

# OPERATION & MAINTENANCE MANUAL

## Water Quality Biofiltration Swale

Manual prepared: Month/Year

DFI No. **D01483**



Figure 1: DFI No. D01483, looking [note cardinal direction]

## Identification

Drainage Facility ID (DFI): D01483  
Facility Type: Water Quality Biofiltration Swale  
Construction Drawings: (V-File Numbers) 55V-088  
Location: District: 2B  
Highway No.: 091  
Mile Post: 13.68 to 13.71, Center Median

### 1. Manual Purpose

The purpose of this manual is to outline inspection needs and summarize maintenance actions.

### 2. Facility Location

The location map below details the facility location. The highway, mile posts, side streets, access location, and stormwater flow directions are noted on the map.

Facility location type: Roadway median

Flow direction: West



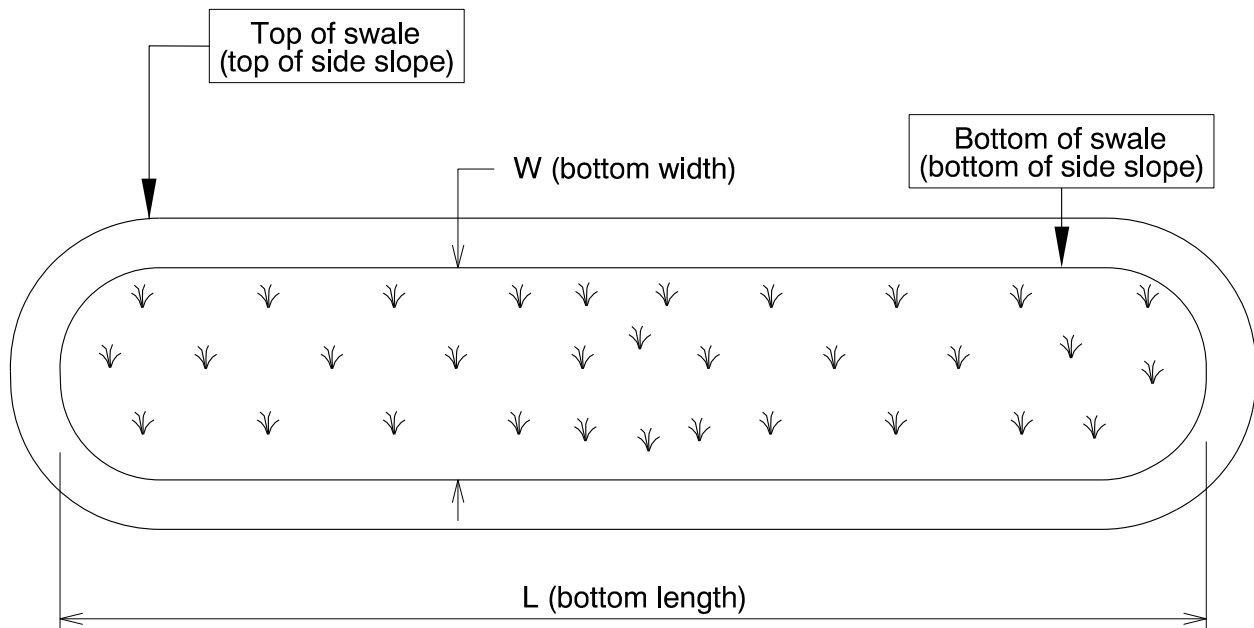
Figure 2: Facility location map

### 3. Facility Summary

The length and width of a swale is based on the bottom dimensions.

The bottom length and bottom width of the swale is:

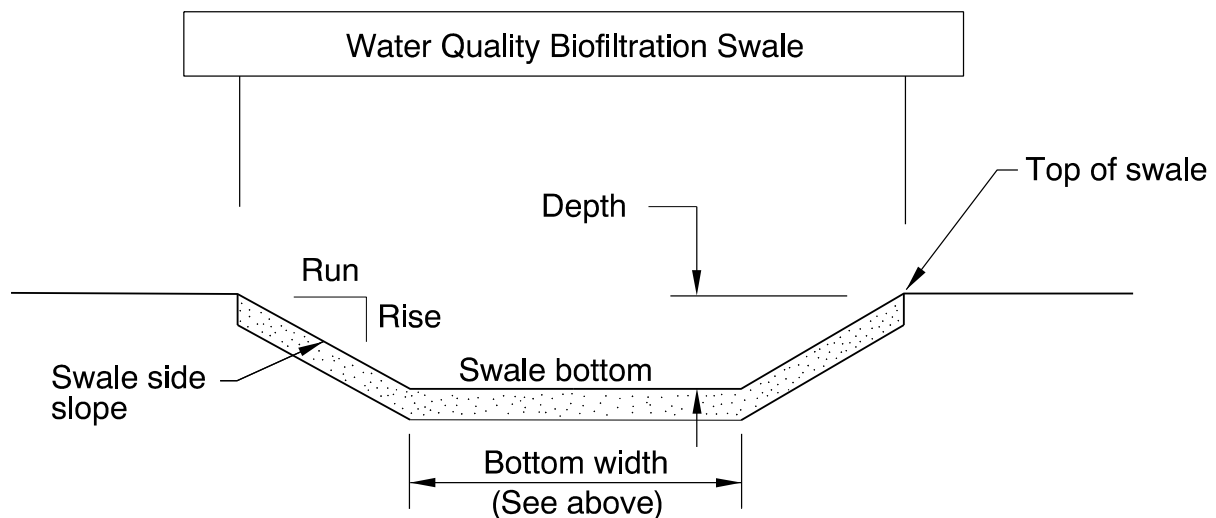
Bottom Length (feet)	Bottom Width (feet)
150	5



The depth of the swale is the vertical distance measured from the bottom of the swale to the top. The slope of the swale sides is presented by a vertical distance (rise) followed by the horizontal distance (run).

Depth and side slopes:

Depth (feet)	Rise (feet)	Run (feet)
2	1	4



**Site Specific Information:**

The swale is located within a center median along a portion of divided highway. There is an existing system of ditches and culverts which captures the flow from both sections of the highway and conveys it to the center median. The swale will be an enhanced section of the center ditch. It has contributing flow from the upstream center ditch as well as sheet flow from the pavement sections. Water flows from east to west (increasing milepost numbers). Treated water will continue downstream in the existing center median ditch and culverts. This swale is downstream of a second water quality treatment swale which begins at milepost 13.54 (DFI 1482).

#### 4. Facility Access

Maintenance access to the facility:

<input type="checkbox"/> Roadside pad	<input checked="" type="checkbox"/> Roadside shoulder
<input type="checkbox"/> Access road with Gate	<input type="checkbox"/> Access road without Gate

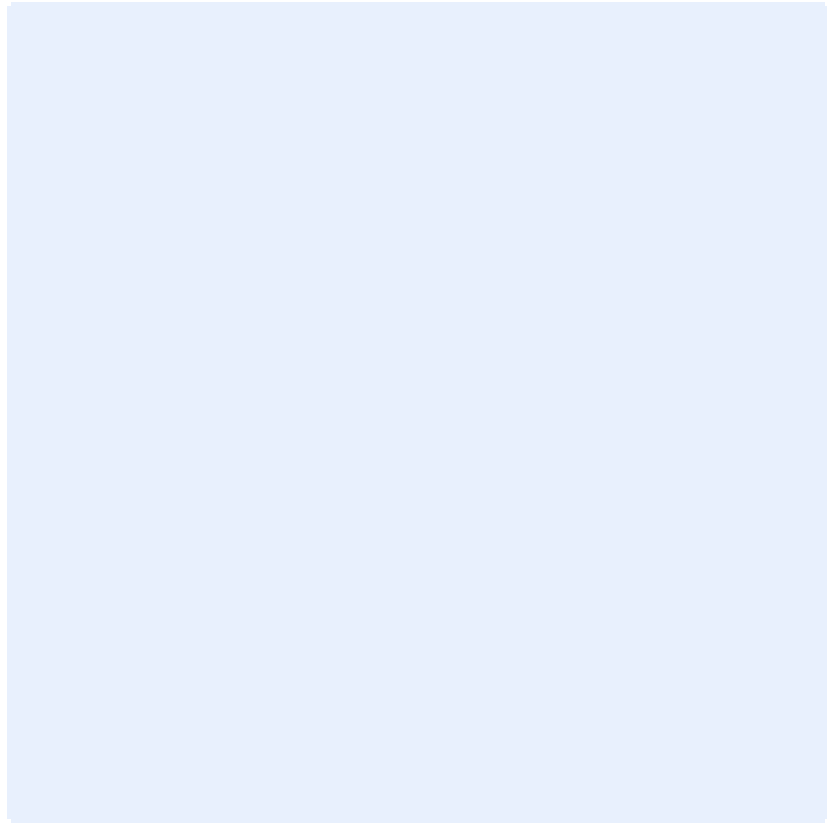


Figure 3: [insert post construction facility access photo and caption text]

#### 5. Operational Components / Maintenance Items

##### Classification

This facility is classified as an:

<input checked="" type="checkbox"/> <b>On-line Swale</b>	<input type="checkbox"/> <b>Off-line Swale</b>
<b>A swale that does not include a high flow bypass component; flow drains into and through the facility</b>	<b>A swale that treats low/small flows and diverts high flows using a bypass component</b>

## Bypass Component

This facility includes a high flow bypass component:

<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
There is no bypass component. High flows drains into and through the facility	There is a bypass component. Only low/small flows drain into the swale. High flows are diverted around the swale using a bypass component

## Operational Components

A swale has many components that assist with treatment, conveyance, and reducing flow velocity to minimize erosion. The components in use can vary depending if the facility was designed to operate on-line or off-line. The facility components table (**Table 1**) has been provided to highlight the applicable components for this facility. The component is in use when the box contains an “x” (e.g. ).

