], AMEC recommends using the following parameters:

Table 5 IBC 2009 Seismic Design Parameters[1]

Parameter	Values
Site Class	D
S_s	0.645
S_1	0.308
F_A	1.284
F_V	1.783
S_{DS}	0.552
S_{D1}	0.367
PGA	0.22 (S_{DS}/2.5)

1 http://earthquake.usgs.gov/designmaps/us/application.php

5.0 SLOPE STABILITY ANALYSIS

We have evaluated the stability of the proposed slopes planned for this project, under representative conditions. The following sections describe our method of analysis and present our results.

5.1 METHOD OF ANALYSIS

Slope stability analyses typically involve five basic slope parameters: (1) location and shape of the potential failure surface, (2) internal friction angle of the various soils, (3) cohesion of the various soils, (4) density of the various soils, and (5) location of the piezometric groundwater surface. Unfortunately, few of these parameters are accurately known at the start of an analysis. Instead, these parameters usually must be estimated, interpreted, and/or assumed on the basis of visual observations, field testing, laboratory testing, empirical correlations, and experience with similar soil types.

Once all five parameters have been tentatively established, the critical slip surface and associated safety factor of a given slope can be calculated. A critical slip surface is defined as the most likely surface along which a soil mass will slide, and a safety factor is defined as the ratio of the sum of all moments resisting slope movement versus the sum of all moments tending to cause slope movement. Consequently, a slope that possesses a safety factor of 1.0 is on the verge of sliding, whereas a slope with a safety factor greater than 1.0 has some resistance to sliding. The US Army Corp of Engineers provides recommended safety factors for dams and levees. The range of values discussed are presented in Table 6. We conservatively used the highest safety factors for each case in our analysis.

Table 6 USACE Minimum Slope Safety Factors[1]

Case	Minimum Safety Factor
End of Construction	1.3
Full Pool/ Steady Seepage	1.4 - 1.5
Sudden Drawdown	1.1 – 1.3
Seismic	1.0 – 1.2

1 Values are the range described in "Slope Stability", USACE, EM-1110-2-1902 (2003), and "Levee Design Manual", USACE, EM-1110-2-1913 (2000)

Slope stability conditions for the project site were analyzed by means of Bishop's Simplified Method of Slices, which utilizes a limit-equilibrium technique. All calculations were performed by means of the computer program SLOPE-W. This program utilizes topographic, soil, and groundwater information input by the user to determine the most critical slip surface.

Our estimated values of internal friction angle, cohesion, and density for each soil layer are listed in Table 7. We elected to analyze the existing slope using a piezometric elevation of 459 feet, which would simulate the groundwater conditions corresponding to "full pool" conditions in the overflow pond. Sudden drawdown conditions were checked by maintaining the groundwater level at elevation 459 feet and dropping the water level to the bottom of pond at elevation 455 feet. Seismic stability was analyzed by applying a horizontal acceleration equal to one-half of the appropriate peak ground acceleration. Based on a peak bedrock acceleration of 0.176 g for the site, we utilized a design value of 0.09 g, where g is the acceleration due to gravity.

Table 7 Estimated Soil Properties for Slope Stability Analysis

Soil Horizon	Elevation Range (feet)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Gravel (Fill)	480 o 472	125	0	34
Clay (Fill and Native)	472 to 453	111	700	0
Gravel (Native)	453 to 430	140	0	38

Groundwater assumed to be at elevation 459 feet during construction, and elevation 464 feet for all other cases.

5.2 RESULTS OF ANALYSIS

Utilizing the aforementioned values, we calculated the safety factors associated with numerous slip surfaces. We subsequently found that the minimum safety factor corresponds with a roughly circular slide surface that exits near the slope toe. As presented in Tables 8, 9, and 10, all slope inclinations meet or exceed the recommended safety factors, for each case of hydraulic and seismic loading evaluated.

Table 8 Calculated Safety Factors for 4H:1V Pond Slopes

Type of Analyses	Calculated Minimum Factor of Safety	USACE Minimum Factor of Safety
End of construction (Pond bottom at elevation 453 feet)	2.4	1.3
Steady State Seepage (Full pool at elevation 459 feet)	2.4	1.5
Sudden Drawdown (Pool level dropped to elevation 453 feet)	2.3	1.3
Earthquake (kh=0.09 g) at Full pool	1.7	1.2

Table 9 Calculated Safety Factors for 3H:1V Swale Slopes

Type of Analyses	Calculated Minimum Factor of Safety	USACE Minimum Factor of Safety
End of construction (Slope bottom at elevation 455 feet)	2.2	1.3
Steady State Seepage (Full “pool” at elevation 457 feet)	2.1	1.5
Sudden Drawdown (Pool level dropped to elevation 455 feet)	1.6	1.3
Earthquake (kh=0.09 g) at Full pool	1.6	1.2

Table 10 Calculated Safety Factors for 2H:1V Swale Slopes

Type of Analyses	Calculated Minimum Factor of Safety	USACE Minimum Factor of Safety
End of construction (Slope bottom at elevation 457 feet)	1.8	1.3
Steady State Seepage (Full “pool” at elevation 459 feet)	1.8	1.5
Sudden Drawdown (Pool level dropped to elevation 457 feet)	1.5	1.3
Earthquake (kh=0.09 g) at Full pool	1.5	1.2

With most slopes, a lower safety factor is found when considering a thin surficial slide plane that lies roughly parallel to the slope surface. This sliding mode represents surficial raveling and indicates that the soil becomes more slide-resistant with depth. This is typically addressed by compaction of the surface, and maintenance of the slope until a hardy vegetative grass cover becomes established.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Development plans call for excavation to create a stormwater treatment pond, and inlet weir and outflow structures. We offer the following general geotechnical conclusions and recommendations concerning this project.

- Permanent Slopes: Slopes interior to the wetted pond should be inclined at 4H:1V or flatter. Cut and fill slopes along the swale outside the pond area would be stable with slope inclinations of 3H:1V or flatter. Cut slopes along the swale would be stable with slope inclinations of 2H:1V or flatter. The outer surface of the slopes is typically subject to softening that can lead to raveling and erosion until vegetation becomes fully re-established. The use of flatter slope inclinations will improve overall slope stability and allow vegetation to become established more readily, and these flatter slopes will be easier to maintain, so that the risk of surficial erosion is reduced.
- Foundation Options: Ideally, to provide the maximum allowable bearing capacity and minimum settlement, the proposed inlet and outlet structures, weir and manhole should be supported by conventional spread footings constructed directly upon the dense native gravels at depth, or upon a bearing pad of compacted granular fill placed directly above the dense native gravel. For structures that can tolerate the risk of some additional settlement, we would recommend foundations be constructed upon a minimum 1-foot thick pad of granular fill above a prepared clay subgrade.
- Retaining Wall Options: In our opinion, conventional backfilled, cast-in-place concrete walls will adequately support the proposed wing walls for the inlet and outlet structures. These walls should be designed to withstand appropriate lateral pressures, as discussed below.
- On-site Soil Reuse: Most of the on-site soils are highly moisture-sensitive and susceptible to disturbance when wet. The clay soils are above their optimum moisture content and will need to be dried by active discing and aerating during hot dry weather to allow re-use as structural fill. To maximize the potential for reusing on-site soils as structural fill, earthwork should be scheduled for periods of dry weather, such as that usually occurring during the summer and early fall months.
- Subgrade Protection: Due to the moisture-sensitive nature of the on-site soils, the contractor should install appropriate temporary drainage systems to keep water out of the construction areas, and should minimize traffic over any subgrades prepared within these soils.

The following text sections of this report present our specific geotechnical conclusions and recommendations concerning site preparation, excavation, foundation preparation, and placement

and compaction of structural fill. American Society for Testing and Materials (ASTM) specification codes cited herein refer to the current ASTM manual. Oregon State Department of Transportation (ODOT) specification codes and plan designations cited herein refer to the 2008 Oregon Standard Specifications for Construction, Volume 2- Technical Specifications.

6.1 SITE PREPARATION

Preparation of the Site will involve demolition, temporary drainage, clearing, stripping, cutting, filling, excavations, erosion control, dewatering, and subgrade compaction. The paragraphs below discuss our geotechnical comments and recommendations concerning site preparation.

Demolition: The first step in site preparation will likely consist of removing waste soil stockpiles. Any existing underground structural elements or utilities, such as old footings, stemwalls, and drainpipes, should be exhumed as part of this demolition operation.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Nonetheless, we anticipate that curbs, berms, or ditches placed around the uphill side of the work areas will adequately intercept surface water runoff.

Clearing and Stripping: After surface and near-surface water sources have been controlled, the construction areas should be cleared and stripped of any vegetation, sod, and any existing stockpiles of topsoil, debris, asphalt, and concrete.

Erosion Control Measures: Because stripped surfaces and soil stockpiles are typically a source of runoff sediments, they should be given particular attention. If earthwork occurs during wet weather, we recommend that all stripped surfaces be covered with straw to reduce runoff erosion. Similarly, soil stockpiles and cut slopes should be covered with plastic sheeting for erosion protection. We also recommend that a staked silt fence be installed around the area to be disturbed. The base of the silt fence should be buried so that sediment cannot pass beneath it, and the silt fence should be inspected and maintained during the time that the site soils are exposed, on a periodic basis, and after any major rainstorm event. It may be prudent to maintain a berm and swale around the downslope side of stripped areas and stockpiles in order to capture runoff water and thereby reduce the downslope sediment transport. In addition, the stripped areas should be revegetated as soon as possible, also reducing the potential for erosion.

Site Cutting: We anticipate that grading plans will call for cutting as deep as about 20 to 25 feet in the topographically high areas of the site, to achieve design subgrades for the new pond, swale and other land features. Based on our explorations, we expect that these cuts will encounter gravelly and mixed debris fill over clay fill. Our explorations encountered rubble within the fill soils which could impede excavation in localized areas. In general, the site soils can likely be cut with conventional earthworking equipment such as scrapers and trackhoes. Our conclusions regarding the reuse of on-site soils are presented subsequently.

Dewatering: Our explorations encountered perched groundwater at variable depths across the site. Therefore intermittent zones of seepage will likely be encountered on face of cut slopes. A more consistent groundwater table was encountered near the lowest planned grades, but we expect that seepage volumes could increase and groundwater levels could rise several feet during the winter and spring. Consequently, site excavations might extend below the groundwater level, depending on the actual excavation depth and time of year.

If groundwater is encountered, we anticipate that an internal system of ditches, sumpholes, and pumps will be adequate temporarily to dewater the excavation. An experienced dewatering contractor should design this type of an external system after being allowed to review our exploration logs.

Temporary Slope Safety Considerations: The stability of temporary excavation slopes is a function of many factors, including soil type, soil density, slope inclination, slope height, the presence of groundwater, and the duration of exposure. Generally, the likelihood of slope failure increases as the cut is deepened and as the duration of exposure increases. For this reason, we recommend that the contractor maintain adequate slopes and/or setbacks. Temporary slope safety should remain the responsibility of the contractor, who is continually present at the site and is able to monitor the performance of the excavation and modify his activities to reflect varying conditions. In all cases, cut-slope inclinations should conform to applicable governmental safety guidelines.

Temporary Cut Slopes: All temporary cut slopes associated with site regrading or excavations should be adequately inclined to prevent sloughing and collapse. For the various soil layers that will likely be encountered, we recommend the following maximum cut slope inclinations, which apply to slopes up to 20 feet in height. However, appropriate inclinations will ultimately depend on the actual soil conditions exposed during earthwork.

Soil Type	Expected Depth Interval	Maximum Inclination
Surficial gravel (fill)	0 to 5 feet	1H:1V
Clay (fill)	5 to 20 feet	1.5H:1V
Clay (native)	5 to 20 feet	1H:1V
Native Gravel	Below 20 feet	1H:1V

Subgrade Compaction: Exposed subgrades for retaining wall footings, pavements, or other structures should be compacted with a large static (non-vibratory) roller to a firm, unyielding state. Any localized zones of loose granular soils observed within a subgrade should be compacted to a density commensurate with the surrounding soils. In contrast, any organic, soft, or pumping soils observed within a subgrade should be overexcavated and replaced with a suitable structural fill material.

Site Filling: We understand that grading plans call for filling by as much as 4 to 5 feet for the overflow berm. Minor fill thicknesses are also planned along topographically low areas of the planned path. Our conclusions regarding the reuse of on-site soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fill should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, all embankment fill soil should be compacted to a uniform density of at least 90 percent (based on ASTM D-1557. Note – this is roughly equivalent to 95 percent of the AASHTO T-99 standard as presented in City of Springfield Stormwater Design Standards).

On-site Soils: Because large cuts are planned for the project, we expect that large quantities of on-site soils will be generated during earthwork activities, which would be a potential source for on-site fills. We offer the following evaluation of these on-site soils in relation to potential use as structural fill.

