OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: March 2019

DFI No. D00645

Figure 1: DFI No. D00645, looking South

Identification

Drainage Facility ID (DFI):	D00645
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45V-157
Location:	District: 4
	Highway No.: 001
	Mile Post: 233.22 to 233.26, Left

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: Off ramp

Flow direction: North

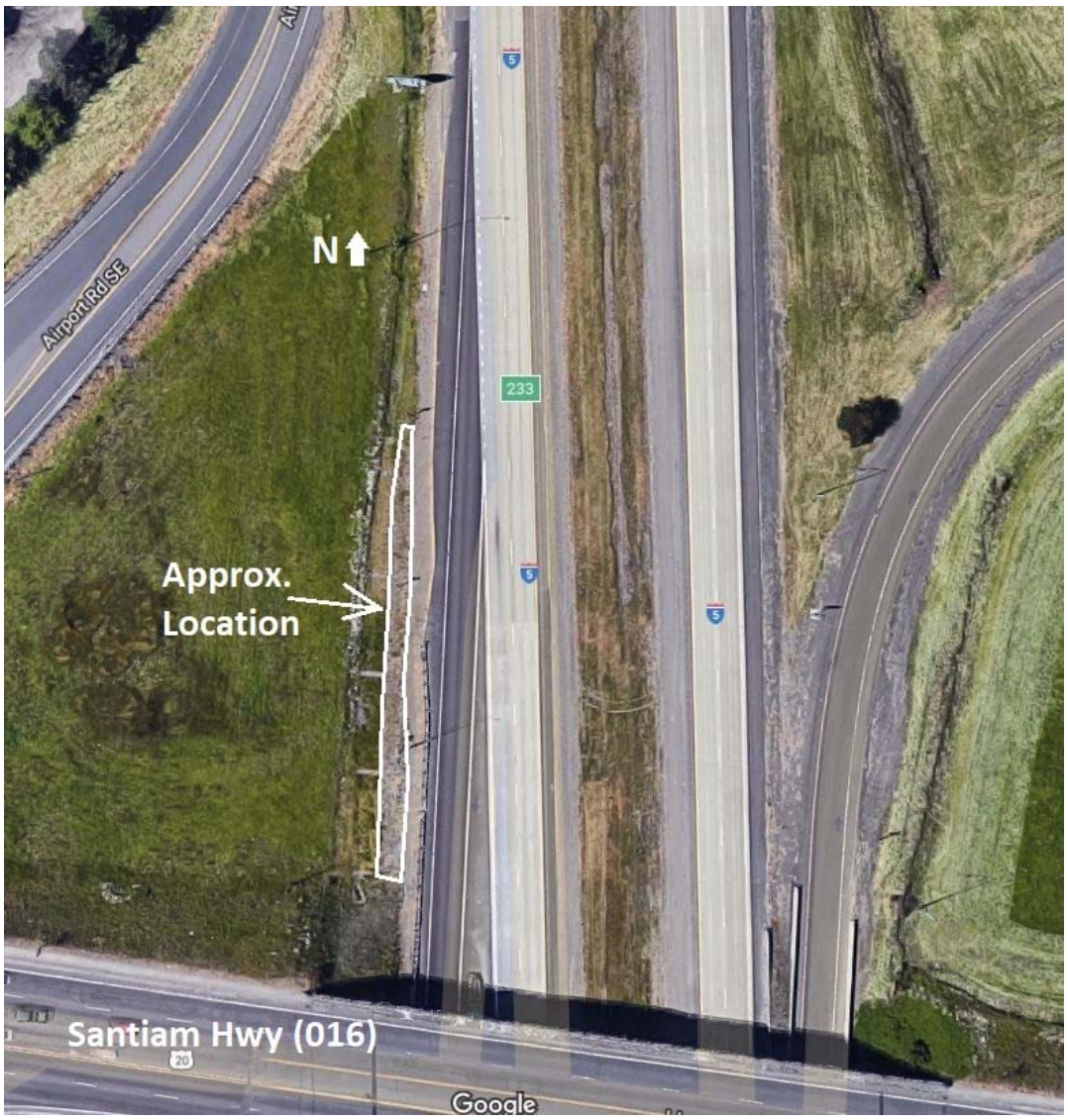


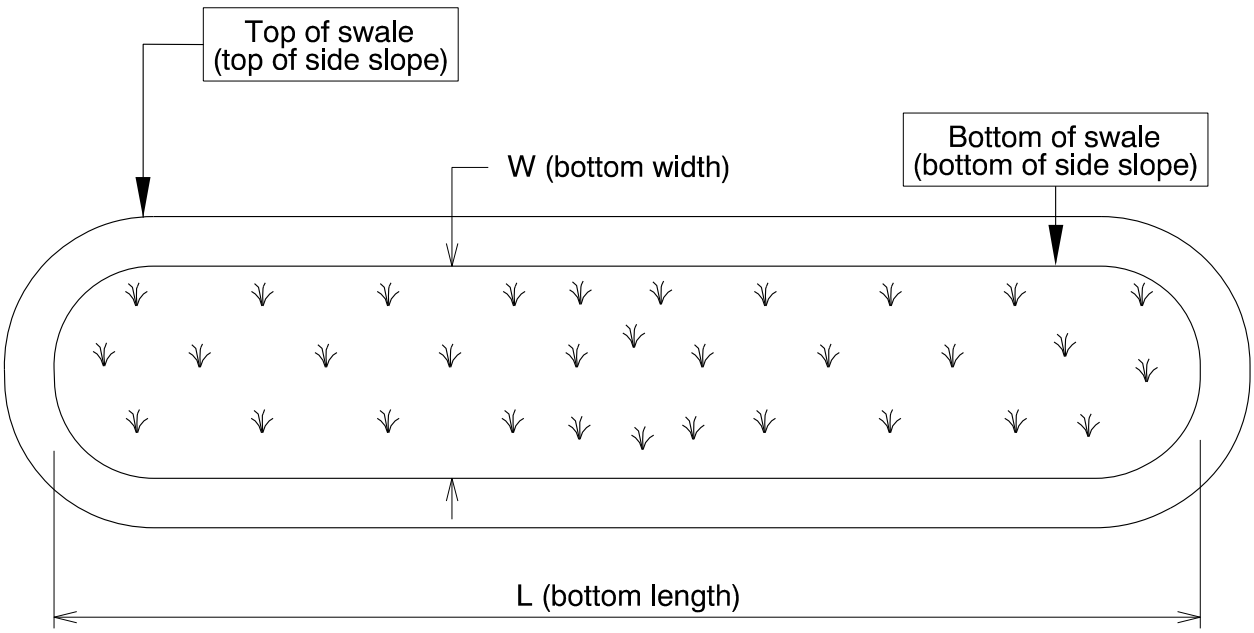
Figure 2: Facility location map

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:

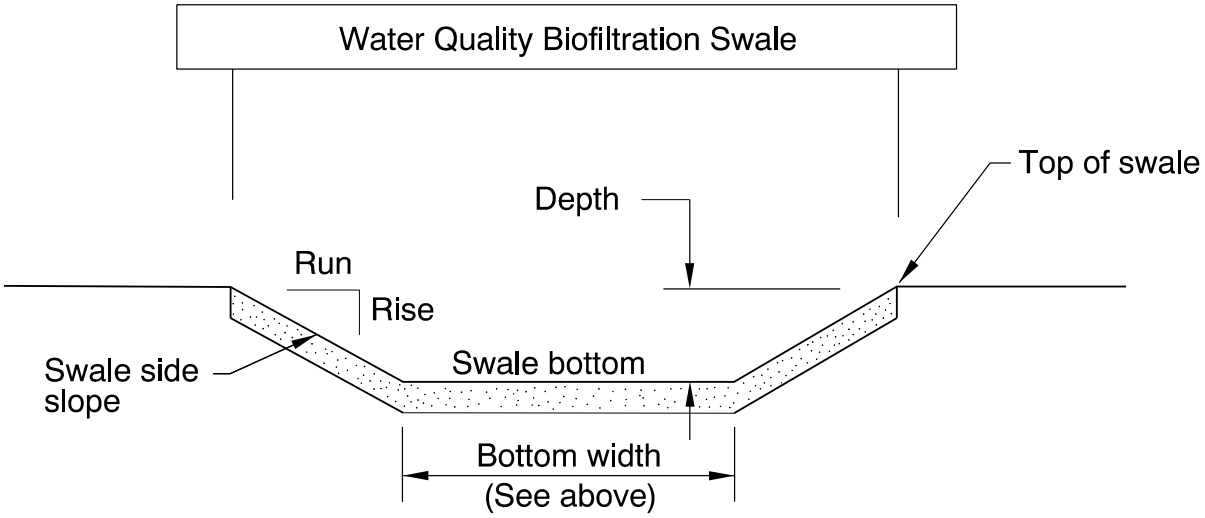
Bottom Length (feet)	Bottom Width (feet)
211	2-12