The Standard Operation Manual for Water Quality Biofiltration Swales (implemented March 2017) outlines facility operation, typical footprint configuration, and component definitions and details. A link to the manual is attached to the feature marker in TransGIS.

<https://gis.odot.state.or.us/TransGIS/>

## Operational Plan

The applicable standard operational plan for this facility is:

<input checked="" type="checkbox"/> Operational Plan A	<input type="checkbox"/> Operational Plan B	<input type="checkbox"/> Operational Plan C
An on-line swale with roadside ditches	An on-line swale with piped inlets and outlets	An off-line swale with a piped high flow bypass
A standard operational plan illustrates the general facility footprint configuration and explains the purpose of each facility component. Operational plans (A, B, C) are provided in the Standard Operation Manual.		

See Appendix A for the site specific operational plan.

## Maintenance Items

Operational components marked in **Table 1** should be inspected and maintained according to Section 7. Each facility component is defined and detailed in the Standard Operation Manual using the associated ID number indicated below.

<b>Table 1: Swale Components</b>		<b>ID #</b>
<b>Manholes/Structures</b>		
Pre-treatment manhole	<input type="checkbox"/>	<b>S1</b>
Weir type flow splitter/flow splitter manhole	<input type="checkbox"/>	<b>S2</b>
Orifice type flow splitter/flow splitter manhole	<input type="checkbox"/>	<b>S3</b>
Standard manhole	<input type="checkbox"/>	<b>S4</b>
<b>Swale Inlet</b>		
Pavement sheet flow	<input checked="" type="checkbox"/>	<b>S5</b>
Inlet Pipe (s)	<input type="checkbox"/>	<b>S6</b>
Open channel inlet	<input checked="" type="checkbox"/>	<b>S7</b>
Riprap pad	<input type="checkbox"/>	<b>S8</b>
<b>Ground Cover</b>		
Grass bottom	<input checked="" type="checkbox"/>	<b>S9</b>
Grass side slopes	<input checked="" type="checkbox"/>	<b>S10</b>
Granular drain rock	<input type="checkbox"/>	<b>S11</b>
Plantings	<input type="checkbox"/>	<b>S12</b>
<b>Underground Components</b>		
Geotextile fabric	<input type="checkbox"/>	<b>S13</b>
Water quality mix	<input checked="" type="checkbox"/>	<b>S14</b>
Perforated pipe	<input type="checkbox"/>	<b>S15</b>
Porous pavers (access grid)	<input checked="" type="checkbox"/>	<b>S16</b>
<b>Flow Spreader</b>		
Rock basin (used at inlet)	<input type="checkbox"/>	<b>S17</b>
Anchored board (midpoint of swale or every 50 feet along swale bottom)	<input checked="" type="checkbox"/>	<b>S18</b>
Other:	<input type="checkbox"/>	<b>S19</b>
<b>Swale Outlet</b>		
Catch basin with grate	<input type="checkbox"/>	<b>S20</b>
Outlet Pipe (s)	<input type="checkbox"/>	<b>S21</b>
Open channel outlet	<input checked="" type="checkbox"/>	<b>S22</b>
Auxiliary Outlet: describe type	<input type="checkbox"/>	<b>S23</b>
<b>Outfall Type</b>		
Waterbody (Creek/Lake/Ocean)	<input type="checkbox"/> <b>C</b>	<b>S24</b>
	<input type="checkbox"/> <b>L</b>	
	<input type="checkbox"/> <b>O</b>	
Ditch	<input checked="" type="checkbox"/>	<b>S25</b>
Storm drain system	<input type="checkbox"/>	<b>S26</b>
<b>Outfall Components</b>		
Riprap pad	<input type="checkbox"/>	<b>S27</b>
Riprap bank protection	<input type="checkbox"/>	<b>S28</b>

## 6. Maintenance

### Maintenance Frequency/Maintain Records

- a. Inspect annually. Preferably prior to the rainy season.
- b. Clean and maintain as necessary. Refer to Activity 125 for conditions when maintenance is needed.
- c. Keep a record of inspections, maintenance, and repairs.

### Maintenance Guide/Maintenance Actions

The ODOT Routine Road Maintenance Water Quality and Habitat Guide (the *Blue Book*) outlines the standard maintenance actions for water quality facilities under Activity 125.

There are standard maintenance tables for standard ODOT designs. The maintenance tables describe the maintenance component, the defect or problem, the condition when maintenance is needed, and the recommended maintenance to correct the problem. Use the following tables to maintain ODOT swales:

- Table 1 (General Maintenance): Contains general maintenance and inspection guidelines that are applicable to all ODOT water quality facilities
- Table 3 (Maintenance of Water Quality or Biofiltration Swales): Contains maintenance information for swales

The *Blue Book* can be viewed at the following website:

[http://www.oregon.gov/ODOT/Maintenance/Documents/blue\\_book.pdf](http://www.oregon.gov/ODOT/Maintenance/Documents/blue_book.pdf)

## 7. Limitations

Access grid installed:

<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
There are <b>Medium</b> porous pavers installed in this swale	

Swales are designed to allow equipment access along the bottom. If an access grid is **NOT** installed, vehicles entering the swale can create depressions (tire ruts), damage vegetation, and damage structural components (e.g. flow spreaders). These conditions may result in poor treatment and drainage performance.

Equipment wheels should be kept on the tops and side slopes. Mower arms may be run along the swale bottom.



## 8. Waste Material Handling

Material removed from the facility is defined as waste by the Department of Environmental Quality (DEQ). Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options:

[http://www.oregon.gov/ODOT/Maintenance/Documents/ems\\_manual.pdf](http://www.oregon.gov/ODOT/Maintenance/Documents/ems_manual.pdf)

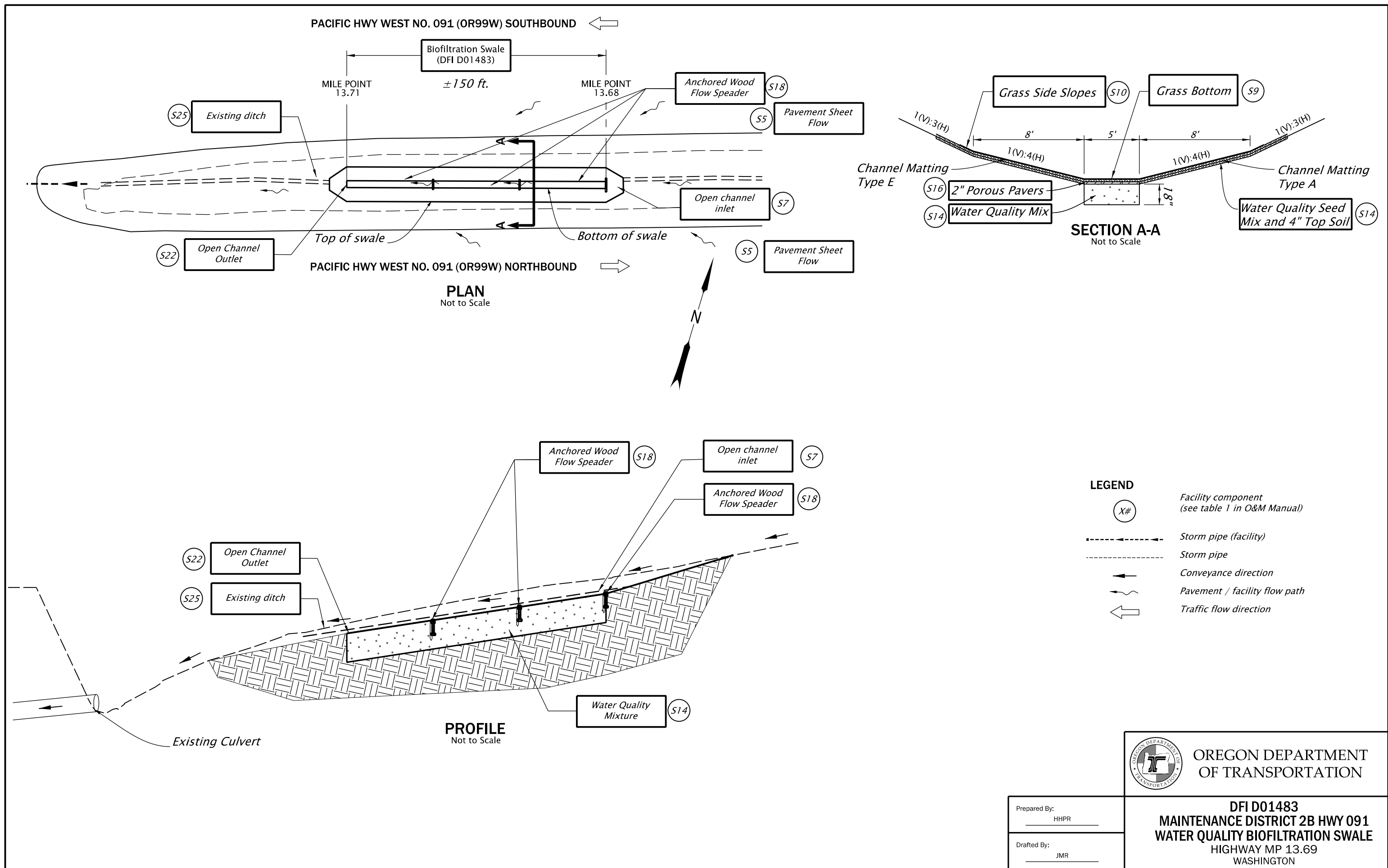
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442
ODOT Region 1 Hazmat Coordinator	(503) 731-8290
ODOT Region 2 Hazmat Coordinator	(503) 986-2647
ODOT Region 3 Hazmat Coordinator	(541) 957-3594
ODOT Region 4 Hazmat Coordinator	(541) 388-6186
ODOT Region 5 Hazmat Coordinator	(541) 963-1590
ODEQ Northwest Region Office	(503) 229-5263