- *Surficial Gravel Fill Soils*: The upper fill soils are mixed and generally contained moderate amounts of silt and intermixed debris. These materials are generally not considered suitable for reuse as structural fill. However, zones of the fill may be more granular in nature and could be stockpiled for use as fill sources, although some screening or segregation of debris might be needed. Any upper fill containing sod, topsoil or other organics are *not* suitable for use as structural fill under any circumstances, due to their long-term compressibility. Consequently, any organic materials can be used only for non-structural purposes, such as in landscaping areas.
- *Clay (Fill)*: Major portions of the clay on-site was found to contain wood and other debris, and is not considered suitable construct overflow berm fill embankments. This material should need to be removed from the site, or used for non-structural purposes, such as in landscaping areas.

- *Clay (Native)*: The native portions of the clay on-site were found to be free of wood and other debris, and has a gradation that would be suitable source to construct new overflow berm fill embankments. This organic-free portion of the clay will need to be identified during mass grading and stockpiled separately. While the native clay soils were generally drier than the clay (fill) soils, they do not appear suitable for reuse as structural fill at their present moisture contents. These soils may become suitable for reuse during a period of dry weather if they can be aerated to reduce their moisture content. The native clay soils would not be recommended for use as fill below path areas due to their high plasticity, unless capped by a minimum 2 foot thick layer of free-draining granular fill.
- *Gravel (Native)*: The gravel encountered at depth would be suitable for reuse as structural fill. However, only limited excavations will extend deep enough to encounter this layer. In some areas, the gravels may be saturated, and would therefore require aerating and drying to reuse as structural fill.

Wet-Weather Considerations: As discussed above, most or all the on-site soils would be difficult to reuse as structural fill during wet weather. Consequently, the project specifications should include provisions for using imported fill meeting the desired gradation in case site filling must proceed during wet weather. For constructing pond berms, the City of Springfield Stormwater Design Standards require a material with a minimum of 30 percent clay, maximum of 60 percent sand and maximum of 60 percent silt. For general structural fill purposes such as below paths and as structural fill bearing pads beneath structure foundations, we recommend using a well-graded sand and gravel, such as "Selected Granular Material" per ODOT 00330.14.

Permanent Slopes: All permanent cut slopes and fill slopes should be adequately inclined to minimize long-term raveling, sloughing, and erosion. We generally recommend that cut slopes along the swale be no steeper than 2H:1V. For mixed cut and fill slopes, we recommend slopes not exceed 3H:1V. For slopes within the pond area, 4H:1V or flatter slopes are recommended.

Slope Protection: the long slopes on this site would be subject to surficial rilling and erosion if exposed to sheet flow or concentrated runoff. We recommend that a permanent berm, swale, or curb be constructed along the top edge of all permanent slopes to intercept surface flow. In addition, a hardy vegetative groundcover should be established as soon as feasible, to further protect the slopes from runoff water erosion. Where slope lengths are greater than about 30 feet we would recommend wattles be placed every 10 feet vertically.

6.2 SPREAD FOOTINGS

The main structures to be constructed on this site are the inlet and outlet control structures, and overflow weir and associated guidewalls. In our opinion, conventional spread footings will provide adequate support for the proposed inlet and outlet control structures and walls if the subgrades are properly prepared.

Footing Depths and Widths: For frost and erosion protection, the bottoms of all footings should bear at least 18 inches below adjacent grades. The top of all foundations should be buried at least 12 inches below grade. To minimize post-construction settlements, footings should be at least 18 inches wide; we expect wall footings will be wider to resist overturning.

Bearing Subgrades: The clayey soils underlying most of the site are not well-suited for supporting spread footings directly, due to their variable density, and moisture sensitivity which could lead to disturbance and softening. Ideally, we recommend foundations bear directly upon the dense gravel stratum at depth (encountered at elevation 448 to 452 feet across most of the site, but as shallow as elevation 455 feet on the east end of the site), or upon a compacted structural backfill bearing pad placed directly above the dense gravel layer. This would provide a suitable bearing surface with minimal settlement.

However, it may not be practical to reach the ideal bearing elevations with conventional footings. As an alternative if the risk of some settlement can be tolerated, we recommend that footing subgrades be prepared by overexcavating the upper 12 inches of existing soils and replacing them with bearing pads of suitable structural fill. These bearing pads would serve to dissipate foundation stresses uniformly, thereby reducing total and differential post-construction settlement. Before any bearing pads are placed, the overexcavation subgrades should be lightly compacted with a static roller to a firm, unyielding condition. If unsuitable very soft or organic rich soils are encountered at the subgrade elevation, additional overexcavation by 12 inches (for a maximum of 24 inches below the foundation) would be recommended.

Bearing Pad Materials: We recommend that bearing pads for all footings be composed of well-graded sands and gravels, such as “Selected Granular Material” per ODOT 00330.14, or a partially crushed rock clean aggregate such as “Open-Graded Aggregate” per ODOT 02630.11. All bearing pad soil should be compacted to at least 95 percent of the Modified Proctor maximum dry density (based on ASTM:D-1557).

Bearing Pad Dimensions: We anticipate that the bearing pads will need to range from about 12 to 24 inches thick, depending on the required overexcavation depth. Because foundation stresses are transferred outward as well as downward into the bearing soils, all bearing pads composed of

structural fill soil should extend horizontally outward from the edge of each footing a distance equal to the bearing pad thickness. Therefore, an overexcavation that extends 12 inches below the footing base should also extend 12 inches outward from the footing edges.

Bearing Capacities: All footings should be designed with allowable static and seismic soil bearing pressures that correspond to their respective subgrade bearing capacities. Table 11 gives our recommended allowable bearing capacities for various footing subgrade conditions, along with our estimated overexcavation depths relative to the minimum depth required for frost and erosion protection. These capacities incorporate static and seismic safety factors of at least 2.0 and 1.5, respectively. If desired, lower design bearing pressures could be utilized to reduce long-term settlements.

Table 11 Recommended Bearing Capacities for Spread Footings

Bearing Surface	Overexcavation depth	Allowable Static Bearing Capacity (psf)
Bearing Pad over Clay Fill	12 to 24 inches	1,000 psf
Structural Fill over Native Gravel	Varies	3,000 psf
Dense Gravel (Native)	0	4,000 psf

Values may be increased by up to one-third to accommodate transient seismic or other dynamic loading.

Footing Settlements: We estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed 1 inch. Differential settlements could approach one-half of the actual total settlement between adjacent foundation elements. These settlements would be reduced if the actual design bearing pressures are lower than our recommended maximum pressures. As discussed, settlements could be greater for bearing bads constructed above clay fill soils.

6.3 BACKFILLED WALLS

Footing and Stemwall Backfill: To provide erosion protection and lateral load resistance, we recommend that all footing excavations be backfilled on both sides of the footings and stemwalls after the concrete has cured. Either imported structural fill or non-organic on-site soils can be used for this purpose, contingent on a suitable moisture content at the time of placement. Regardless of soil type, all footing backfill soil should be compacted to a density of at least 90 percent (based on ASTM:D-1557).

Curtain Drains: To preclude hydrostatic pressure development behind backfilled retaining walls, we recommend that a curtain drain be placed behind the entire wall. This curtain drain should consist of a clean, uniform, well-rounded gravel such as “Special Filter Material” per ODOT 02610, extending

outward a minimum of 2 feet from the wall and extending upward from the footing drain to within about 12 inches of the ground surface. For walls that do not include a footing drain, we recommend that a 4-inch-diameter perforated drain pipe be installed behind the heel of the wall.

Backfill Soil: Ideally, all retaining wall backfill placed behind the curtain drain would consist of clean, free-draining, granular material, such as such as "Open-Graded Aggregate" per ODOT 02630.11. In the event that silty soils are used as backfill, a geotextile should be placed between the curtain drain and the backfill soil, to prevent drain clogging.

Backfill Compaction: Because soil compactors place significant lateral pressures on retaining walls, we recommend that only small, hand-operated compaction equipment be used within 3 feet of a backfilled wall. Also, all backfill should be compacted to a density as close as possible to 90 percent of the maximum dry density (based on ASTM:D-1557); a greater degree of compaction closely behind the wall would increase the lateral earth pressure, whereas a lesser degree of compaction might lead to excessive post-construction settlements.

6.3.1 Lateral Earth Pressures on Walls

Static Pressures: Yielding (cantilever) retaining walls should be designed to withstand an appropriate *active* lateral earth pressure, whereas non-yielding (restrained) walls should be designed to withstand an appropriate *at-rest* lateral earth pressure. These pressures act over the entire back of the wall and vary with the backslope inclination. For various backslope angles, we recommend using the following active and at-rest pressures (given as equivalent fluid unit weights):

Backslope Angle	**Active Pressure**	**At-Rest Pressure**
Level	35 pcf	55 pcf
4.0H:1V	40 pcf	62 pcf
3.0H:1V	44 pcf	69 pcf
2.0H:1V	53 pcf	83 pcf

Surcharge Pressures: Static lateral earth pressures acting on a retaining wall should be increased to account for surcharge loadings resulting from any traffic, construction equipment, material stockpiles,

or structures located within a horizontal distance equal to the wall height. For simplicity, a traffic surcharge can be modeled as a uniform pressure of 75 psf acting against the upper 6 feet of wall.

Seismic Pressures: Static lateral earth pressures acting on a retaining wall should be increased to account for seismic loadings. Given the cohesive nature of surrounding site soils and based on recent NCHRP data, no increase is required for the contemplated wall heights.

Hydrostatic Pressures: If groundwater is allowed to saturate the backfill soils, a hydrostatic pressure will act against a retaining wall below the saturation level and above the foreslope level. In contrast, if an adequate drainage and discharge system is included behind the retaining wall, we do *not* expect that hydrostatic pressures will develop.

Resisting Forces: Static pressures, surcharge pressures, seismic pressures, and hydrostatic pressures are resisted by a combination of passive lateral earth pressure, base friction, and subgrade bearing capacity. Passive pressure acts over the embedded front of the wall (neglecting the upper 2 feet) and varies with the foreslope declination, whereas base friction and bearing capacity act along the bottom of the footings. Assuming a level foreslope at the wall location, we recommend the following design values, which incorporate static and seismic safety factors of at least 1.5 and 1.1, respectively. Base friction can be combined with the respective passive pressure to resist static and seismic loads.

Design Parameter	**Allowable Value**
Static Passive Pressure	300 pcf
Seismic Passive Pressure	400 pcf
Base Friction Coefficient	0.4

6.4 STRUCTURAL FILL

The term "structural fill" refers to any materials used for trail embankments, and detention pond berms, as well as materials placed under foundations, retaining walls, and other structures. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, gravel, pea gravel, washed rock, crushed rock, controlled-density fill (CDF), lean-mix concrete (LMC), well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, or any individual particles greater than approximately 6 inches in diameter.

Fill Placement: Generally, pea gravel, washed rock, crushed rock, quarry spalls, CDF, and LMC do not require special placement and compaction procedures. In contrast, sand, gravel, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical vibratory compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM D-1557) as the standard, we recommend structural fill be used for various on-site applications and compacted to the following minimum densities:

Fill Application	Minimum Compaction
Footing subgrade or bearing pad	95 percent
Footing and stemwall backfill	90 percent
Retaining wall subgrade	95 percent
Retaining wall backfill	90 percent
Detention pond berm	90 percent

Subgrade Verification and Compaction Testing: Regardless of material or location, all structural fill should be placed over firm, unyielding subgrades prepared in accordance with the *Site Preparation* section of this report. The condition of all subgrades should be verified by an AMEC representative before filling or construction begins. In addition, fill soil compaction should be verified by means of in-place density tests performed during fill placement so the adequacy of the soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (the soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using

"clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight), based on the soil fraction passing the U.S. No. 4 Sieve.

Pond Berm Fill: A source of finer grained soil may be required to construct pond berms. This material will need to be moisture conditioned before delivery to the site, and protected from moisture until it can be placed and compacted. It is important that a fine grained fill source be placed and compacted at a moisture content that is within about 3 percent +/- of its optimum moisture content. A fill that is placed too wet will be difficult to place and to achieve the desired level of compaction. On the other hand, a fill that is placed too dry may appear to achieve adequate compaction but can lose strength leading to embankment failure upon first inundation with water.

7.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Consequently, we recommend that AMEC be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design;
- Prepare a letter summarizing all review comments (if required by the City of Springfield);
- Attend a pre-construction conference with the design team and contractor to discuss important geotechnically related construction issues;
- Provide on-call consultation and review field inspection and testing reports as required;; and
- Prepare a post-construction letter summarizing our review of pertinent field observations, inspections, and test results (if required by the City).

8.0 CLOSURE

The conclusions and recommendations presented in this report are based, in part, on the explorations AMEC performed and used for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. In addition, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. AMEC is available to provide earthwork monitoring, soils testing, and geotechnical engineering services throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report, or any aspects of the project, please feel free to contact our office.