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)
Varies	1	3



Site Specific Information: Stormwater enters the swale via two storm sewer pipes and then flows north before exiting into an open ditch. Maintenance access is via the roadside shoulder.

4. Facility Access

Maintenance access to the facility:

☐Roadside pad	☒Roadside shoulder
☐Access road with Gate	☐Access road without Gate

Figure 3: Access via roadside shoulder

5. Operational Components / Maintenance Items

Classification

This facility is classified as an:

☒ On-line Swale	☐ Off-line Swale
A swale that does not include a high flow bypass component; flow drains into and through the facility	**A swale that treats low/small flows and diverts high flows using a bypass component**

Bypass Component

This facility includes a high flow bypass component:

☒ No	☐ 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:

☐ Operational Plan A	☒ Operational Plan B	☐ Operational Plan C
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.

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

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

7. Limitations

Access grid installed:

☒ No	☐ Yes
There are no 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

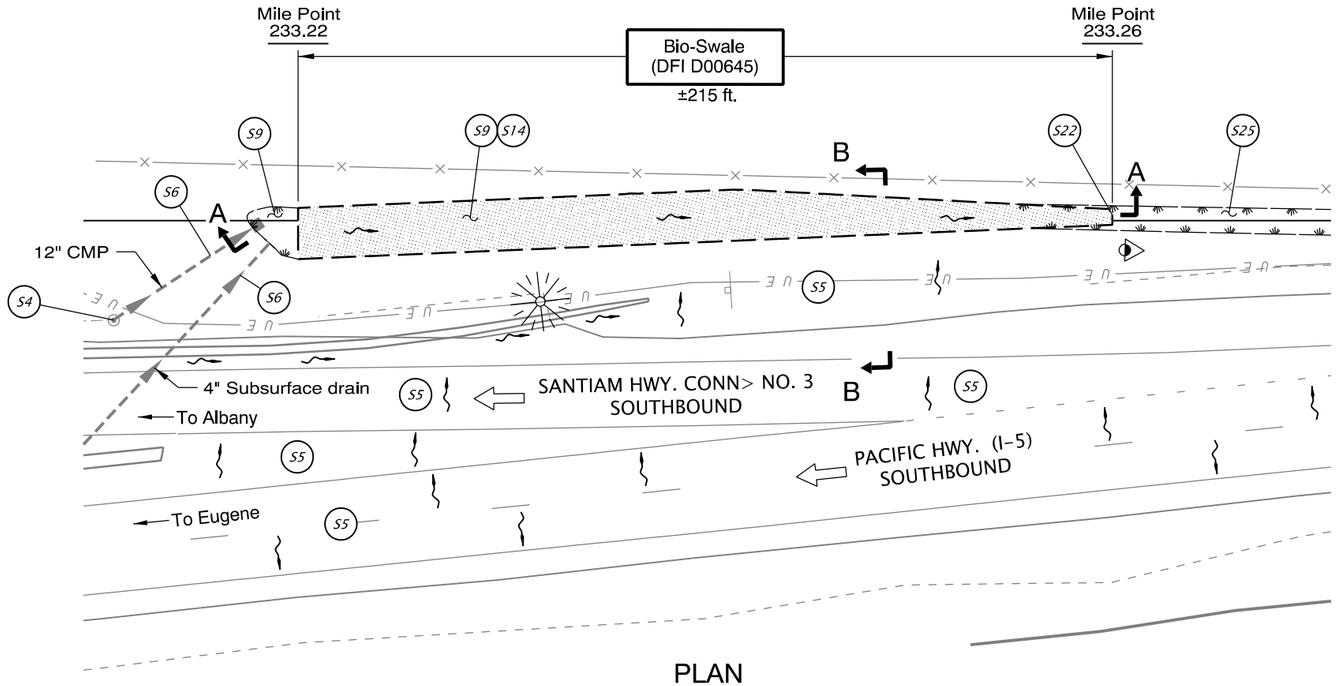
Contact any of the following for more detailed information about management of waste materials found on site:

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 D00645

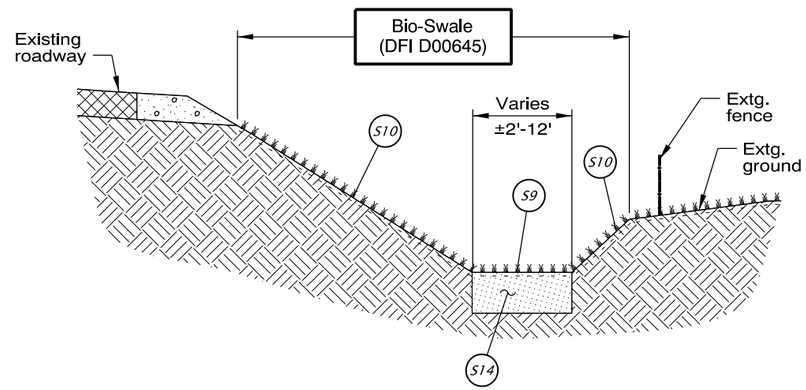


PLAN
N.T.S.

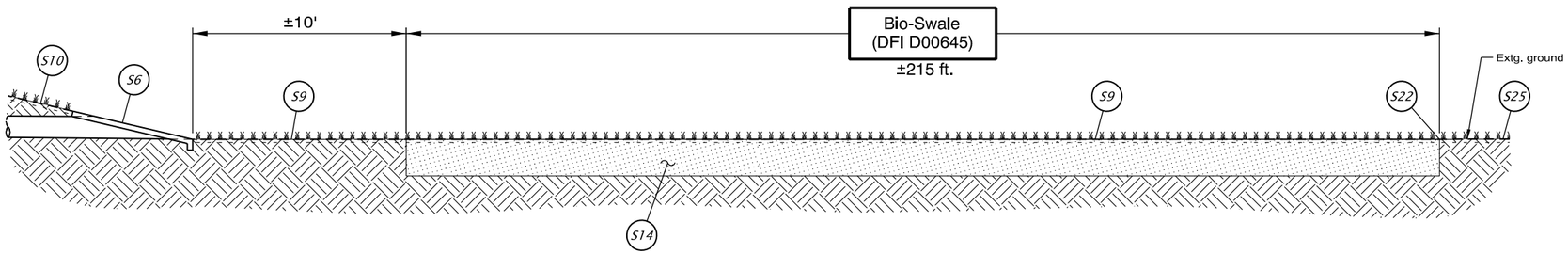
N

LEGEND:

- Photo Location / Direction
- S# — Facility Component (see table 1 in O&M Manual)
- Cleanout
- Inlet (and / or)
- Storm Pipe (Facility)
- Storm Pipe (Facility)
- Conveyance Direction
- Pavement / Facility Flow Path



SECTION B-B
N.T.S.



SECTION A-A
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Jason Stroud

Drafted By: Michael Skelton

DFI D00645
MAINTENANCE DISTRICT 4 I-5
WATER QUALITY BIOFILTRATION SWALE
PACIFIC HIGHWAY MP 233.22 LT.
LINN COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 45V-157

45V-157

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd. & Std. Drg. Nos.