## **A Appendix A – Site Specific Operational Plan**

### **Contents:**

**Operational Plan: DFI D01483**



OREGON DEPARTMENT OF TRANSPORTATION

Prepared By:  
HHPR

Drafted By:  
JMR

**DFI D01483**  
**MAINTENANCE DISTRICT 2B HWY 091**  
**WATER QUALITY BIOFILTRATION SWALE**  
HIGHWAY MP 13.69  
WASHINGTON

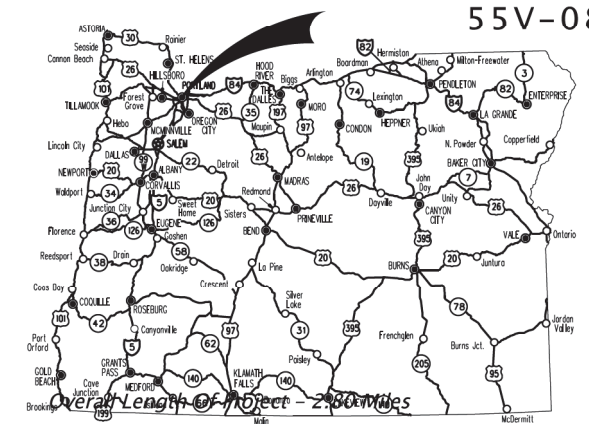
## **B Appendix B – Project Contract Plans**

### **Contents:**

**Site Specific Subset of Project Contract Plan 55V-088**

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
A01	Title Sheet
A02 & A03	Index Of Sheets Cont.
A03 & A04	Std. Dwg. No and R/W Maps

STATE OF OREGON  
**DEPARTMENT OF TRANSPORTATION**  
 PLANS FOR PROPOSED PROJECT  
**GRADING, DRAINAGE, STRUCTURES, PAVING, CURB RAMPS, PAVEMENT MARKINGS, SIGNING, SIGNALS & ROADSIDE DEVELOPMENT**  
**OR99W: I-5 - MCDONALD ST SECTION**  
**PACIFIC HIGHWAY WEST**  
 WASHINGTON & MULTNOMAH COUNTIES  
 OCTOBER 2022



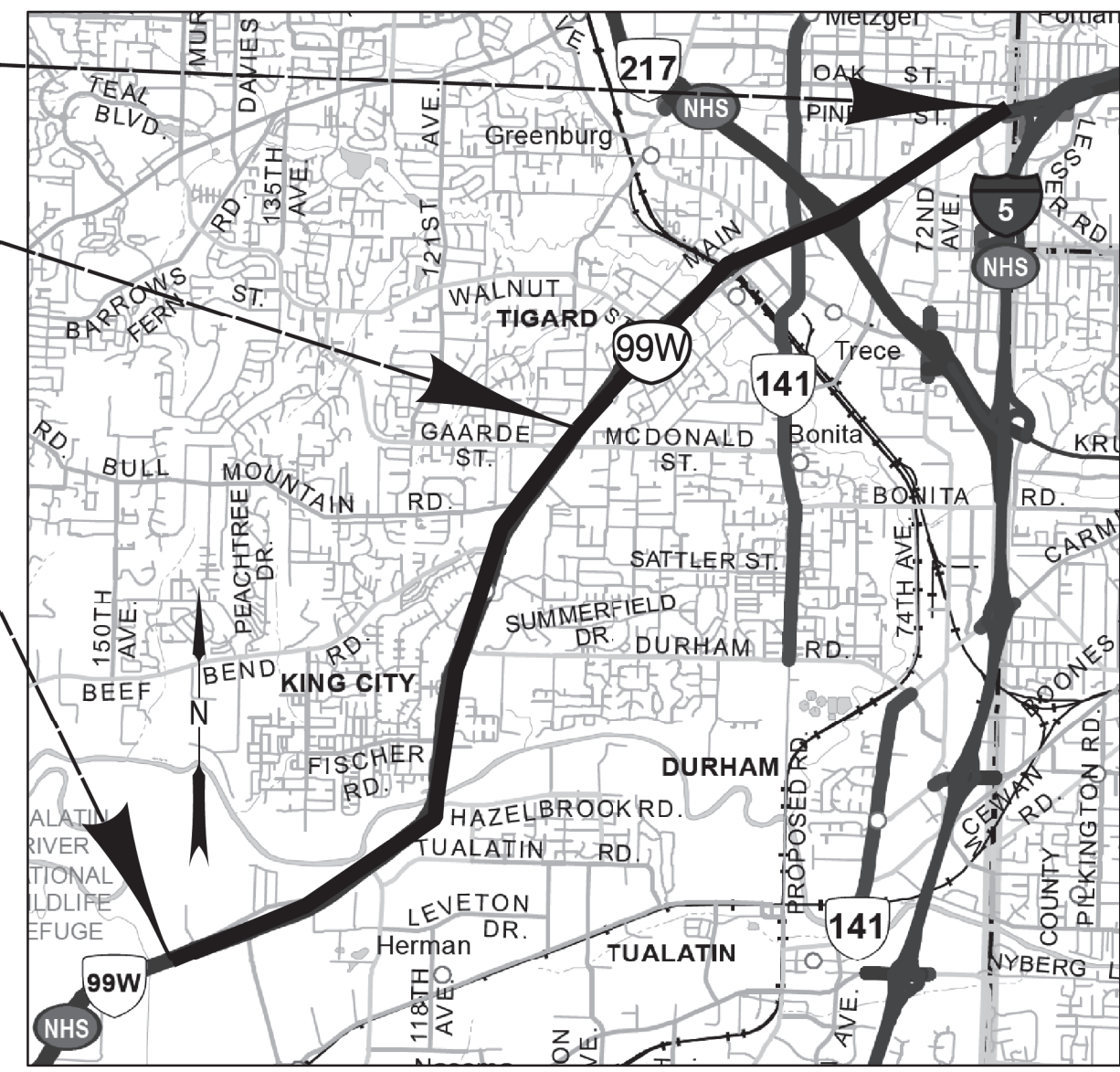
**ATTENTION:**  
 Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0001 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center (Note: The Telephone Number For The Oregon Utility Notification Center Is (503) 232-1987).



**BEGINNING OF PROJECT**  
**STA "B" 191+45.46 (MP 7.46)**

**END OF PROJECT**  
**STA "L" 140+59.02. (MP 10.26)**

**END OF CONTRACT**  
**STA "Ls" 325+50.00. (MP 13.72)**



PLANS PREPARED FOR  
 OREGON DEPARTMENT OF TRANSPORTATION

**HHPR** Harper Houf Peterson  
 Righellis Inc.  
ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS  
 201 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

OREGON TRANSPORTATION COMMISSION

Robert Van Brocklin Alando Simpson Julie Brown Sharon Smith Marclynn Burke Kristopher W. Strickler	CHAIR VICE-CHAIR COMMISSIONER COMMISSIONER COMMISSIONER DIRECTOR OF TRANSPORTATION
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These plans were developed using ODOT design standards. Exceptions to these standards, if any, have been submitted and approved by the ODOT Chief Engineer or their delegated authority.

Approving Authority: Digitally signed by Aaron Isenhart  
 Date: 2022.08.02 13:45:16-07'00'

Signature & date  
 Aaron J. Isenhart, PE  
 Consultant Associate Principal

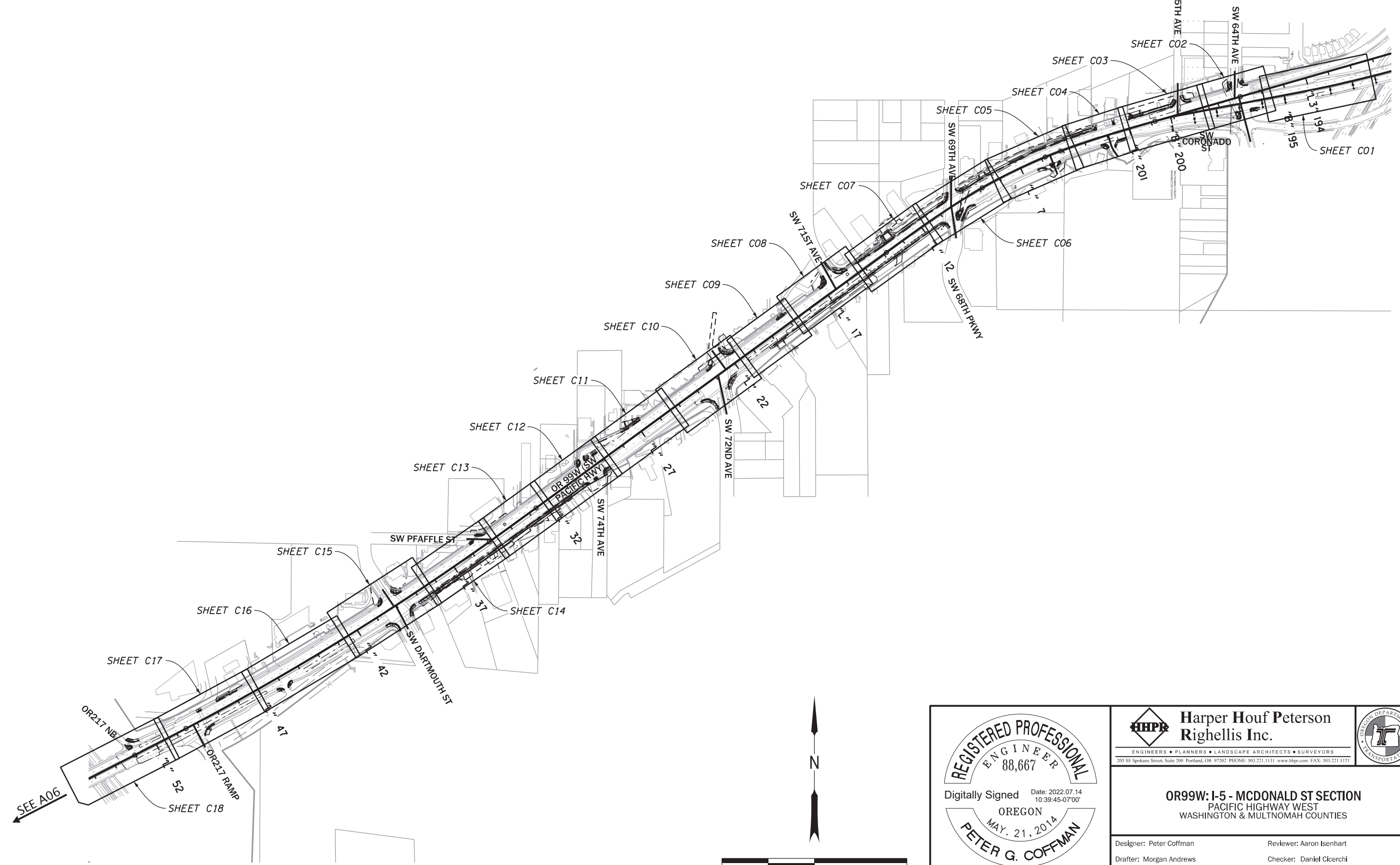
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 -07'00'