Sincerely,

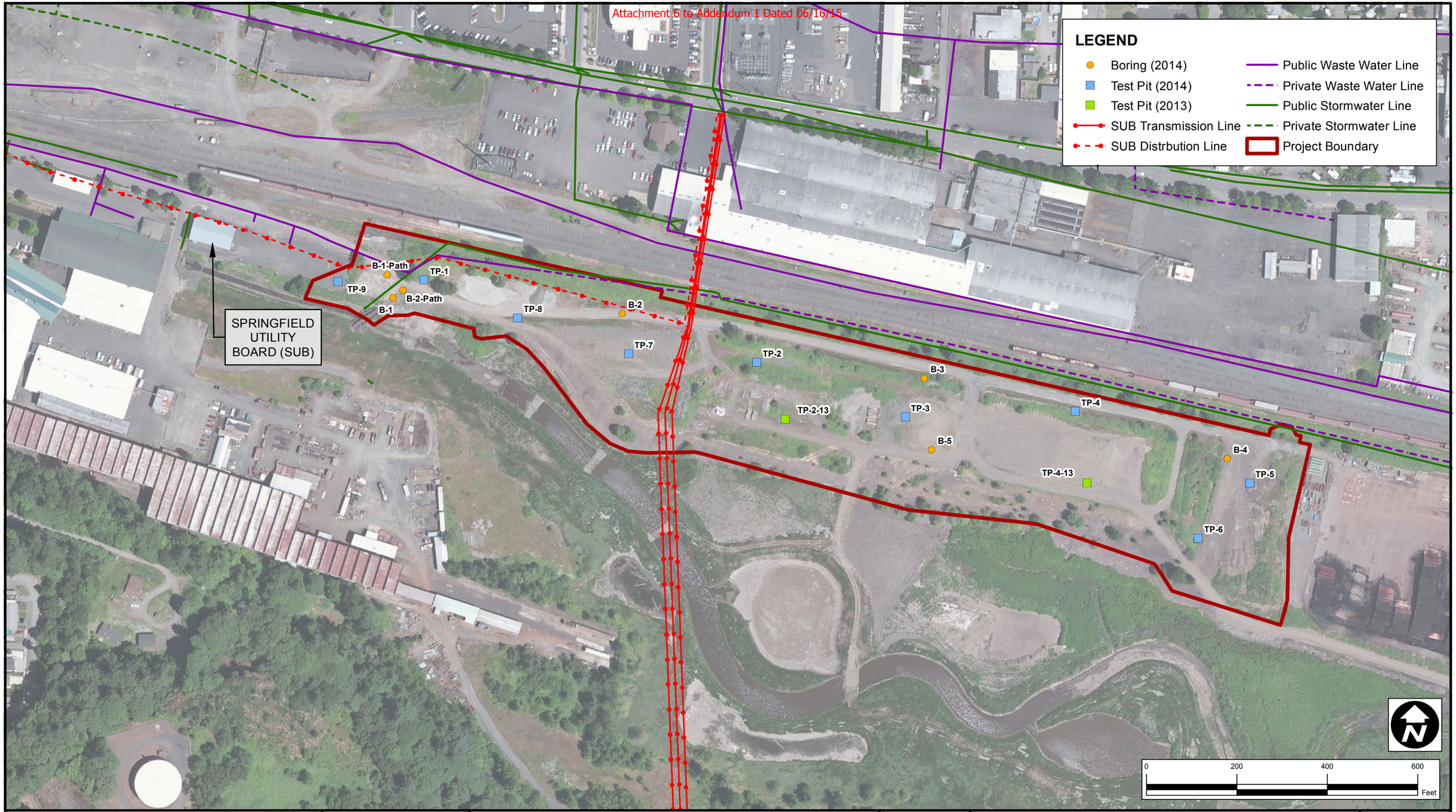
AMEC Environment & Infrastructure, Inc.

REGISTERED PROFESSIONAL ENGINEER
72236PE
OREGON
SEP. 10, 2002
JAMES S. DRANSFIELD
RENEWAL DATE 12/31/15

James S. Dransfield, P.E.
Principal Geotechnical Engineer

Reviewed by; Todd D. Wentworth, P.E., L.G
Associate

FIGURES



CLIENT: CITY OF SPRINGFIELD	DWN BY: PM	PROJECT: MILL RACE STORMWATER FACILITY	DATE: OCTOBER 2014
	CHK'D BY: DS		PROJECT NO.: 3-61M-12790
AMEC 7376 SW Durham Road Portland, OR, U.S.A. 97224	DATUM: NAD83	TITLE: GEOTECHNICAL FIELD EXPLORATION PLAN	REV. NO.: X
	PROJECTION: OR SP S. Ft.		FIGURE NO.: 1
	SCALE: 1 inch = 200 feet		

K:\12000\12700\12790\127901\dwg_Geotech_Samples_Testpits_2014\Final Geotechnical Field Exploration Map.mxd - patrick.mccarthy - 10/15/2014 - 2:14:47 PM

APPENDIX A

Field Exploration Procedures and Logs

APPENDIX A
FIELD EXPLORATION PROCEDURES AND LOGS
461M-127901-0

The following paragraphs describe our procedures associated with the field explorations and field tests AMEC Environment & Infrastructure, Inc. (AMEC) conducted for this project. Descriptive logs of our explorations are enclosed in this appendix.

Auger Boring Procedures

Our exploratory borings were advanced with a hollow-stem auger, using a truck-mounted drill rig operated by an independent drilling firm working under subcontract to AMEC. A geologist from AMEC continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our subcontract laboratory for testing. After each boring was completed, the borehole was backfilled with a mixture of bentonite chips and soil cuttings.

Throughout the drilling operation, soil samples were obtained at 2.5- or 5-foot depth intervals by means of the Standard Penetration Test (SPT) per American Society for Testing and Materials (ASTM) D-1586. This testing and sampling procedure consists of driving a standard 2-inch diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils. Where soft soils were encountered, these split-spoon samples were supplemented with Shelby tube samples. A Shelby tube consists of a 3-inch diameter thin-wall steel tube that is pushed into the soil by means of hydraulic rams.

The enclosed *Boring Logs* describe the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log. Groundwater depth estimates are typically based on

the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the borehole after the auger has been extracted.

Test Pit Procedures

Our exploratory test pits were excavated with a track-mounted hoe operated by an independent firm working under subcontract to AMEC. A geologist from AMEC continuously observed the test pit excavations, logged the subsurface conditions, and obtained representative soil samples. All samples were stored in watertight containers and later transported to our subcontract laboratory for testing. After we logged each test pit, the hoe operator backfilled it with excavated soils and tamped the surface.

The enclosed *Test Pit Logs* indicate the vertical sequence of soils and materials encountered in each test pit, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the *in-situ* soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits, as well as all sample numbers and sampling locations.

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LESS THAN 5% FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(GREATER THAN 12% FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LESS THAN 5% FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50 OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(GREATER THAN 12% FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	INORGANIC		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	LIQUID LIMIT LESS THAN 50	ORGANIC		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	INORGANIC		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
	LIQUID LIMIT GREATER THAN 50	ORGANIC		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS
FILL SOILS				FILL (AF)	HUMAN ALTERED SOIL OR MODIFIED LAND

NOTES:

1. SOIL DESCRIPTIONS ARE BASED ON THE GENERAL APPROACH PRESENTED IN THE STANDARD PRACTICE FOR DESCRIPTION AND IDENTIFICATION OF SOILS (VISUAL-MANUAL PROCEDURE), AS OUTLINED IN ASTM D 2488. WHERE LABORATORY INDEX TESTING HAS BEEN CONDUCTED, SOIL CLASSIFICATIONS ARE BASED ON THE STANDARD TEST METHOD FOR CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES, AS OUTLINED IN ASTM D 2487.

2. SOIL DESCRIPTION TERMINOLOGY IS BASED ON VISUAL ESTIMATES (IN THE ABSENCE OF LABORATORY TEST DATA) OF THE PERCENTAGES OF EACH SOIL TYPE AND IS DEFINED AS DESCRIBED BELOW:

3. DUAL SYMBOLS (E.G. SP-SM, OR GP-GM) ARE USED TO INDICATE A SOIL WITH AN ESTIMATED 5-12% FINES.

   PRIMARY CONSTITUENT: >50% - "GRAVEL", "SAND", "SILT", "CLAY", etc.
   SECONDARY CONSTITUENTS: >12% and ≤50% - "gravelly", "sandy", "silty", etc.
   ADDITIONAL CONSTITUENTS: >5% and ≤12% - "some gravel", "some sand", "some silt", etc.
   ≤5% - "trace gravel", "trace sand", "trace silt" etc. or not noted.

4. RELATIVE DENSITY OF SOIL IS BASED ON STANDARD TEST METHOD FOR PENETRATION TEST (SPT) AND SPLIT-BARREL SAMPLING OF SOILS ASTM D 1586 OR CORRELATIONS FOR OTHER SIMPLER TYPES AND METHODS FOR SPT SAMPLING, THE FOLLOWING BLOW COUNT CORRELATION APPLIES.

   A. RELATIVE DENSITY OF COARSE GRAINED SOILS (N = BLOWS/FOOT SPT METHOD)
   - VERY LOOSE: N = ≤4
   - LOOSE: N = >4 AND ≤10
   - MEDIUM DENSE: N = >10 AND ≤30
   - DENSE: N = >30 AND ≤50
   - VERY DENSE: N = >50

   B. RELATIVE CONSISTENCY OF FINE GRAINED SOILS (N = BLOWS/FOOT SPT METHOD)
   - VERY SOFT: N = <2
   - SOFT: N = ≥2 AND ≤4
   - MEDIUM STIFF: N = >4 AND ≤8
   - STIFF: N = >8 AND ≤15
   - VERY STIFF: N = >15 AND ≤30
   - HARD: N = >30

AMEC Environment & Infrastructure
11810 North Creek Parkway North
Bothell, WA, U.S.A. 98011-8201

PROJECT	DWN BY: JRS	DATUM:	DATE: JULY 2010
TITLE: SOIL CLASSIFICATION CHART / KEY	CHK'D BY: JD	REV. NO.:	PROJECT NO:
	PROJECTION:	SCALE: NOT TO SCALE	FIGURE No. A-1

CLIENT LOGO | CLIENT

G:_Amec_Library\Standard Details\SOIL CLASS CHART.dwg – Layout1 (2) – Dec. 06, 2011 11:36am – jeffrey.sanders

PROJECT: *Mill Race Stormwater Facility* JOB No. *4-61M-127901.01* BORING No. *B-1*

Location:
Approximate ground surface elevation: 465 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
0	Medium dense, moist, gray, rounded to angular, well graded, fine to coarse GRAVEL with some sand (Fill) GW				N/E		
5	Soft, moist, dark brown with reddish brown mottles CLAY with some organics: wood chips, 2" thick layer of charred wood at 5.5', high plasticity (Fill) CH		100%	S-1		4	1.5, 94, 38
				S-2			
10	becomes medium stiff, scattered organics (decreasing from above)		100%	S-3		5	1.9
15	becomes gray		100%	S-4		7	2.9
	Boring terminated at approximately 16.5 feet						
20							
25							

Page 1 of 1

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit — Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- Shelby Tube
- N/E No groundwater encountered
- Atterberg Test (PI shown)
- PID reading (ppm)
- Grain Size Analysis (% fines shown)
- Compressive strength
- Dry Density

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *January 15, 2014* Logged By: *JF*

Drilled by: *Western States*

PROJECT: *Mill Race Stormwater Facility* JOB No. *4-61M-127901.01* BORING No. *B-2*

Location:
Approximate ground surface elevation: 470 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
0	Medium dense, moist, coarse, angular GRAVEL with some sand and silt (Fill) GP						
5	Medium stiff, moist, dark gray and blue gray, CLAY with some fine angular gravel and trace sand. Scattered organics: wood fibers. High plasticity. (Fill) CH		65%	S-1		6	1.6
10	becomes dark brown with reddish brown mottles, no sand or gravel		100%	S-2			30
			100%	S-3		8	1.3, 92
15			100%	S-4	ATD	8	2.1
20	Medium dense, wet, brown, silty, clayey fine SAND with gravel in tip of sample tube (Native) SC-SM		65%	S-5		18	3.7, 24
	blowcount possibly overstated						
	Boring terminated at approximately 21.5 feet						
25							

Page 1 of 1

PENETRATION RESISTANCE: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 (Plastic Limit – Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- Shelby Tube
- ATD Groundwater level at time of drilling
- Atterberg Test (PI shown)
- PID reading (ppm)
- Dry Density
- Compressive strength
- Hydrometer test

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *January 15, 2014* Logged By: *JF*

Drilled by: *Western States*

PROJECT: *Mill Race Stormwater Facility* JOB No. *4-61M-127901.01* BORING No. *B-3*

DEPTH (feet)	Soil Description Location: Approximate ground surface elevation: 475 feet	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE ▲ Standard ##/## Blows over inches △ Other Blows per foot 0 10 20 30 40 50	Page 1 of 1 TESTING
0	Medium dense to dense, coarse SAND with some silt and clay (Fill)				N/E		
	Rock/debris						
	Rig refusal on concrete debris (?) or rocks. Made 3 attempts, moving rig 10 feet west after 2nd attempt w/o success.						
5	Boring terminated at approximately 4 feet						
10							
15							
20							
25							

LEGEND

N/E No groundwater encountered

0 20 40 60 80 100
Plastic Limit MOISTURE CONTENT Liquid Limit

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *January 15, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