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

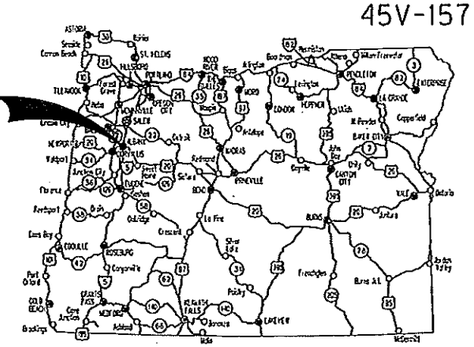
PLANS FOR PROPOSED PROJECT

GRADING, DRAINAGE, & PAVING

I-5: SANTIAM HWY. O'XING, SB LANES (ALBANY) SECTION

PACIFIC HIGHWAY

LINN COUNTY
OCTOBER 2012



Overall Length Of Project - 0.43 Miles

REVISED AS CONSTRUCTED

Gene Wilborn

DATE 7/19/13

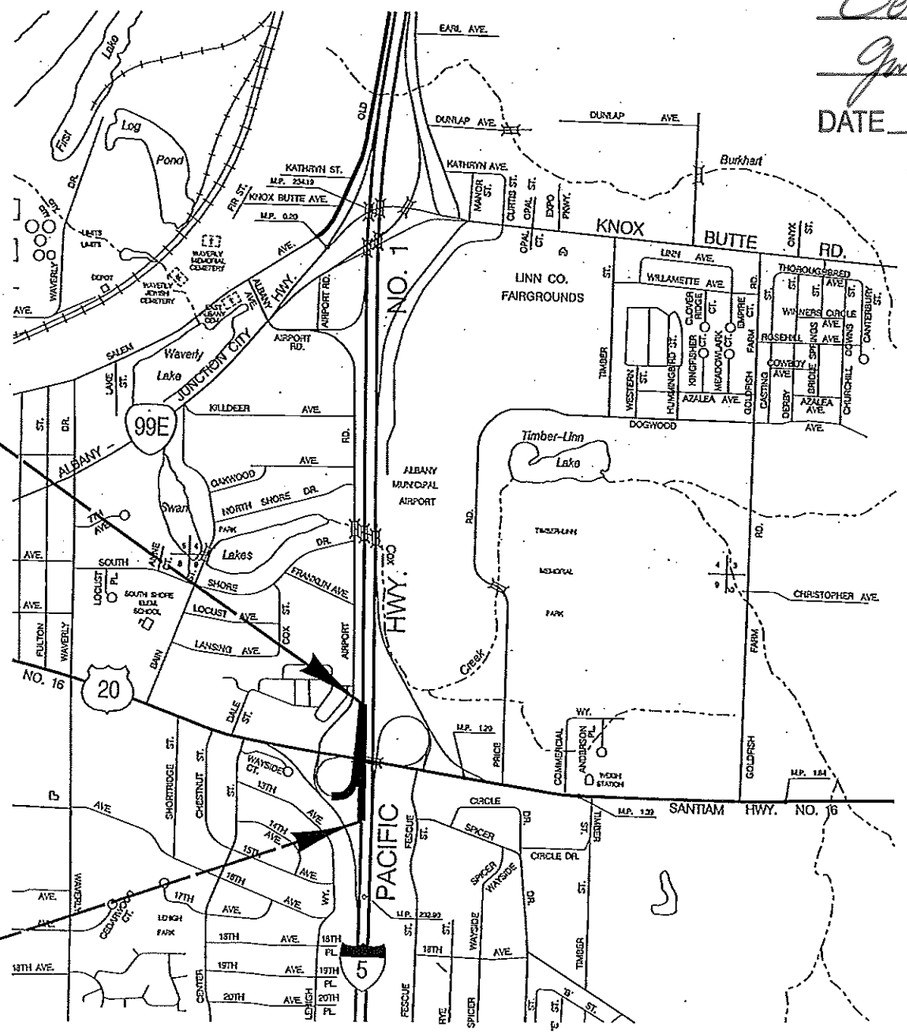
ORIGINAL

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

HPP-S001(418)
BEGINNING OF PROJECT
STA. "SB" 1096+10 (M.P. 233.46)