Concurrence by ODOT Chief Engineer

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**OR99W: I-5 - MCDONALD ST SECTION**  
 PACIFIC HIGHWAY WEST  
 WASHINGTON & MULTNOMAH COUNTIES

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	S091(090)	A01



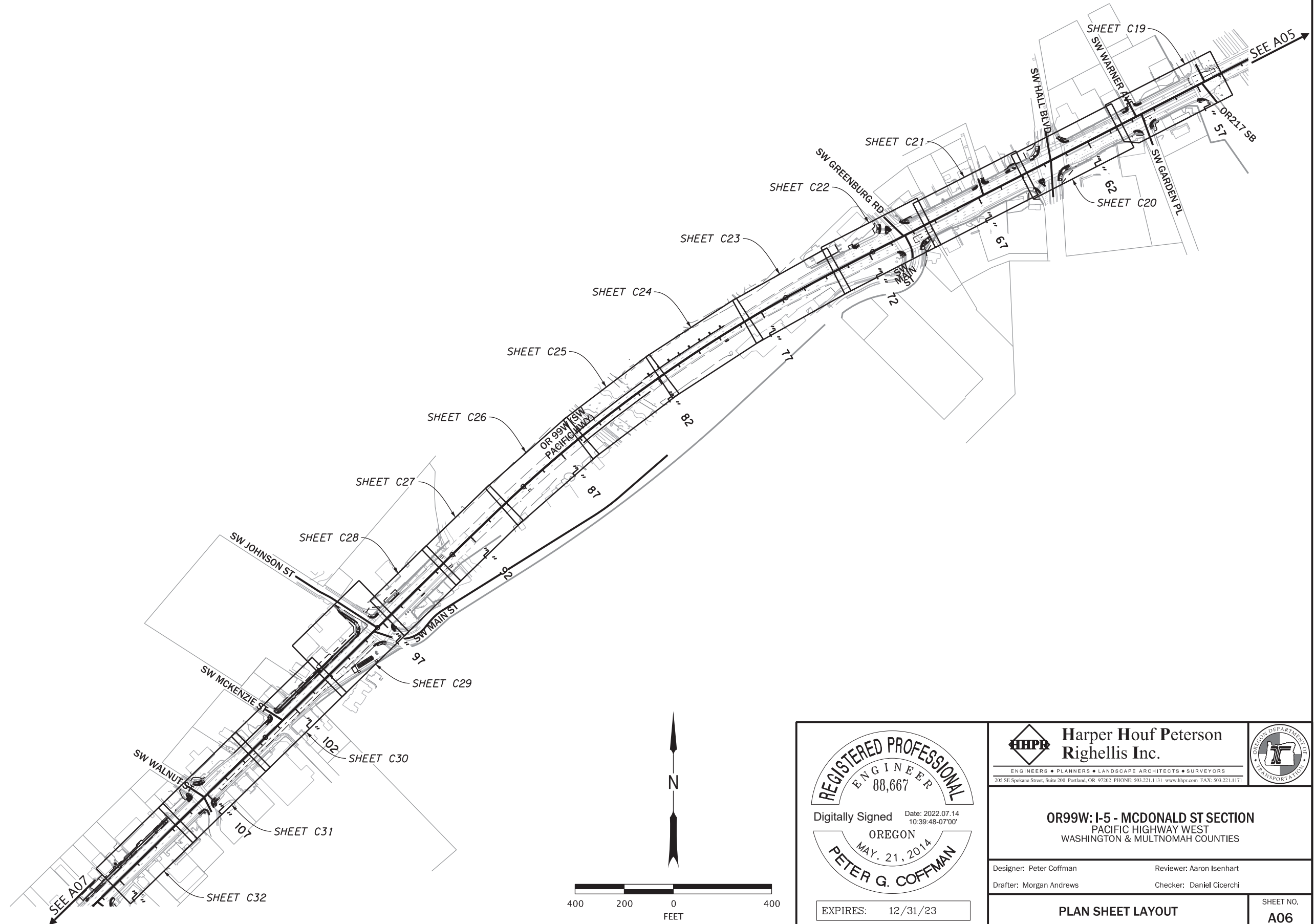
**REGISTERED PROFESSIONAL ENGINEER**  
 88,667  
 Digitally Signed Date: 2022.07.14 10:39:45-07'00"  
 OREGON  
 MAY. 21, 2014  
**PETER G. COFFMAN**  
 EXPIRES: 12/31/23

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**OR99W: I-5 - MCDONALD ST SECTION**  
 PACIFIC HIGHWAY WEST  
 WASHINGTON & MULTNOMAH COUNTIES

Designer: Peter Coffman Reviewer: Aaron Isenhart  
 Drafter: Morgan Andrews Checker: Daniel Cicerchi

**PLAN SHEET LAYOUT** SHEET NO. **A05**



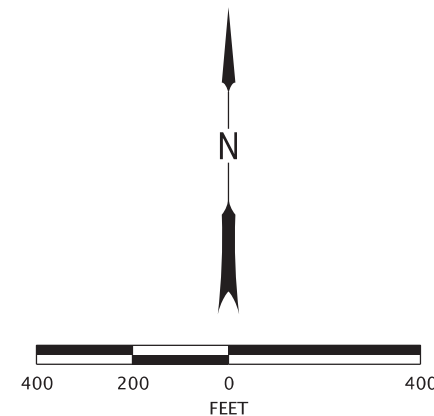
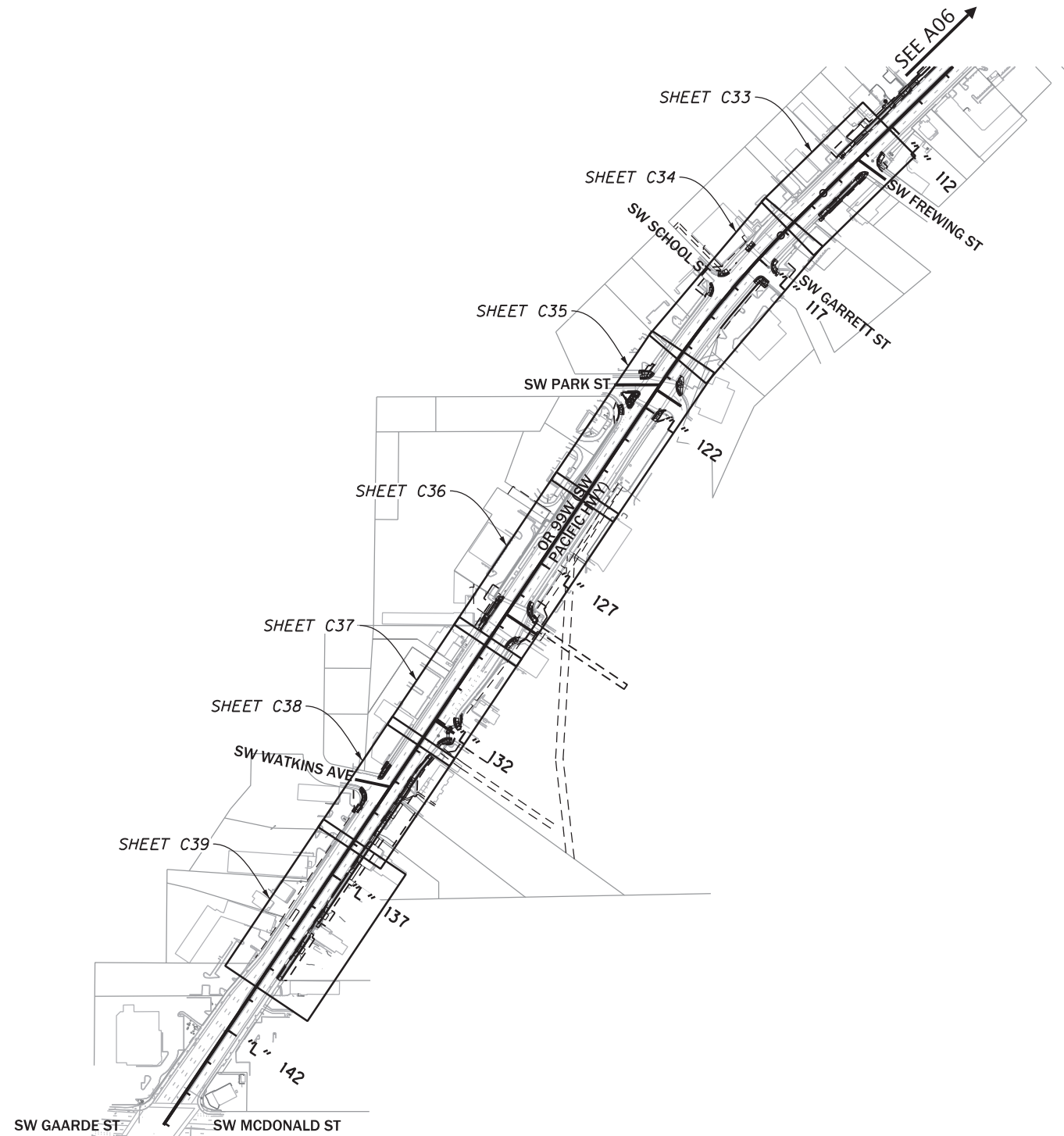
**REGISTERED PROFESSIONAL ENGINEER**  
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 OREGON  
 MAY. 21, 2014  
**PETER G. COFFMAN**  
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 205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