PROJECT: *Mill Race Stormwater Facility* JOB No. *4-61M-127901.01* BORING No. *B-4*

DEPTH (feet)	Soil Description Location: Approximate ground surface elevation: 475 feet	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE ▲ Standard ##/## Blows over inches △ Other Blows per foot 0 10 20 30 40 50	Page 1 of 1 TESTING
0	Medium dense to dense, coarse GRAVEL with wood debris (Fill)				N/E		
5	Rig refusal at surveyed location. 2 additional unsuccessful attempts made, moving rig 10 feet east and 20 feet east. Refusal on concrete or rock debris. Boring terminated at approximately 3 feet						
10							
15							
20							
25							

LEGEND

N/E No groundwater encountered

0 20 40 60 80 100
Plastic Limit MOISTURE CONTENT Liquid Limit

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *January 15, 2014* Logged By: *JF*

Drilled by: *Western States*

PROJECT: *Mill Race Stormwater Facility* JOB No. *4-61M-127901.01* BORING No. *B-5*

Location:
Approximate ground surface elevation: 476 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
0	Medium dense, dark gray, moist, fine to coarse, well graded, sub-rounded to angular GRAVEL with some sand and trace silt/clay (Fill) GW				N/E		
	Hard, moist, dark gray, clayey GRAVELwith some organics (Fill) GC						
5			75%	S-1		50/4	1.6
	contact by drilling change						
10	no sample recovery		0%	S-2		4	1.3
15	Soft, moist, gray, CLAY, high plasticity (Native?) CH			S-3			24
	becomes medium stiff		100%	S-4		7	2.1
20	becomes brown with gray mottles		100%	S-5		7	3.7
	blowcount possibly overstated						
25	Dense, moist, gray, sandy, well-graded, fine to coarse, rounded to sub-angular GRAVEL (Native) GW		50%	S-6		46	
	Boring terminated at approximately 26.5 feet						
30							

Page 1 of 1

PENETRATION RESISTANCE: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 (Plastic Limit – Liquid Limit)

LEGEND

- 2.00-inch OD split-spoon sampler
- No Recovery
- Shelby Tube
- N/E No groundwater encountered
- PID reading (ppm)
- Compressive strength
- Hydrometer test
- Atterberg Test (PI shown)

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *January 15, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-1

Location:
Approximate ground surface elevation: 467.4 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Soft, moist, brown, CLAY with some to trace rounded gravel (Fill) CL			NS	NC		
	Medium dense, moist, gray, sandy, fine GRAVEL (Fill) GW						
	Medium dense debris layer: concrete blocks up to 4-feet long, brick, with gravel, sand, or clay matrix dispersed between blocks (Fill)						
5	Medium dense, moist, brown, poorly graded, sandy, rounded, fine GRAVEL with some organics: wood fibers (Fill) GP		G-1			●	0.4
	abandoned pipe						
	Soft, moist, dark brown CLAY with organics: wood fibers (Fill) CH		G-2				0.5
10	metal debris						
	color change to gray, with scattered organics		G-3			●	0.6
			G-4				0.7
	becomes medium stiff to stiff, grayish brown						
	Test pit terminated at approximately 14 feet						
15							
20							
25							

LEGEND

- Moderate Seepage
- NS no seepage observed
- Rapid Seepage
- NC no caving observed
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-2

Location:
Approximate ground surface elevation: 478.9 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0 20 40 60 80 100)	TESTING
0	Dense, gray and brown, clayey, fine to coarse GRAVEL with cobbles and boulders (up to 2.5 feet diameter) . Abundant wood debris: wood fibers, chips, scattered branches (Fill) GW				NC		
			G-1				0.5; 16
5	Dense, moist, gray, sub-rounded to angular, fine to coarse GRAVEL and cobbles with some clay and abundant wood debris (Fill) GW-GC						
	large (3.5- 4' diameter) boulder		G-2				4.6
10	Medium stiff, moist, gray, gravelly CLAY with organics: wood debris (Fill) CH						
	5' long log						
15	becomes brown with trace gravel, abundant wood debris: chips, strong organic odor		G-3				0.8
			G-4				0.8
20	becomes grayish brown, no fill/ debris observed below 20'						
			G-5				0.7
25	Test pit terminated at approximately 25 feet						
30							

LEGEND

- Moderate Seepage
- NS no seepage observed
- Rapid Seepage
- NC no caving observed
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

amec

11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-3

Location:
Approximate ground surface elevation: 475.1 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Medium dense, fine, rounded to sub-rounded GRAVEL with some sand (Fill) GP				NC		
	Medium stiff to soft, dark gray, CLAY with some gravel and scattered organics- wood debris (Fill) CH		G-1				1.0
5	becomes gray with rootlets noted in clay		G-2				0.7
	Layer of abundant wood debris: large branches						
10							0.6
	Dense, wet, gray, rounded, coarse GRAVEL/ COBBLES with trace to some clay and wood fibers (Fill) GW		G-3				
	sheen noted on accumulated groundwater seepage (organic?)						
	Test pit terminated at approximately 12 feet						
15							
20							
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-4

Location:
Approximate ground surface elevation: 469.0 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Dense, moist, brownish-gray, fine to coarse, angular to rounded GRAVEL with basalt cobbles, trace sand, silt and clay (Fill) GW				NC		
	Medium stiff, moist, brown with red staining on fracture surfaces, CLAY, high plasticity (Native?) CH						
5			G-1				0.5
10	becomes soft, wet, brown with gray mottles						
15			G-2				0.3
	Test pit terminated at approximately 16 feet						
20							
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Test Pit No.: TP-5

Location:
Approximate ground surface elevation: 476.5 feet

DEPTH (feet)	Soil Description	SAMPLE NUMBER	CAVING	TESTING
0	Medium stiff, brown, sandy SILT with some gravel, cobbles and organics: sawdust, wood chips (Fill)		NC	
	Dense, moist, gray and dark brown, poorly graded, coarse GRAVEL and COBBLES with boulder size concrete fragments up to 3' in diameter, abundant wood chips, fibers. Angular to sub-angular gravel and concrete debris layers (Fill) GP			
	hard digging			
5	Medium stiff, moist, gray CLAY, high plasticity (Fill) CH	G-1		0.5
10	Medium dense, poorly graded, rounded, GRAVEL with some sandy silt and clay, abundant wood chips (Fill) GP	G-2		0.4
	Soft, moist, gray, high plasticity CLAY with scattered organics: wood chips, fibers (Fill) CH			
	steel cable in sidewall of test pit			
	1-foot thick layer of wood debris			0.2
15	becomes brown with gray mottles	G-3		41
	scattered wood debris - decrease in organic content excavation becomes easier	G-4		0.3
20	trace rounded gravel			
	Dense, wet, brown, well graded, rounded, fine to coarse GRAVEL with trace silt, fine sand and clay (Native) GW-GC	G-5		10, 0.3, 26, NP
	Test pit terminated at approximately 23.5 feet			
25				

MOISTURE CONTENT: Plastic Limit, Liquid Limit; 0, 20, 40, 60, 80, 100

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-6

Location:
Approximate ground surface elevation: 475.2 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Soft, dark brown, organic, gravelly CLAY with abundant wood debris and branches (Fill) CH-OH				NC		
	Dense, moist, gray, clayey, coarse, rounded GRAVEL with trace wood fibers (Fill) GC-GP		G-1				0.6
5	plastic pipe within wood debris layer						
	Soft, dark gray CLAY with scattered wood debris (Fill) CH						
10			G-2				0.7
	gravel lense with rapid water seepage						
15	trace wood debris, organics		G-3				0.6
	becomes brown		G-4				0.5
	Test pit terminated at approximately 17 feet						
20							
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-7

Location:
Approximate ground surface elevation: 474.3 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0 20 40 60 80 100)	TESTING
0	Soft, brown, high plasticity CLAY with trace gravel, cobbles (Fill) CH				NC		
	piece of rebar exposed		G-1				0.5
5	hot water heater encountered						
	Medium dense, moist, gray, clayey, rounded to angular GRAVEL (Fill) GC		G-2				0.7
	Soft, moist, gravelly CLAY with abundant organics: wood debris, high plasticity (Fill) CH						
10	wood debris layer: dimensional lumber pieces, wood beam. Water seepage emanating from layer						
	becomes blue-gray with less organics, some gravel/cobbles		G-3				0.6
15	becomes dark gray, trace gravel, scattered fibrous organics		G-4				0.6
	scattered gravel, trace wood debris		G-5				0.3
20	Test pit terminated at approximately 20 feet						
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

amec

11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-8

Location:
Approximate ground surface elevation: 469.5 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Medium dense, moist, brown, clayey, fine to coarse GRAVEL (Fill) GC				NC		
	becomes gray, abundant wood debris, some large (2.5' diameter), angular boulders						
	Medium stiff, brown, CLAY, little or no organics (Native?) CH		G-1				0.4
5							
			G-2				4.7
	becomes soft, dark gray						
10							
	becomes medium gray		G-3				0.6
15	becomes stiff, brown		G-4				0.5
	Test pit terminated at approximately 16 feet						
20							
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- NS no seepage observed
- Rapid Seepage
- 200 Wash (% fines shown)
- Analytical Tests
- Atterberg Test (PI shown)
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *January 16, 2014*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 2/11/14

Attachment 6 to Addendum 1 Dated 06/16/15

Test Pit No.: TP-9

Location:
Approximate ground surface elevation: 465 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0, 20, 40, 60, 80, 100)	TESTING
0	Loose, damp, brown, fine to coarse GRAVEL (Fill) GP						
	Loose, damp, brown, coarse GRAVEL with trace sand (Fill) GP						
	Loose to medium dense, damp to moist, dark brown, coarse GRAVEL with some sand and trace cobbles and quarry spalls (Fill) GP						
	Encountered concrete wall in test pit wall from 2 to 6 feet						
5	Soft, wet, dark brown, CLAY with trace sand and organics; high plasticity (Fill/Native?) CH						
	becomes medium stiff						
	Medium stiff, moist, grayish dark brown CLAY; high plasticity (Native?) CH						
10							
	becomes dark gray						
15							
	Dense, wet, gray, fine to coarse rounded GRAVEL with trace silt and clay (Native) GW			ATD			
	Test pit terminated at approximately 19 feet						
20							
25							

LEGEND

- Moderate Seepage
- NC no caving observed
- 200 Wash (% fines shown)
- Analytical Tests
- NS no seepage observed
- Atterberg Test (PI shown)
- Rapid Seepage
- Compressive strength

Excavation Method: Trackhoe

Date Excavated: *June 19, 2014*

Logged By: *DS*

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11810 North Creek Parkway N
Bothell, Washington 98011

TEST_PIT_LOG_1/PAGE W/O TP1-TP8_B1-B5.GPJ BOTHELL GEO 2010 B&TP.GDT 10/16/14

Test Pit No.: TP-2-13

Location:
Approximate ground surface elevation: 474.2 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0 20 40 60 80 100)	TESTING
0	Dense, moist to wet, brown, silty, sandy GRAVEL with some cbbles and trace decomposing organic woody debris (Fill) GM						
	Stiff, moist, gray, silty CLAY with some gravel (Fill) CH		G-1				0.0; pH=5
5	Medium stiff, moist to wet, silty CLAY with trace gravel and wood debris (Fill) CH						0.0
	Layer of rock with log from 9 to 9.5 feet		G-2				0.0; pH=6
10							
	Abundant wood debris and perched groundwater from 11 to 12 feet		G-3				0.1
	Trace to some wood debris 12 to 16 feet						
			G-4				0.0
15							0.0; pH=5
	Medium stiff to stiff, wet to saturated, brown-gray, silty CLAY with some sand, gravel and cobbles, and abundant wood debris (Fill) CH-GM		G-5				
			G-6				0.1
	Stiff, moist, gray, silty CLAY with trace organics (Native) CH		G-7				34; pH=6
20							0.0
	Dense, wet, gray, silty, sandy GRAVEL (Native) GM		G-8				
			G-9	4/23/13			
	Becomes saturated						
25	Test pit terminated at approximately 24.5 feet						

LEGEND

- Moderate Seepage
- Rapid Seepage
- Slight Seepage
- Analytical Tests
- Atterberg Test (PI shown)
- Grain Size Analysis (% fines shown)

Excavation Method: Trackhoe

Date Excavated: *April 22, 2013*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

Test Pit No.: TP-4-13

Location:
Approximate ground surface elevation: 474.4 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE NUMBER	SEEPAGE	CAVING	MOISTURE CONTENT (Plastic Limit – Liquid Limit; 0 20 40 60 80 100)	TESTING
0	Dense, moist, brown, silty, sandy GRAVEL with some cobbles (Fill) GM						
	Dense, wet to saturated, gray, silty, sandy GRAVEL with some cobbles (Fill) GM		G-1				17; 0.4; pH=5
	Medium stiff, moist, gray, silty CLAY with trace gravel (Fill) CH						
5			G-2				0.2; pH=5
10			G-3				42; 0,2; pH=5
15			G-4				0.0; pH=5
	Becomes very stiff with brown mottling						
	Becomes brown with gray mottling		G-5				0.2; pH=5
20							
	Dense, wet, gray, silty, sandy GRAVEL with some clay (Native) GM			4/23/13			
	Becomes saturated at 22 feet		G-6				0.1; pH=6
	Test pit terminated at approximately 23.5 feet						
25							

LEGEND

- Moderate Seepage
- Rapid Seepage
- Slight Seepage
- Analytical Tests
- Atterberg Test (PI shown)
- Grain Size Analysis (% fines shown)

Excavation Method: Trackhoe

Date Excavated: *April 22, 2013*

Logged By: *JF*

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11810 North Creek Parkway N
Bothell, Washington 98011

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-1-Path*

Location:
Approximate ground surface elevation: 468 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
0	2-inch asphalt covering: Medium dense, moist, sandy, fine GRAVEL with some silt (Fill) GP-GM						
	contact by drilling change						
	Soft, moist, gray, gravelly CLAY with trace sand. Low plasticity (Native) CL						
5			27%	S-1		4	
10	becomes CLAY. Medium plasticity		67%	S-2		4	
15	becomes gray with brown mottles		100%	S-3	P ATD	3	
	contact by gravelly drilling						
20	Dense, wet, gray, sandy, fine to coarse GRAVEL with trace silt/clay (Native) GW		50%	S-4		42	
	caving of hole noted to 25 feet						
25	becomes very dense		33%	S-5		68	
30							

Page 1 of 2

PENETRATION RESISTANCE: ▲ Standard; ##/## Blows over inches; △ Other; Blows per foot 0 10 20 30 40 50

MOISTURE CONTENT: 0 20 40 60 80 100; Plastic Limit; Liquid Limit

LEGEND

- 2.00-inch OD split-spoon sampler
- No Recovery
- P ATD — Perched water level at time of drilling

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11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O B1-B2.GPJ BOTHELL GEO 2010 B&TP.GDT 4/1/14

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-1-Path*

Soil Description

Location:

Approximate ground surface elevation: 468 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard / Blows over inches / Other; Blows per foot)	TESTING
30	becomes trace fines to clean		70%	S-6		72	
35			33%	S-7		51	
	contact by drilling change SILTSTONE, light gray, weak (friable) unweathered, massive- no apparent structure						
40			100%	S-8		50/5	
45			100%	S-9		50/4	
50				S-10		50/5	
	Boring terminated at approximately 50.4 feet						
55							
60							

LEGEND

2.00-inch OD split-spoon sampler

No Recovery

P ATD Perched water level at time of drilling

MOISTURE CONTENT: 0 20 40 60 80 100; Plastic Limit — Liquid Limit

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11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

BOTHELL_LOG FORMAT 2012 W/O B1-B2.GPJ BOTHELL GEO 2010 B&TP.GDT 4/1/14

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-2-Path*

Location:
Approximate ground surface elevation: 469 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Standard ▲; Blows over inches ##; Blows per foot; Other △)	TESTING
0	Dense, moist GRAVEL with some sand and silt (Fill) GP						
5	Medium stiff, moist, mottled reddish brown and gray, silty CLAY. High plasticity (Native) CH		33%	S-1		6	
10	becomes soft, gray CLAY, medium plasticity		100%	S-2		4	
15	becomes medium stiff		100%	S-3		7	
20	contact by drilling change, becomes gravelly Very dense, wet, gray, fine to coarse GRAVEL with some sand and trace silt. Sub-angular to rounded, well graded. (Native) GW		67%	S-4	P ATD	68	
25			67%	S-5		54	
30							

Page 1 of 2

PENETRATION RESISTANCE: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit — Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

P ATD — Perched water level at time of drilling

amec

11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

PROJECT: *Springfield Millrace Pedestrian Bridge* JOB No. *461M127902.02* BORING No. *B-2-Path*

Location:
Approximate ground surface elevation: 469 feet

DEPTH (feet)	Soil Description	USCS/USGS GRAPHICS	SAMPLE TYPE	SAMPLE NUMBER	GROUND WATER	PENETRATION RESISTANCE (Blows per foot)	TESTING
30	sand fraction of sample becomes coarse		67%	S-6		60	
35	sand fraction of sample becomes well graded		67%	S-7		59	
40	contact by drilling change SILTSTONE, light gray, fresh, unweathered, weak, massive - no apparent structure		100%	S-8		50/6	
45			100%	S-9		50/3	
50	Boring terminated at approximately 50.4 feet		100%	S-10		50/4	
55							
60							

PENETRATION RESISTANCE: ▲ Standard; ##/## Blows over inches; △ Other. Blows per foot: 0, 10, 20, 30, 40, 50

MOISTURE CONTENT: 0, 20, 40, 60, 80, 100 — Plastic Limit — Liquid Limit

LEGEND

2.00-inch OD split-spoon sampler

P ATD — Perched water level at time of drilling

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11810 North Creek Parkway N
Bothell, Washington 98011

Drilling Method: HSA Hammer Type: Automatic Date drilled: *March 06, 2014* Logged By: *JF*

Drilled by: *Western States*

APPENDIX B

Laboratory Testing Procedures and Results

APPENDIX B
LABORATORY TESTING PROCEDURES AND RESULTS
461M-127901-0

The following paragraphs describe our procedures associated with the laboratory tests AMEC conducted for this project. Graphical results of certain laboratory tests are enclosed in this appendix.

Visual Classification Procedures

Visual soil classifications were conducted on all samples in the field and on selected samples in our laboratory. All soils were classified in general accordance with the Unified Soil Classification System, which includes color, relative moisture content, primary soil type (based on grain size), and any accessory soil types. The resulting soil classifications are presented on the exploration logs contained in Appendix A.

Moisture Content Determination Procedures

Moisture content determinations were performed on representative samples to aid in identification and correlation of soil types. All determinations were made in general accordance with ASTM D-2216. The results of these tests are shown on the exploration logs contained in Appendix A.

Atterberg Limit Determination Procedures

Atterberg limits are used primarily for classifying and indexing cohesive soils. The liquid and plastic limits, which are defined as the moisture contents of a cohesive soil at arbitrarily established limits for liquid and plastic behavior, were determined for selected samples in general accordance with ASTM D-4318. The results of these tests are presented on the enclosed Atterberg limit graphs and on the exploration logs contained in Appendix A.

No. “200-Wash” Analysis Procedures

A “200-wash” is a procedure in which the fine-grained soil fraction is separated from the sand and gravel by washing the soil on a U.S. No. 200 sieve. A “200-wash” analysis was performed on a selected soil sample obtained from our explorations in general accordance with ASTM D-1140. The result of this analysis is presented in the enclosed table and was used in our soil classifications shown on the exploration logs contained in Appendix A.

Grain-size Analysis Procedures

A grain-size analysis indicates the range of soil particle diameters included in a particular sample. Grain-size analyses were performed on representative samples in general accordance with ASTM D-

422. The results of these tests are presented on the enclosed grain-size distribution graphs and were used in soil classifications shown on the exploration logs contained in Appendix A.

Unconfined Compression Test Procedures

The unconfined compression test was performed on relatively undisturbed cylindrical samples obtained from Shelby tube samplers in general accordance with ASTM D-2166. Soil core specimens were subjected to axial loads, and taken to failure. The peak strength prior to sample failure is typically interpreted to represent the unconfined compressive strength. The results of these tests are presented on the enclosed laboratory testing results.

Modified Proctor Test Procedures

The test consists of compacting the soil or aggregate to be tested into a standard mold using a standardized compactive energy at several moisture contents. The maximum dry density and optimum moisture content is determined from the results of the test. The modified proctor test was performed on representative samples in general accordance with ASTM D-1557. The results of these tests are presented on the enclosed laboratory testing results.

Summary of Laboratory Results

Attachment 6 to Addendum 1 Dated 06/16/15

BORING ID	Depth	USCS Classification and Soil Description	Compressive Strength (psf)	Liquid Limit	Plastic Limit	Plasticity Index	% <#200 Sieve	% Gravel	% Sand	% Silt	% Clay	Water Content (%)	Dry Density (pcf)
B-1	6.5 - 8.5	FAT CLAY (CH)	1762	67	29	38	94.1	0.0	0.0			39.6	77.3
B-2	10 - 12	FAT CLAY(CH)	2572	58	28	30	92.4	0.0	7.6	54.9	37.4	38.9	81.1
B-2	20	CLAYEY SAND with GRAVEL(SC)					24.3	34.7	41.0			27.7	
B-5	15 - 17	ELASTIC SILT(MH)	1414	53	29	24	92.0	0.0	8.0	56.0	36.0	42.6	78.1
TP-1	5											8.3	
TP-1	12											44.4	
TP-2	3	CLAYEY GRAVEL(GC)					15.8	69.9	14.4			10.4	
TP-3	5											43.9	
TP-4	5											34.4	
TP-5	6											36.4	
TP-5	15	FAT CLAY(CH)		64	23	41	90.6	0.0	9.4	53.0	37.6	44.7	
TP-5	22	WELL-GRADED GRAVEL with					10.0	76.0	14.0			10.4	
		SILT(GW-GM)											
TP-5	23	SILTY SAND(SM)		NP	NP	NP	25.6	0.0	0.0			24.3	
TP-6	2.5											22.5	
TP-7	13											26.6	
TP-8	4											41.4	

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

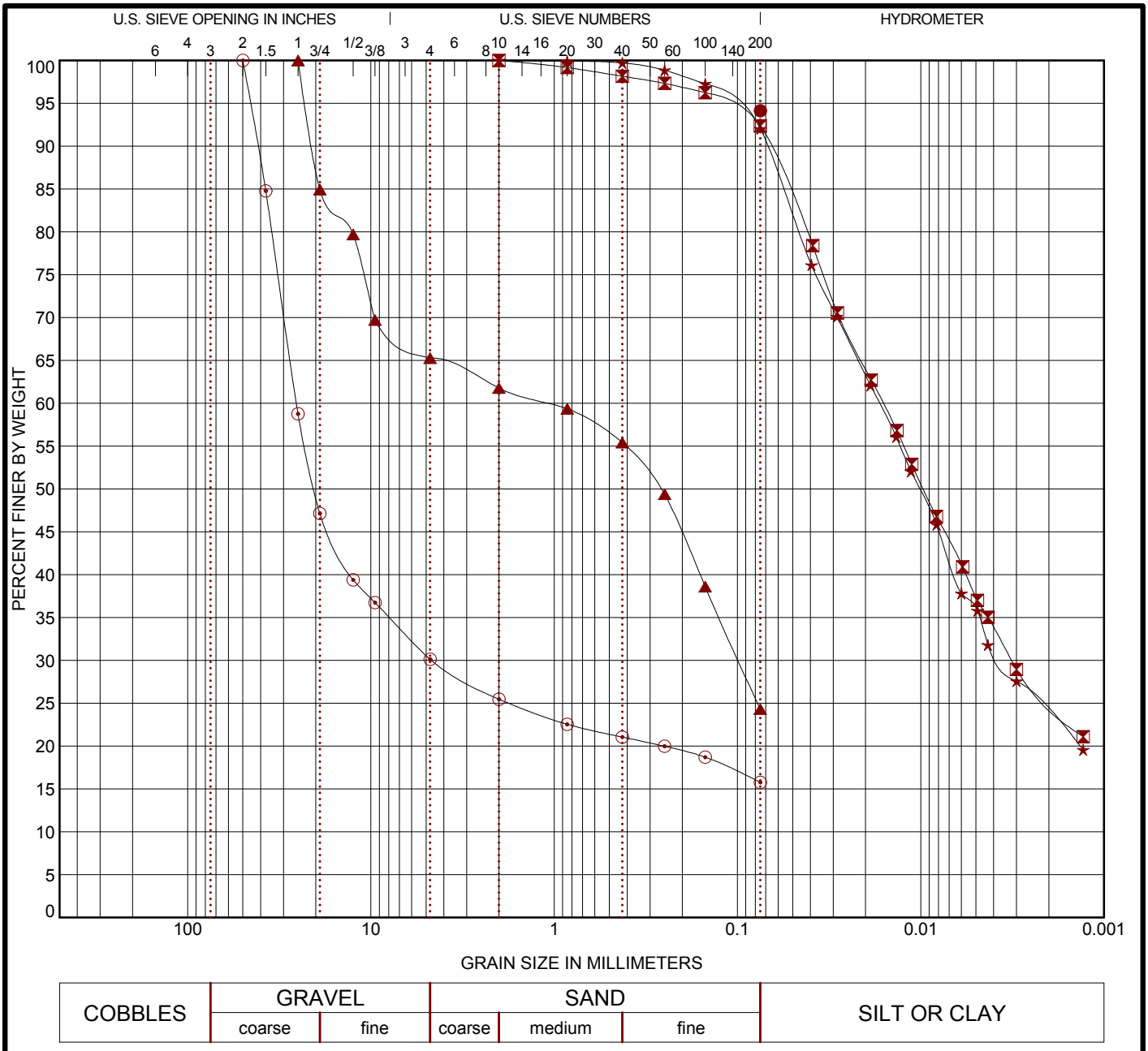
EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. LAB SUMMARY: USCS 82141005 AMEC.GPJ TERRACON2012.GDT 2/6/14