**OR99W: I-5 - MCDONALD ST SECTION**  
 PACIFIC HIGHWAY WEST  
 WASHINGTON & MULTNOMAH COUNTIES

Designer: Peter Coffman Reviewer: Aaron Isenhart  
 Drafter: Morgan Andrews Checker: Daniel Cicerchi

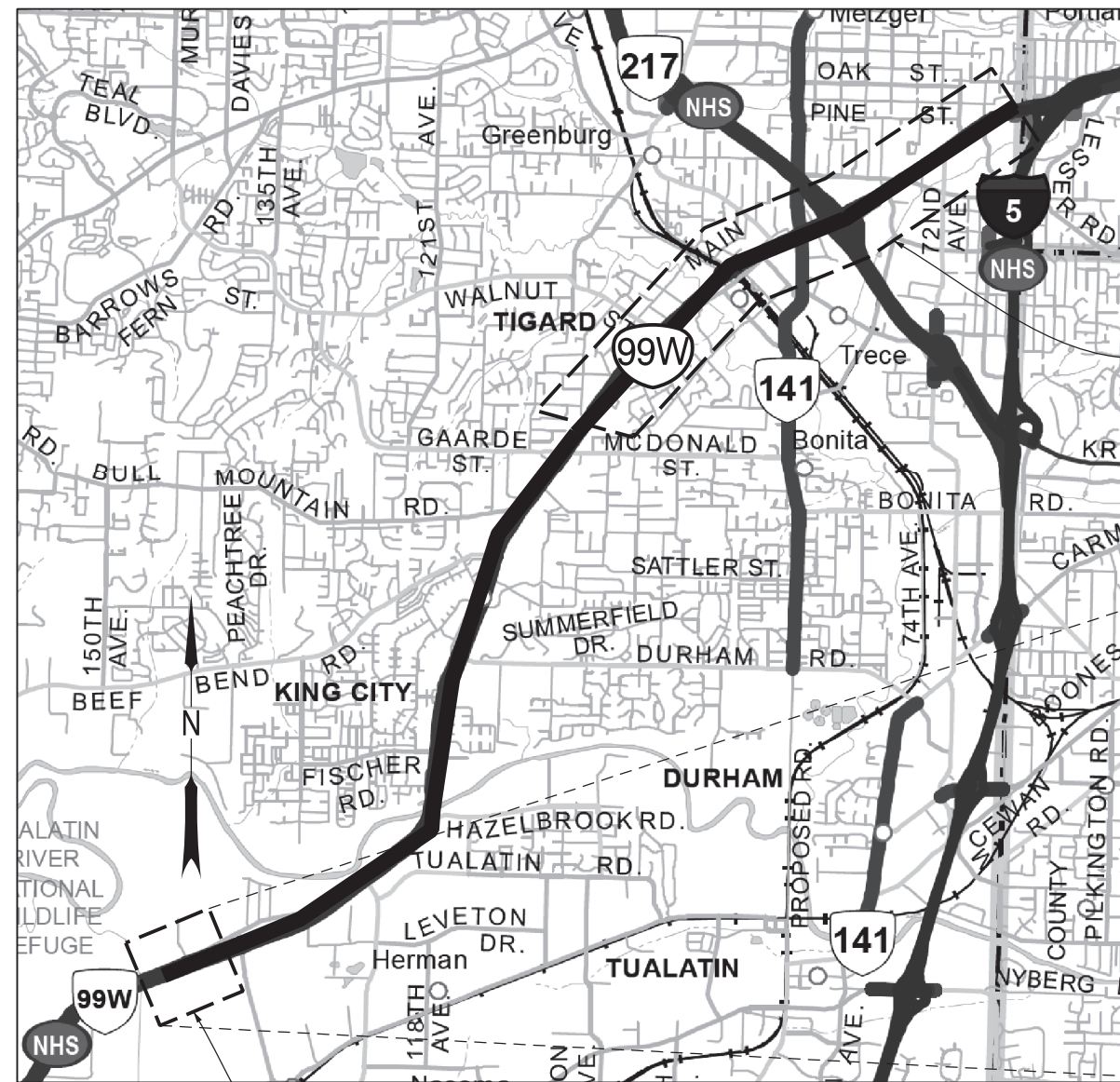
**PLAN SHEET LAYOUT** SHEET NO. **A06**



**REGISTERED PROFESSIONAL**  
**ENGINEER**  
 88,667  
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 OREGON  
 MAY. 21, 2014  
**PETER G. COFFMAN**  
 EXPIRES: 12/31/23

<b>Harper Houf Peterson Righellis Inc.</b> <small>ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS</small> <small>205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171</small>		
<b>OR99W: I-5 - MCDONALD ST SECTION</b> PACIFIC HIGHWAY WEST WASHINGTON & MULTNOMAH COUNTIES		
<small>Designer: Peter Coffman</small> <small>Drafter: Morgan Andrews</small>	<small>Reviewer: Aaron Isenhart</small> <small>Checker: Daniel Cicerchi</small>	<small>SHEET NO.</small> <b>A07</b>
<b>PLAN SHEET LAYOUT</b>		

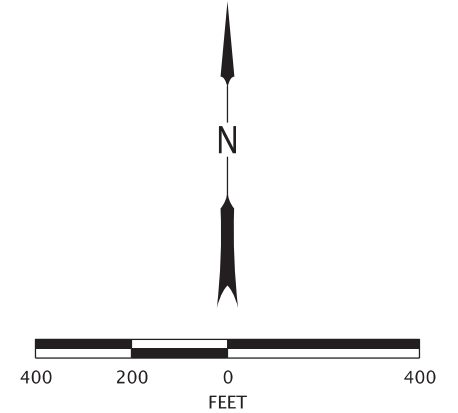
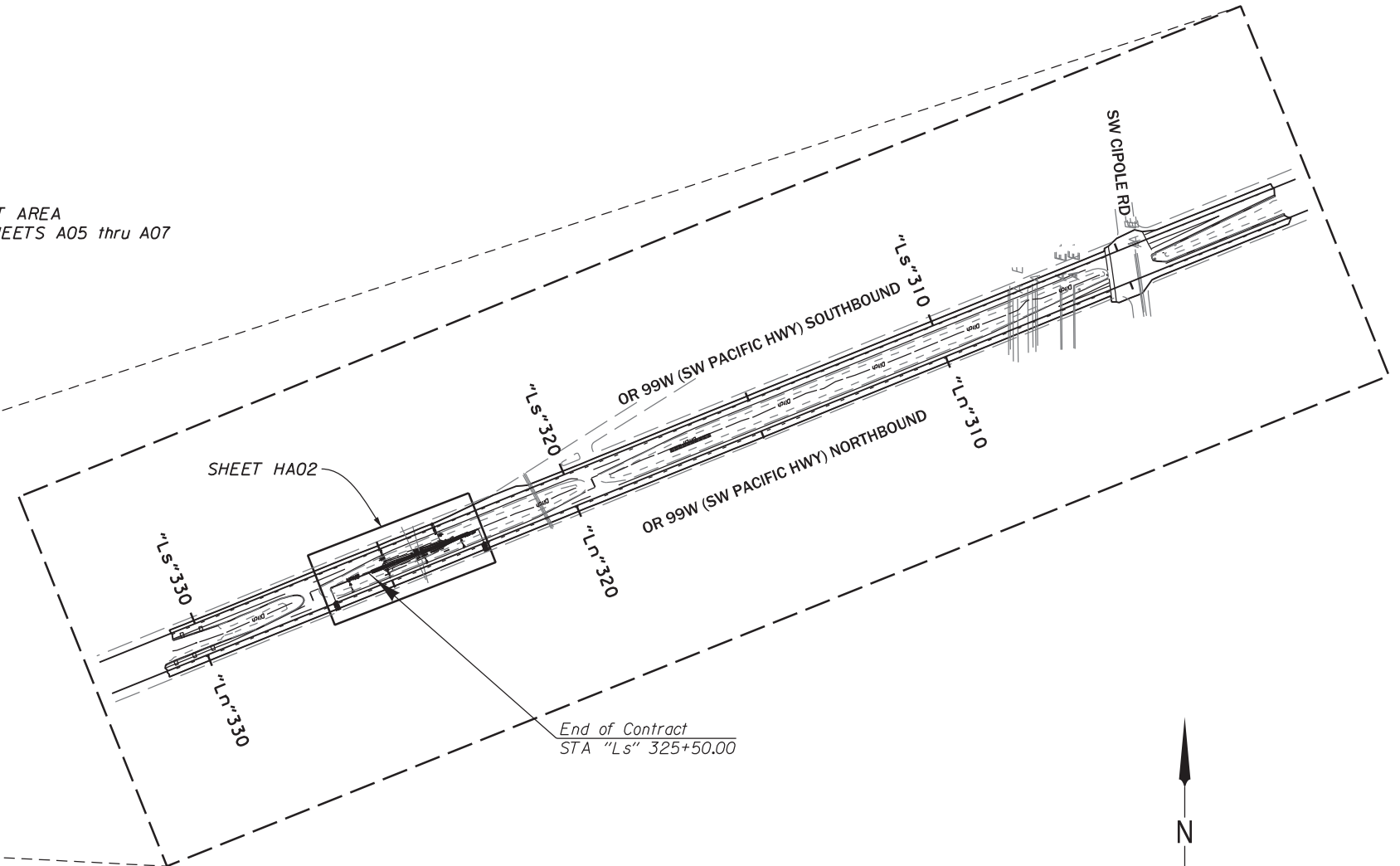