GRAIN SIZE DISTRIBUTION

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	B-1	6.5	FAT CLAY (CH)	67	29	38		
⊠	B-2	10.0	FAT CLAY(CH)	58	28	30		
▲	B-2	20.0	CLAYEY SAND with GRAVEL(SC)					
★	B-5	15.0	ELASTIC SILT(MH)	53	29	24		
⊙	TP-2	3.0	CLAYEY GRAVEL(GC)					

	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-1	6.5	0.075				0.0	0.0	94.1	
⊠	B-2	10.0	2	0.016	0.003		0.0	7.6	54.9	37.4
▲	B-2	20.0	25	1.067	0.099		34.7	41.0	24.3	
★	B-5	15.0	2	0.017	0.004		0.0	8.0	56.0	36.0
⊙	TP-2	3.0	50	25.487	4.639		69.9	14.4	15.8	

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

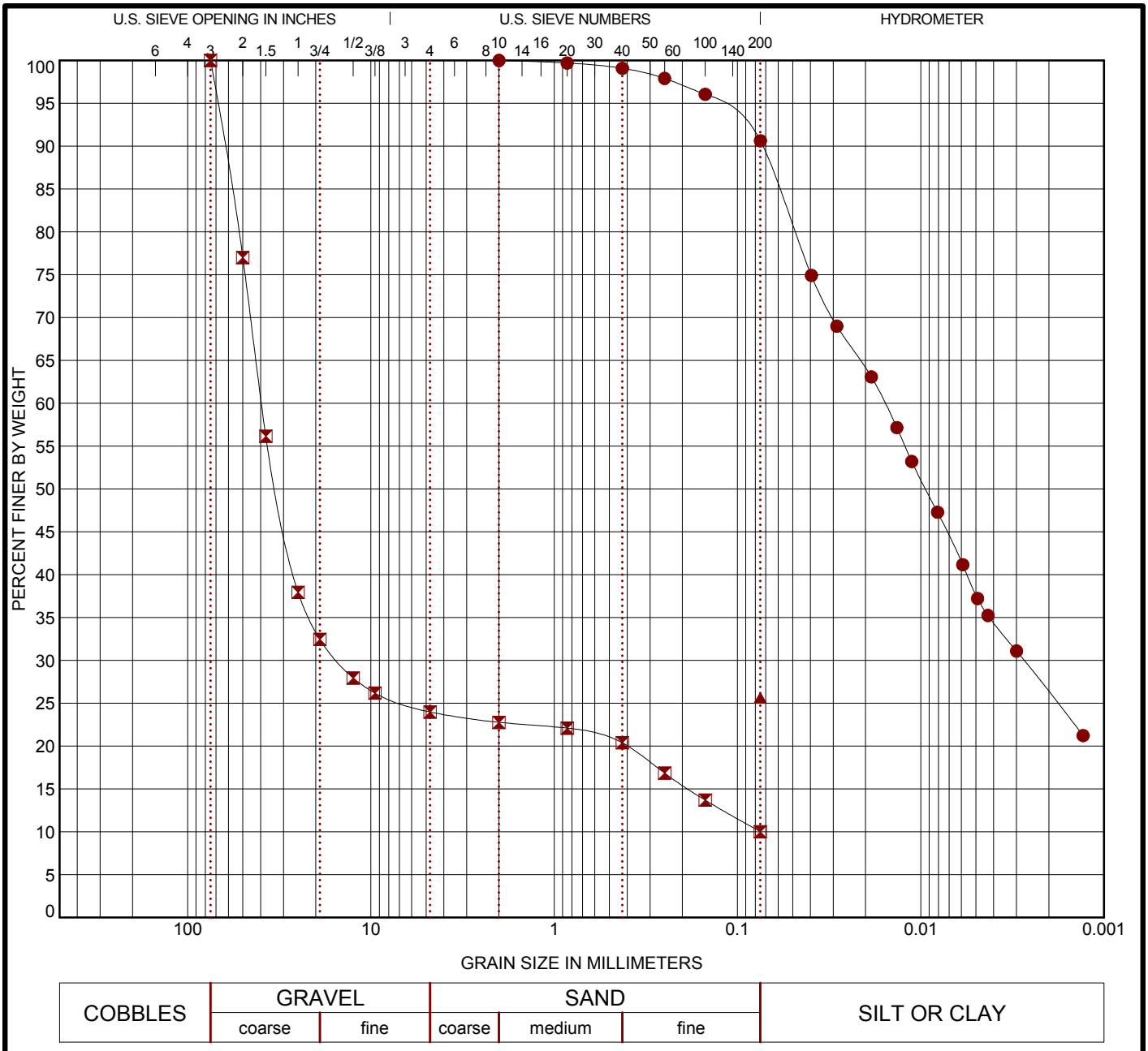
EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 82141005 AMEC.GPJ FENCE PROJECT 1-8-13.GPJ 2/6/14

GRAIN SIZE DISTRIBUTION

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	TP-5	15.0	FAT CLAY(CH)	64	23	41		
⊠	TP-5	22.0	WELL-GRADED GRAVEL with SILT(GW-GM)				77.39	528.72
▲	TP-5	23.0	SILTY SAND(SM)	NP	NP	NP		

	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	TP-5	15.0	2	0.016	0.003		0.0	9.4	53.0	37.6
⊠	TP-5	22.0	75	39.544	15.129		76.0	14.0	10.0	
▲	TP-5	23.0	0.075				0.0	0.0	25.6	

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

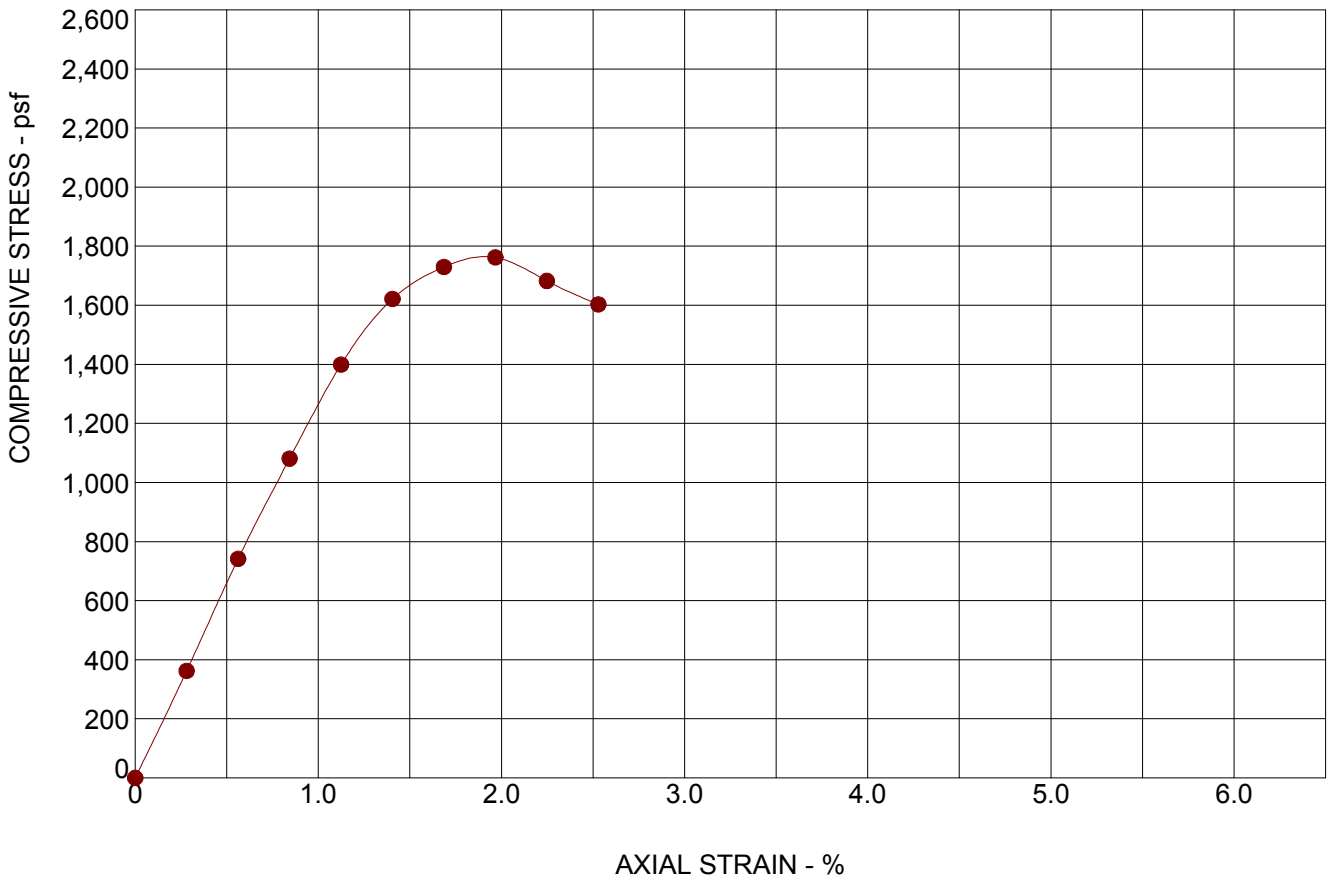
EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 82141005 AMEC.GPJ FENCE PROJECT 1-8-13.GPJ 2/6/14

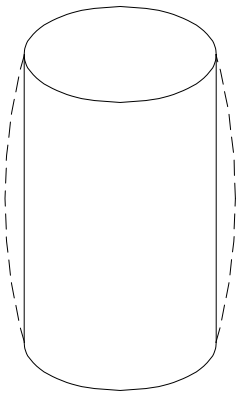
UNCONFINED COMPRESSION TEST

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D2166



SPECIMEN FAILURE MODE



Failure Mode: Bulge (dashed)

SPECIMEN TEST DATA

Moisture Content:	%	39.6
Dry Density:	pcf	77.3
Diameter:	in.	2.88
Height:	in.	7.12
Height / Diameter Ratio:		2.47
Calculated Saturation:	%	
Calculated Void Ratio:		
Assumed Specific Gravity:		
Failure Strain:	%	1.97
Unconfined Compressive Strength	(psf)	1762
Undrained Shear Strength:	(psf)	881
Strain Rate:	in/min	2.0000
Remarks:		

SAMPLE TYPE: Shelby Tube

SAMPLE LOCATION: B-1 @ 6.5 Feet

DESCRIPTION: FAT CLAY (CH)

LL	PL	PI	Percent < #200 Sieve
67	29	38	94

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

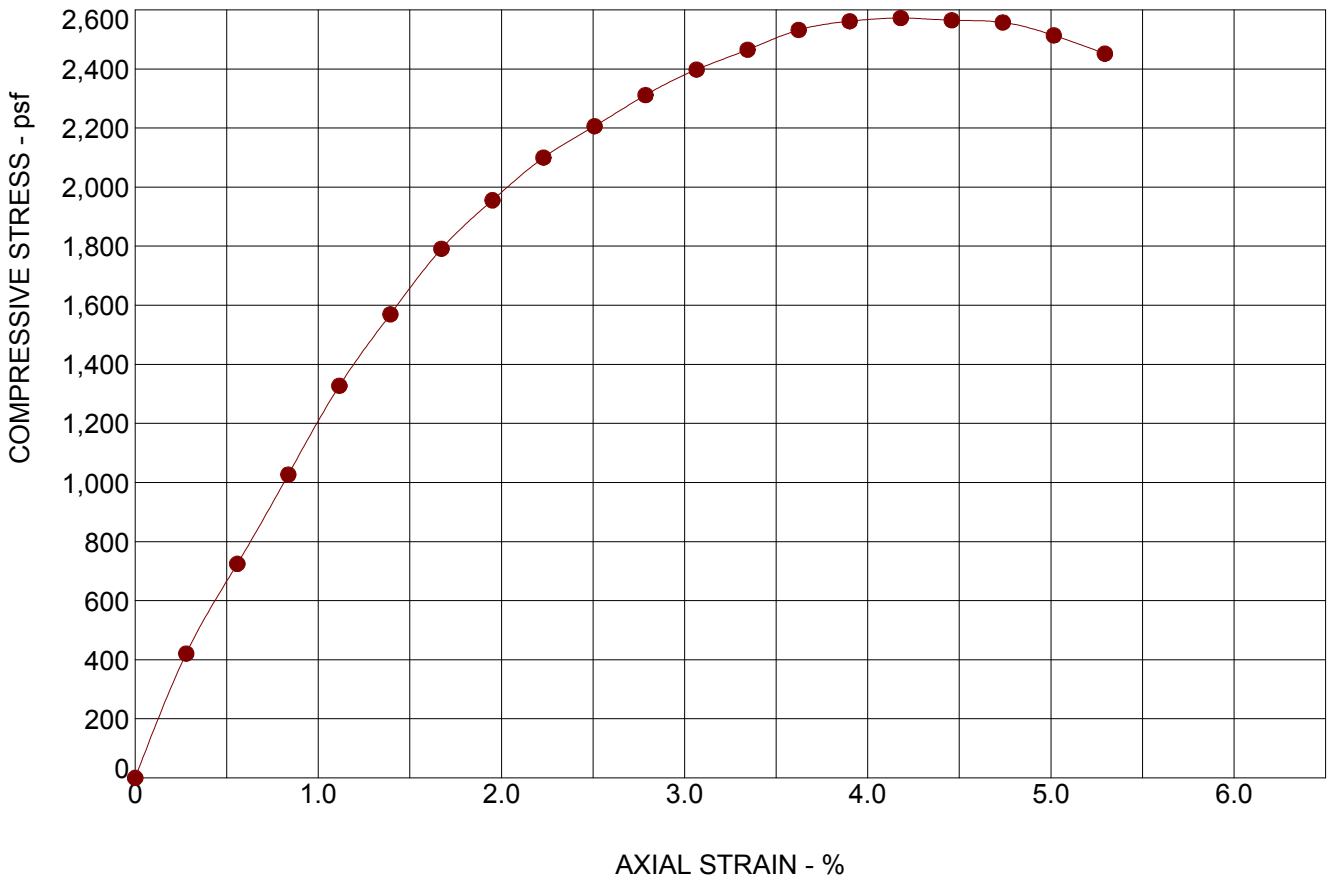
EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNCONFINED 82141005 AMEC.GPJ TERRACON_STD_TEMPLATE.GDT 2/6/14