VICINITY MAP

STORMWATER SHEETS  
SEE THIS SHEET

PROJECT AREA  
SEE SHEETS A05 thru A07



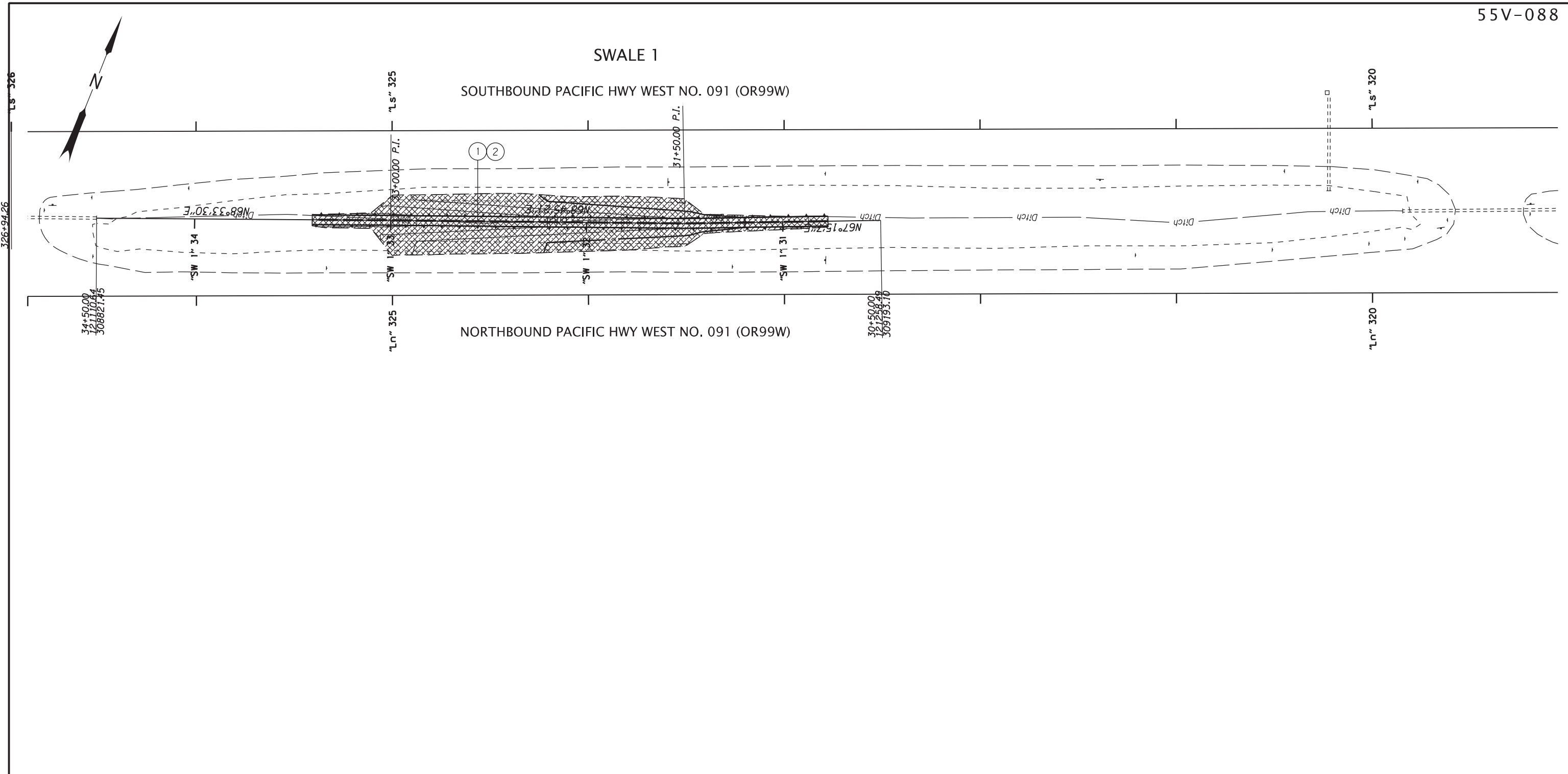
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OREGON  
MAY. 21, 2014  
**PETER G. COFFMAN**  
EXPIRES: 12/31/23

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ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS  
205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

**OR99W: I-5 - MCDONALD ST SECTION**  
PACIFIC HIGHWAY WEST  
WASHINGTON & MULTNOMAH COUNTIES

Designer: Peter Coffman Reviewer: Aaron Isenhart  
Drafter: Morgan Andrews Checker: Daniel Cicerchi

**PLAN SHEET LAYOUT** SHEET NO. **A08**



**CONSTRUCTION NOTES**

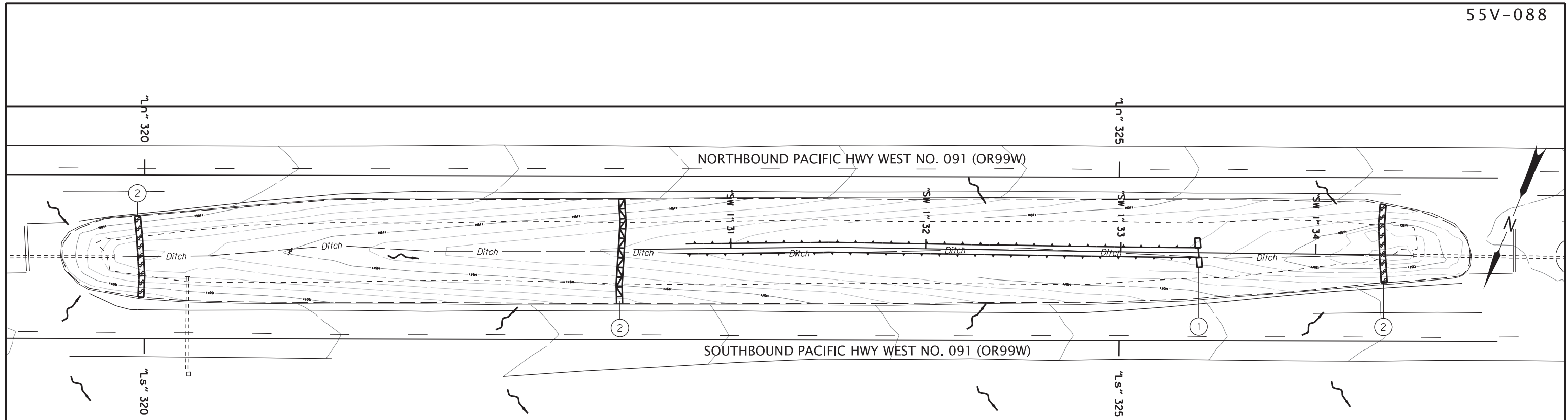
- ① Install water quality seeding as shown, 0.123 acre
- ② Place 4" deep top soil in seeded areas, 66.4 cuyd



Note: See HA02 & HA10 for swale construction

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Jeffery P. Creel  
**OREGON**  
**LANDSCAPE ARCHITECT**  
EXPIRES: 05/31/23

<b>Harper Houf Peterson Righellis Inc.</b> <small>ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS                  205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171</small>		
<b>OR99W: I-5 - MCDONALD ST SECTION</b> PACIFIC HIGHWAY WEST WASHINGTON & MULTNOMAH COUNTIES		
Designer: Jeff Creel Drafter: HHPR	Reviewer: Peter Coffman Checker: Aaron Isenhart	
<b>ROADSIDE DEVELOPMENT</b>		SHEET NO. <b>FA12</b>



**LEGEND**

- ..... Fill slope
- Cut slope
- Check Dam, type 2
- Sediment barrier, compost sock
- Flow direction
- xxxft--- Ex. 1' Maj. Contour
- xxxft--- Ex. 1' Minor. Contour
- xxxft--- Prop. 1' Maj. Contour
- xxxft--- Prop. 1' Minor. Contour

**CONSTRUCTION NOTES**

- ① Inst. check dam, type 2  
(See dwg. no RD1006)
- ② Inst. sediment barrier, type 8  
(See dwg. no RD1032)

Note: See HA02 & HA10 for swale construction

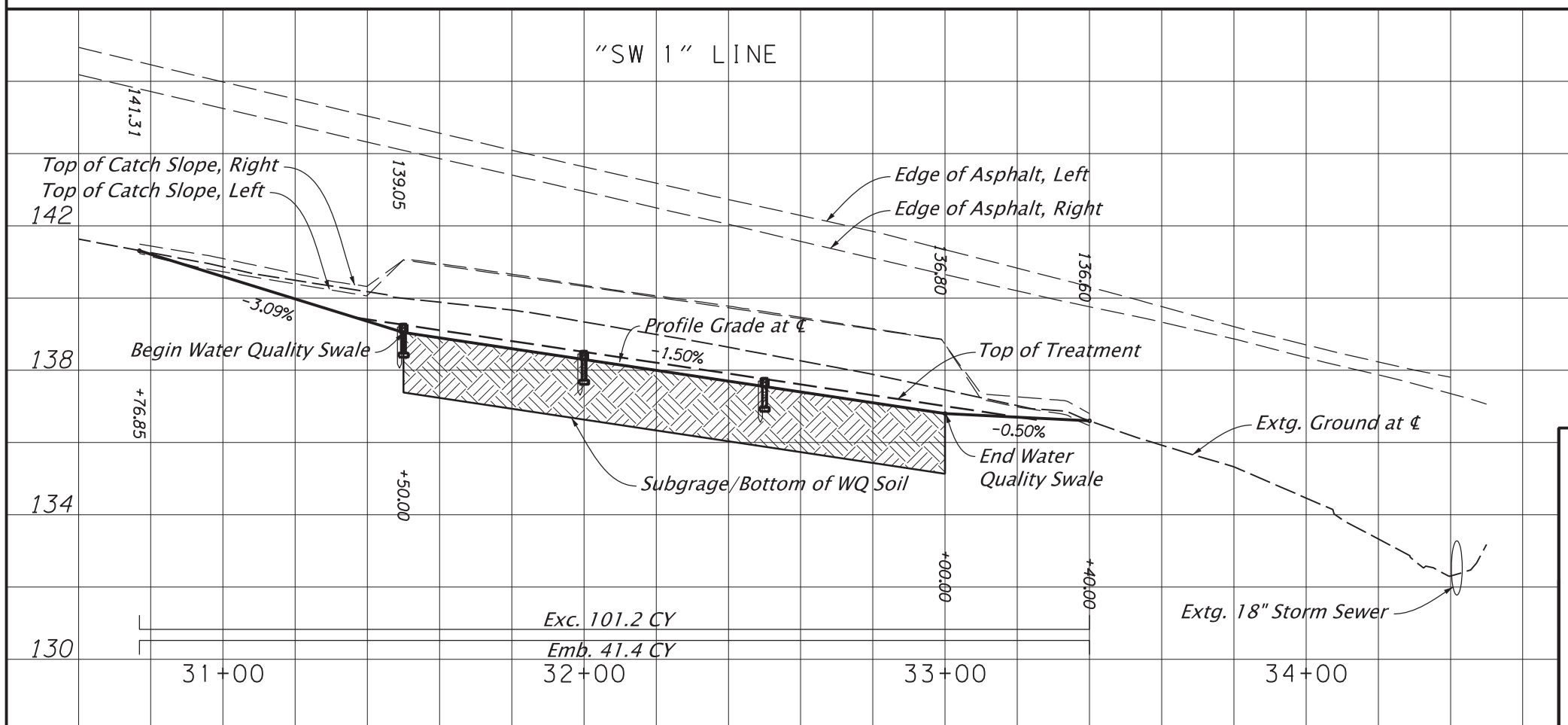
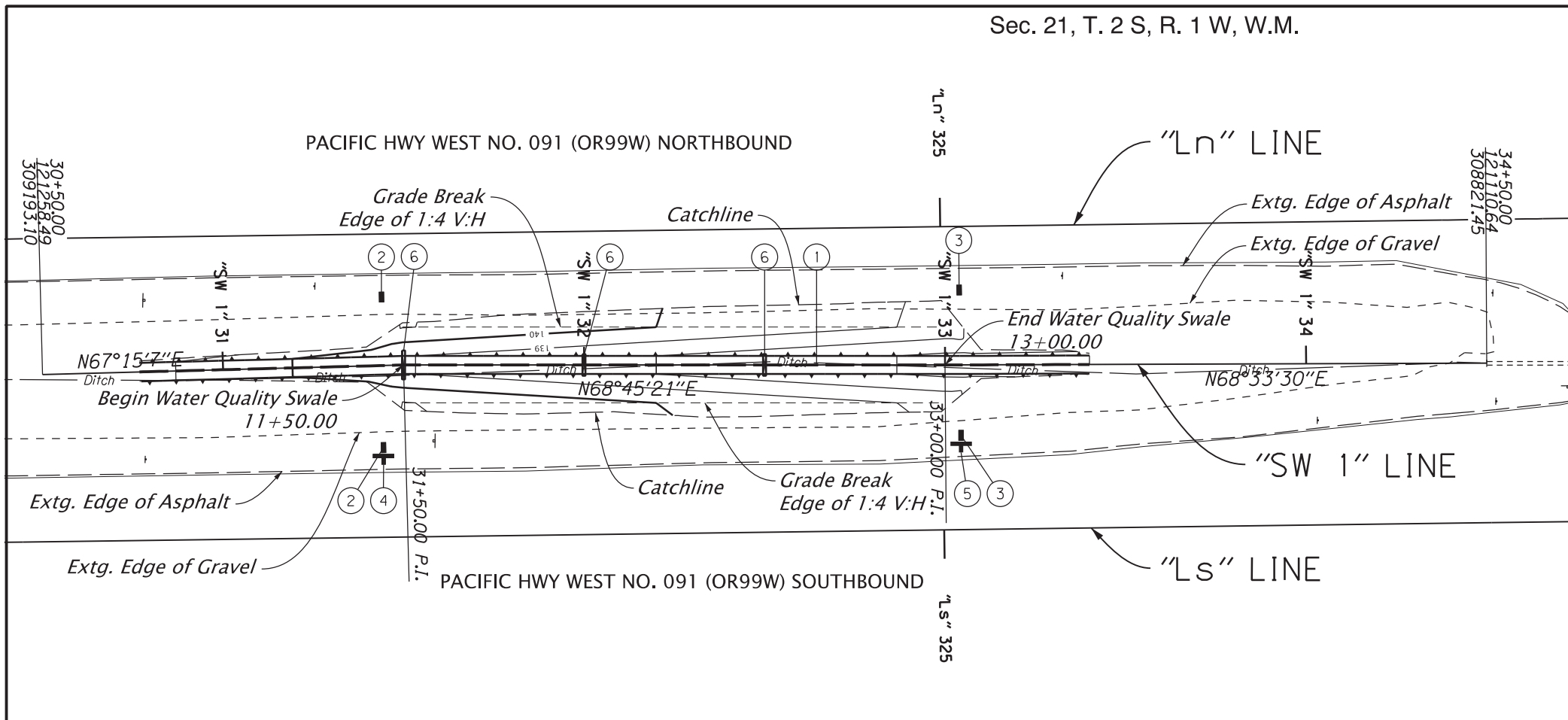
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OREGON  
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**PETER G. COFFMAN**

EXPIRES: 12/31/23

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<b>OR99W: I-5 - MCDONALD ST SECTION</b> PACIFIC HIGHWAY WEST WASHINGTON & MULTNOMAH COUNTIES		
Designer: Jeff Creet Drafter: HHPR	Reviewer: Peter Coffman Checker: Aaron Isenhardt	SHEET NO. <b>FB12</b>
<b>EROSION AND SEDIMENT CONTROL PLAN</b>		

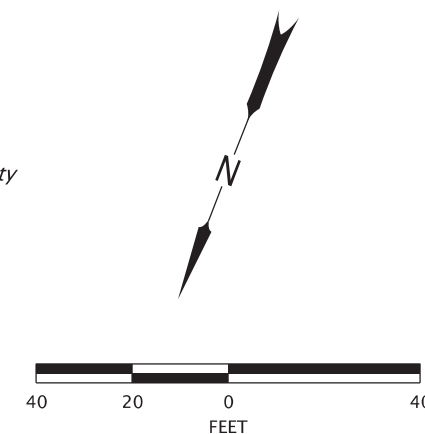
CONSTRUCTION NOTES

- ① "SW 1" Sta. 31+50 to 33+00  
Const. Water Quality Swale - 5' wide  
Inst. water quality mix - 18" thkn.  
Inst. porous pavers - 2" thkn.  
(For details, see shts. FA12, FB12, & HA10)
- ② "Ls" Sta. 323+45  
Inst. stormwater facility marker,  
type S1, red - 2
- ③ "Ls" Sta. 325+05  
Inst. stormwater facility marker,  
type S1, green - 2
- ④ "Ls" Sta. 323+45, 50' Rt.  
Inst. stormwater facility marker in median  
at facility start, type S2  
DFI # D01483
- ⑤ "Ls" Sta. 325+05, 50' Rt.  
Inst. stormwater facility marker in median  
at facility stop, type S2  
DFI # D01483
- ⑥ Inst. anchored board flow spreader,  
+/- 50' spacing - 3  
(For details, see HA10)



General Notes:

- 1) All items shown are incidental to Water Quality Bioretention Swale Bid Item.
- 2) Coordinate with Engineer for grading at beginning and end of swale and around existing utilities.
- 3) All imported fill will be clean and free of debris.
- 4) Roadway stationing (Ls and Ln Lines) has not been fully resolved and is based on as-built data.