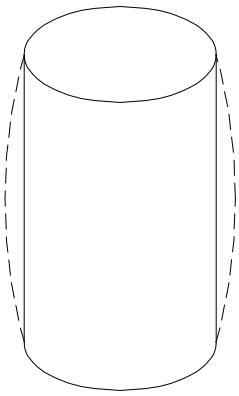
UNCONFINED COMPRESSION TEST

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D2166



SPECIMEN FAILURE MODE



Failure Mode: Bulge (dashed)

SPECIMEN TEST DATA

Moisture Content:	%	38.9
Dry Density:	pcf	81.1
Diameter:	in.	2.87
Height:	in.	7.18
Height / Diameter Ratio:		2.50
Calculated Saturation:	%	
Calculated Void Ratio:		
Assumed Specific Gravity:		
Failure Strain:	%	4.18
Unconfined Compressive Strength	(psf)	2572
Undrained Shear Strength:	(psf)	1286
Strain Rate:	in/min	2.0000
Remarks:		

SAMPLE TYPE: Shelby Tube

SAMPLE LOCATION: B-2 @ 10 Feet

DESCRIPTION: FAT CLAY(CH)

LL	PL	PI	Percent < #200 Sieve
58	28	30	92

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

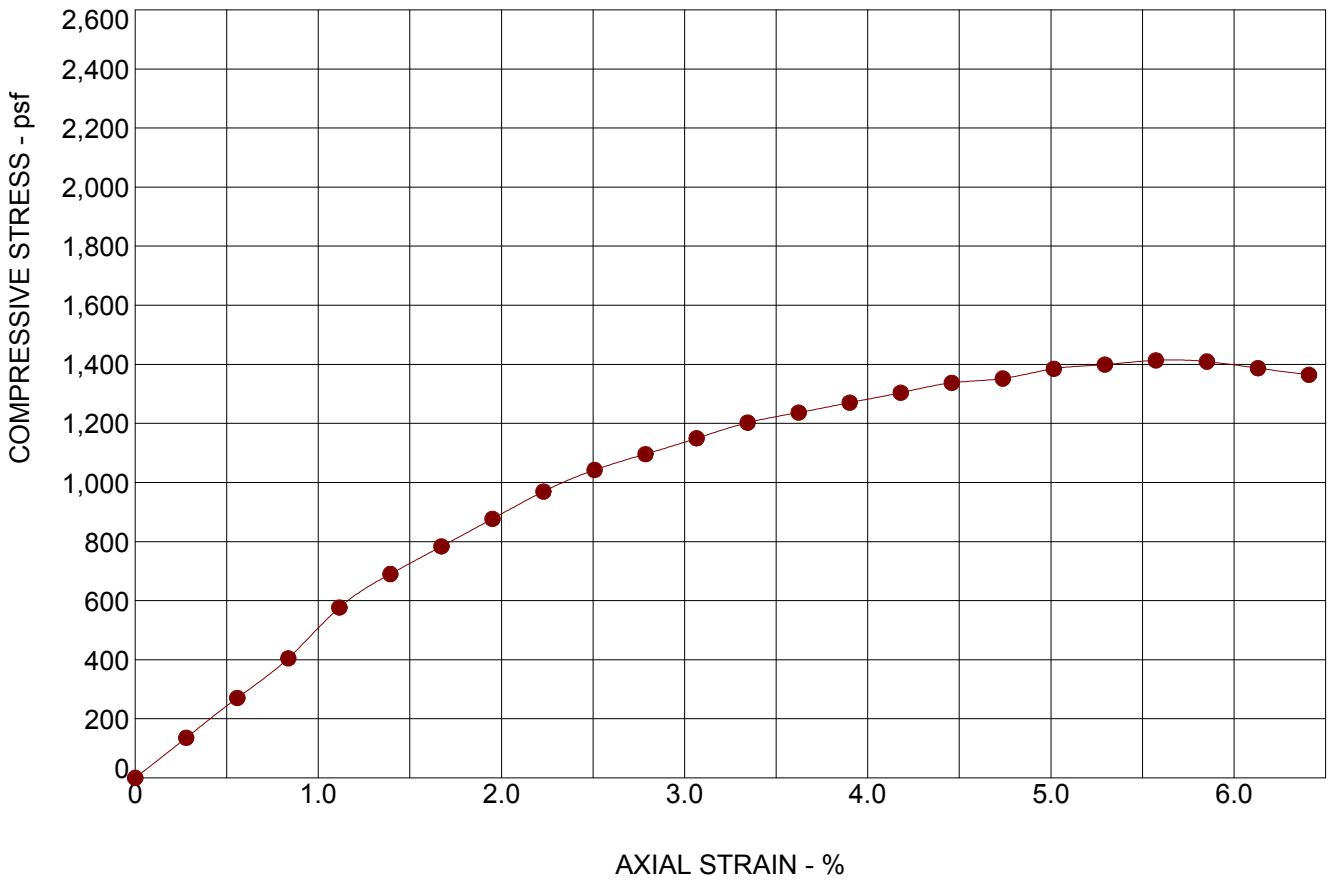
EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNCONFINED 82141005 AMEC.GPJ TERRACON_STD_TEMPLATE.GDT 2/6/14

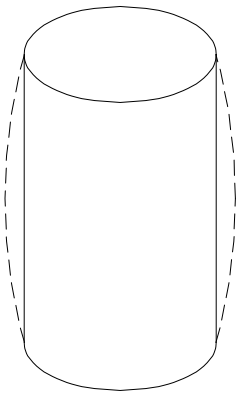
UNCONFINED COMPRESSION TEST

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D2166



SPECIMEN FAILURE MODE



Failure Mode: Bulge (dashed)

SPECIMEN TEST DATA

Moisture Content:	%	42.7
Dry Density:	pcf	78.1
Diameter:	in.	2.85
Height:	in.	7.18
Height / Diameter Ratio:		2.51
Calculated Saturation:	%	
Calculated Void Ratio:		
Assumed Specific Gravity:		
Failure Strain:	%	5.57
Unconfined Compressive Strength	(psf)	1414
Undrained Shear Strength:	(psf)	707
Strain Rate:	in/min	2.0000
Remarks:		

SAMPLE TYPE: Shelby Tube

SAMPLE LOCATION: B-5 @ 15 Feet

DESCRIPTION: ELASTIC SILT(MH)

LL	PL	PI	Percent < #200 Sieve
53	29	24	92

PROJECT: Mill Race

SITE: Springfield, Oregon

Terracon
4103 SE International Way, # 300
Portland, Oregon

PROJECT NUMBER: 82141005

CLIENT: AMEC

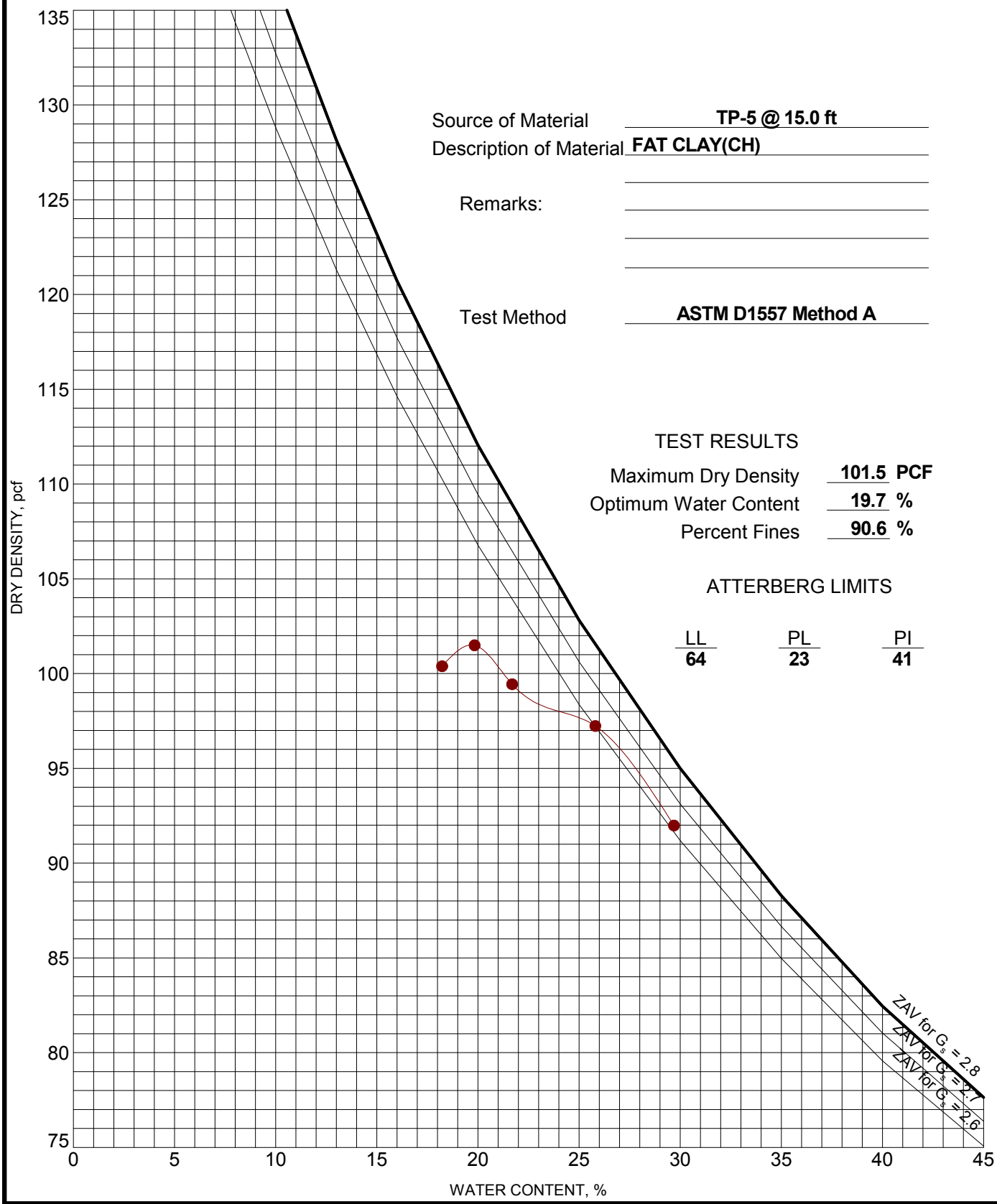
EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNCONFINED 82141005 AMEC.GPJ TERRACON_STD_TEMPLATE.GDT 2/6/14

MOISTURE-DENSITY RELATIONSHIP

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D698/D1557



Source of Material: **TP-5 @ 15.0 ft**

Description of Material: **FAT CLAY(CH)**

Remarks:

Test Method: **ASTM D1557 Method A**

TEST RESULTS

Maximum Dry Density	**101.5**	**PCF**
Optimum Water Content	**19.7**	**%**
Percent Fines	**90.6**	**%**

ATTERBERG LIMITS

LL	PL	PI
64	**23**	**41**

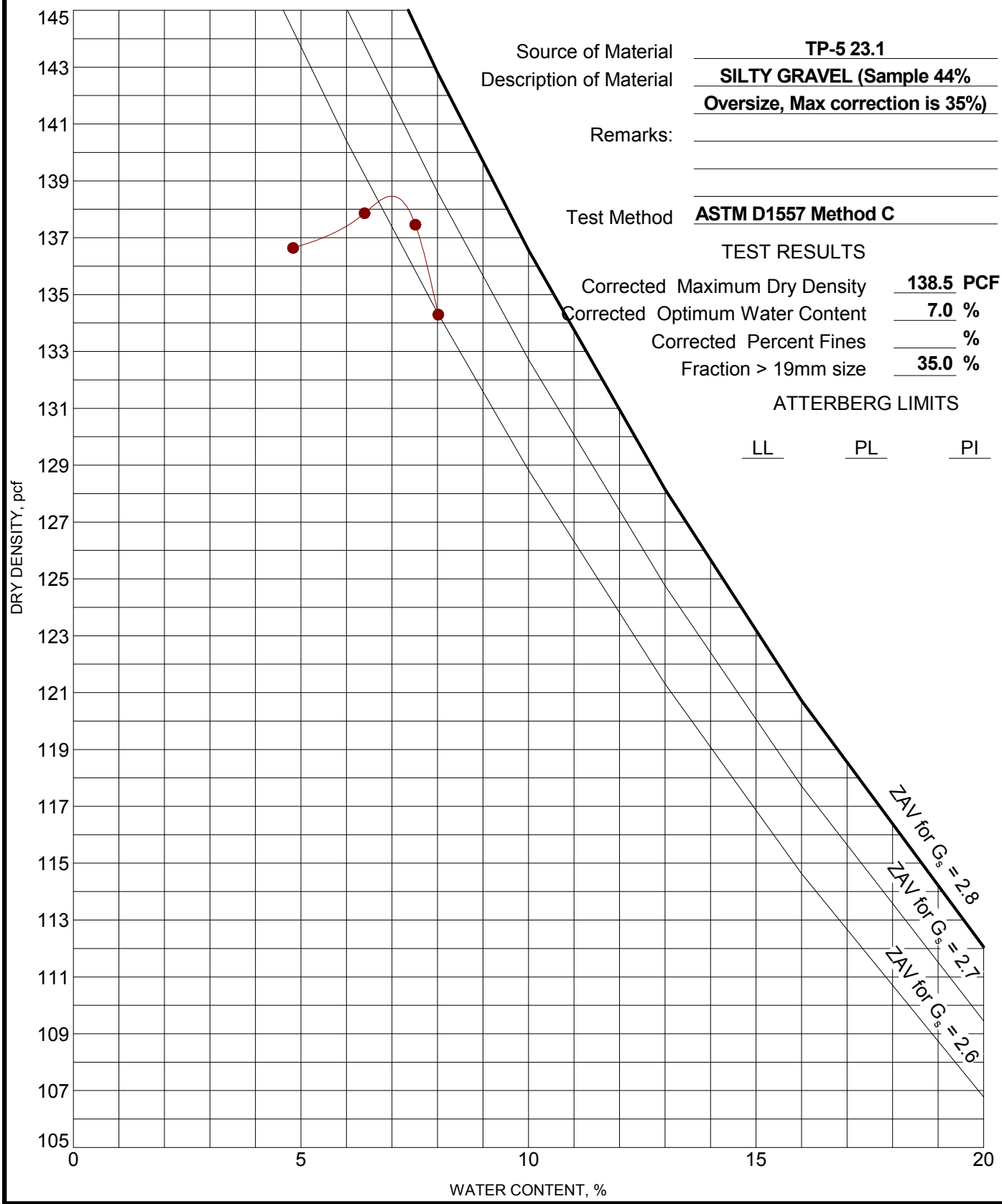
PROJECT: Mill Race	Terracon 4103 SE International Way, # 300 Portland, Oregon	PROJECT NUMBER: 82141005
SITE: Springfield, Oregon		CLIENT: AMEC
		EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 82141005 AMEC.GPJ TERRACON2012.GDT 3/21/14

MOISTURE-DENSITY RELATIONSHIP

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D698/D1557



Source of Material	**TP-5 23.1**
Description of Material	**SILTY GRAVEL (Sample 44% Oversize, Max correction is 35%)**
Remarks:	
Test Method	**ASTM D1557 Method C**

TEST RESULTS

Corrected Maximum Dry Density	**138.5**	**PCF**
Corrected Optimum Water Content	**7.0**	**%**
Corrected Percent Fines		**%**
Fraction > 19mm size	**35.0**	**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Mill Race	Terracon 4103 SE International Way, # 300 Portland, Oregon	PROJECT NUMBER: 82141005
SITE: Springfield, Oregon		CLIENT: AMEC
		EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V1 82141005 AMEC.GPJ MEASUREMENT FIELDS.GPJ 3/21/14

Summary of Laboratory Results

Attachment 6 to Addendum 1 Dated 06/16/15

BORING ID	Depth	USCS Classification and Soil Description	Compressive Strength (psi)	Liquid Limit	Plastic Limit	Plasticity Index	% <#200 Sieve	% Gravel	% Sand	% Silt	% Clay	Water Content (%)	Dry Density (pcf)
TP-2	19	Fat CLAY		60	26	34						38.8	
TP-4	3	Clayey GRAVEL with Sand (GC)					16.5	63.4	20.2			8.6	
TP-4	10	Fat CLAY		73	31	42						55.2	

(These lab tests are from the test pits are refered to in this report as TP-2 Deep and TP-4 Deep)

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. LAB SUMMARY: USCS 82125033 SPRINGFIELD MILL RACE.GPJ TERRACON2012.GDT 5/9/13

PROJECT: Springfield Mill Race

SITE: Springfield, Oregon

Terracon

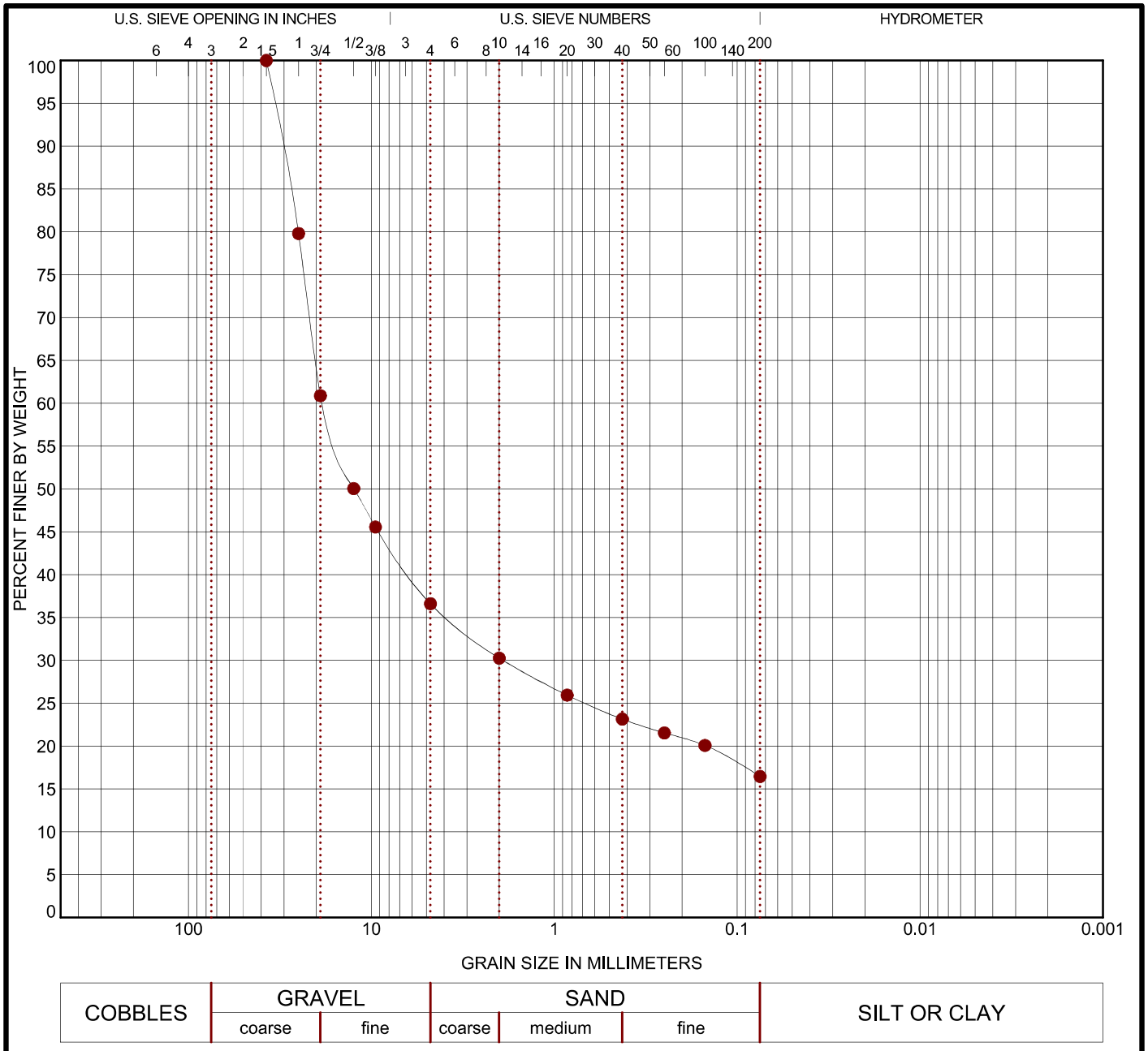
PROJECT NUMBER: 82125033

CLIENT: AMEC

GRAIN SIZE DISTRIBUTION

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
TP-4	3.0	Clayey GRAVEL with Sand (GC)					

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
TP-4	3.0	37.5	18.362	1.899		63.4	20.2	16.5	

PROJECT: Springfield Mill Race

SITE: Springfield, Oregon

Terracon

PROJECT NUMBER: 82125033

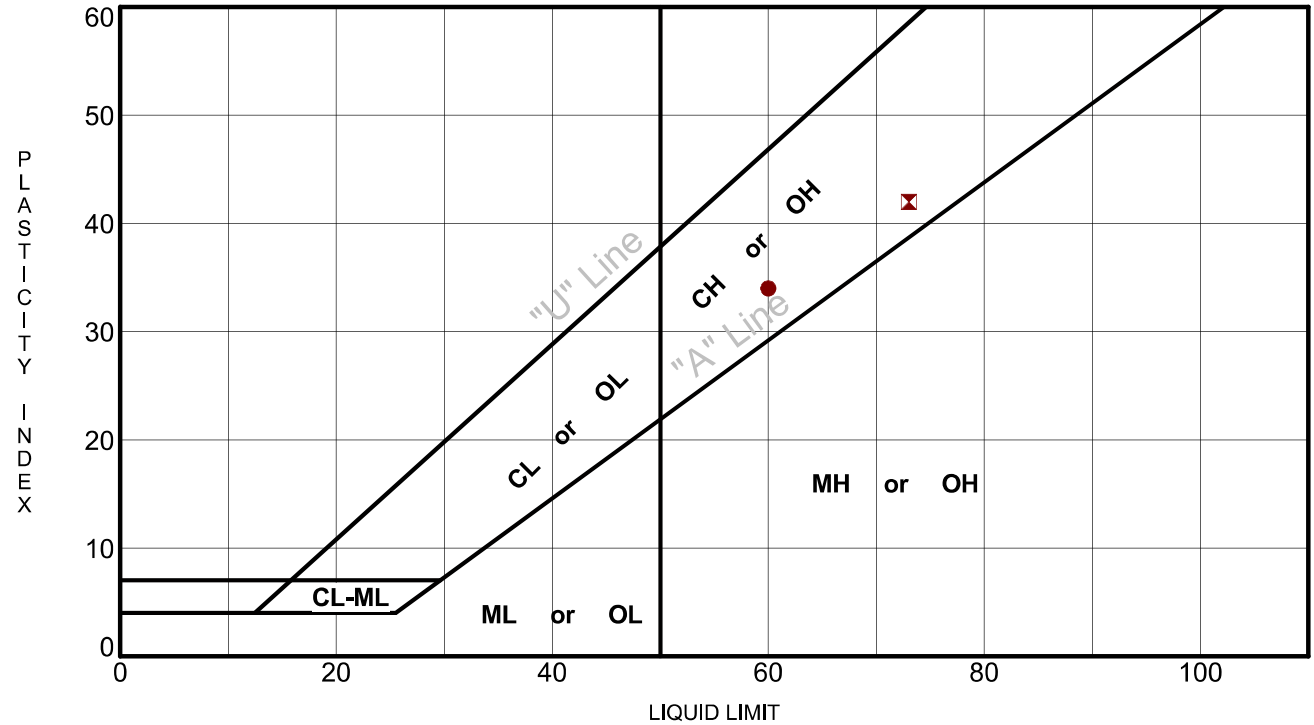
CLIENT: AMEC

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 82125033 SPRINGFIELD MILL RACE.GPJ FENCE PROJECT 1-8-13.GPJ 5/9/13

ATTERBERG LIMITS RESULTS

Attachment 6 to Addendum 1 Dated 06/16/15

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● TP-2	19.0	60	26	34		CH	Fat CLAY
⊠ TP-4	10.0	73	31	42		CH	Fat CLAY

PROJECT: Springfield Mill Race

SITE: Springfield, Oregon

Terracon

PROJECT NUMBER: 82125033

CLIENT: AMEC

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 82125033 SPRINGFIELD MILL RACE.GPJ FENCE PROJECT 1-8-13.GPJ 5/9/13