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88,667  
Digitally Signed Date: 2022.08.05 12:10:27-0700  
OREGON  
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**PETER G. COFFMAN**  
EXPIRES: 12/31/23

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ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS  
205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

**OR99W: I-5 - MCDONALD ST SECTION**  
PACIFIC HIGHWAY WEST  
WASHINGTON & MULTNOMAH COUNTIES

Designer: Morgan K. Andrews      Reviewer: Aaron J. Isenhart  
Drafter: HHPR      Checker: Peter G. Coffman

**WATER QUALITY FACILITY PLAN & PROFILE**

SHEET NO.  
HA02

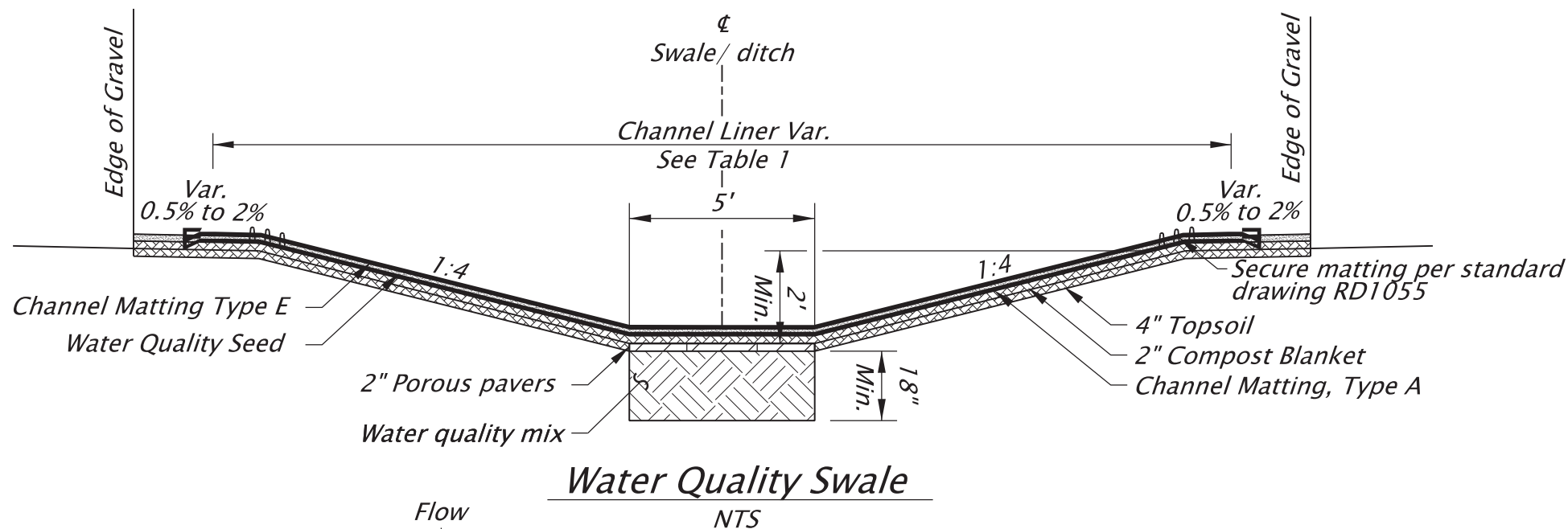


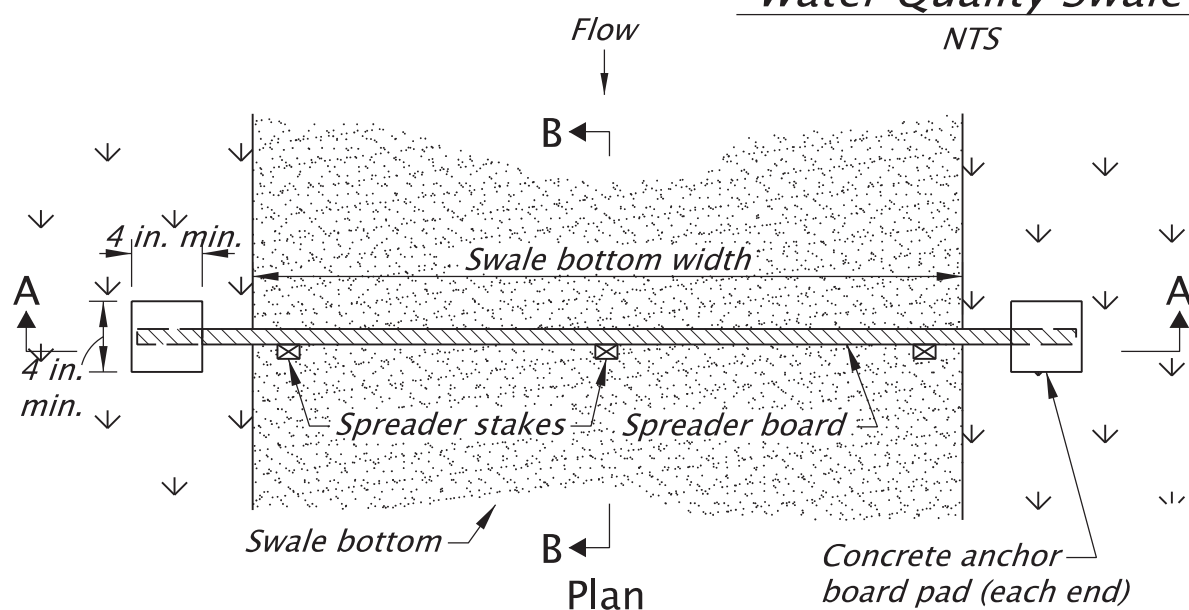
Table 1 - Channel Lining Widths

Swale #	Width of Lining
Swale 1	16'

Table 2 - Stormwater Field Markers

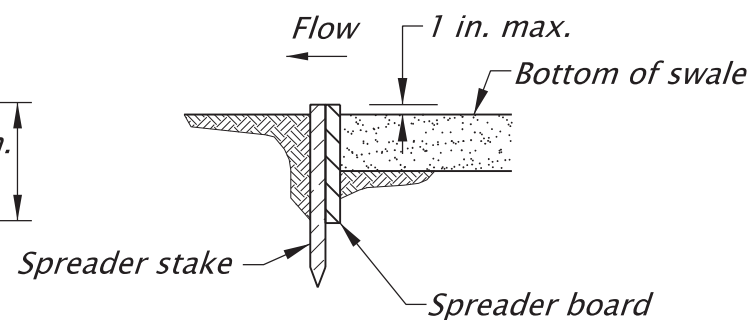
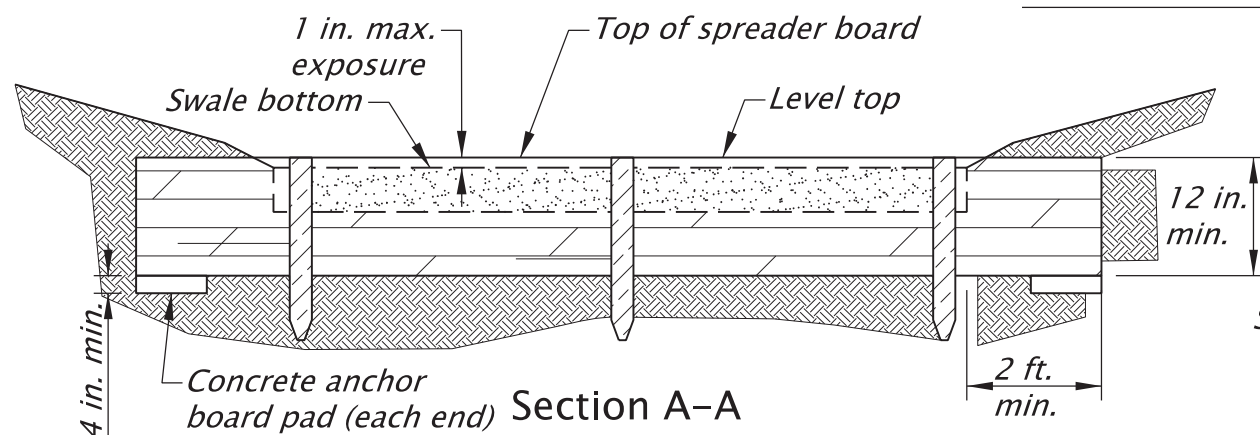
FACILITY LOCATION		DFI #	TYPE S2 MARKER LOCATION		TYPE S1 MARKER	
STATION	MP		BEGIN	END	RED	GREEN
"L" 98+44.00	9.48	D01498			✓	
"L" 99+23.00	9.49	D01498				✓
"L" 98+50.00	9.48	D01498	✓			
"L" 99+30.50	9.49	D01498		✓		
"Ls" 323+45.00	13.68	D01483	✓		✓	
"Ls" 325+05.00	13.71	D01483		✓		✓

Check where appropriate  
 Red = Beginning of facility  
 Green = End of facility



Anchored Board Flow Spreader

NTS



Section B-B

REGISTERED PROFESSIONAL ENGINEER  
 88,667  
 Digitally Signed Date: 2022.08.05 12:10:15-07'00"  
 OREGON  
 MAY. 21, 2014  
 PETER G. COFFMAN  
 EXPIRES: 12/31/23

**HHPR Harper Houf Peterson Righellis Inc.**  
 ENGINEERS • PLANNERS • LANDSCAPE ARCHITECTS • SURVEYORS  
 205 SE Spokane Street, Suite 200 Portland, OR 97202 PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

**OR99W: I-5 - MCDONALD ST SECTION**  
 PACIFIC HIGHWAY WEST  
 WASHINGTON & MULTNOMAH COUNTIES

Designer: Morgan K. Andrews Reviewer: Aaron J. Isenhart  
 Drafter: HHPR Checker: Peter G. Coffman

**STORMWATER DETAILS** SHEET NO. HA10