HPP-S001(418)
END OF PROJECT
STA. "SB" 1118+90 (M.P. 233.03)



N

T. 11S., R. 3W., W.M.

OREGON TRANSPORTATION COMMISSION

Pat Egan	CHAIR
David Lohman	COMMISSIONER
Mary Olson	COMMISSIONER
Mark Frohnmayer	COMMISSIONER
Tammy Baney	COMMISSIONER
Matthew L. Garrett	DIRECTOR OF TRANSPORTATION

PLANS PREPARED FOR
ODOT
BY:
QUINCY ENGINEERING, INC.

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: Jeff W Olson 9/12/12
Signature & date

Jeff W. Olson, Principal
Print name and title

Concurrence by ODOT Chief Engineer

I-5: SANTIAM HWY. O'XING, SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	HPP-S001(418)	1

INDEX OF SHEETS, CONT'D.

SHEET NO.	DESCRIPTION
2 Thru 2A-3 Incl.	Typical Sections
2B Thru 2B-4 Incl.	Details
2C, 2C-2	Traffic Control Details
2C-3	Detour Plan
2C-4 Thru 2C-18 Incl.	Traffic Control Plan
2D	Pipe Data Sheet
3,4	Alignment
4A	General Construction
4B	Notes
4C	Profile
5	Alignment
GEO/HYDRO	
GA Thru GA-3, Incl.	Erosion Control Plan
GN	Planting Plan
GN-2	Planting Details
PERMANENT PAVEMENT MARKINGS	
ST	Striping Details
ST-2 Thru ST-4 Incl.	Striping Plan
PERMANENT SIGNING	
S-13212	Sign & Post Data Table, Sign Details, and Permanent Signing Plan
ILLUMINATION	
I-01943	Illumination Legend
I-01944	Illumination Plan

Standard Drg. Nos.

RD140	- Roadway Cross Slopes Superelevated Sections
RD300	- Trench Backfill, Bedding, Pipe Zone And Mult. Installations
RD312	- Subsurface Drain
RD364, RD368	- Concrete Inlets
RD376	- Misc. Drainage Structures
RD386	- Fill Height Tables
RD399	- Stormwater Treatment and Storage Facility Field Markers
RD400, RD405, RD410, RD415, RD420	- Guardrail
RD500	- Precast Concrete Barrier Pin and Loop Assy.
RD505	- Concrete Barrier Cast-in-Place
RD515	- Median Barrier Anchoring Details
RD516	- Securing Concrete Barrier to Roadway
RD545	- Precast Tall (42") Concrete Barrier
RD570	- Guardrail Trasition to Tall Concrete Barrier
RD610	- Asphalt Pavement Details
RD700	- Curbs
RD1005	- Check Dams
RD1010	- Inlet Protection
RD1040	- Sediment Fence (Supported and Unsupported)
RD1055	- Matting
TM200	- Sign Installation Details
TM211	- Signing Details US and Interstate Route Shields
TM225	- Exit Number and Gore Signing Details
TM472	- Traffic Signal Junction Box
TM500, TM502	- Pavement Markings
TM517	- Recessed Pavement Markers
TM520, TM521	- Durable Pavement Markings
TM551	- Freeway Exit Ramp Pavement Markings
TM560	- Alignment Layout: General
TM570, TM571, TM575	- Traffic Delineators
TM670	- Wood Post Sign Supports
TM671	- 3 Second Wind Gust Speed Isotach
TM676	- Sign Attachments
TM681, TM687, TM688	- Square Tube Sign Supports
TM800	- Tables, Abrupt Edge, and PCMS Details
TM810	- Temporary Reflective Pavement Markers
TM820	- Temporary Barricades
TM821	- Temporary Sign Supports
TM830	- Temporary Concrete Barrier and Rumble Strips
TM832	- Temporary Impact Attenuators
TM850	- 2-Lane, 2-Way Roadways
TM860	- Freeway Sections

No R/W Map

NOT REVISED AS CONSTRUCTED

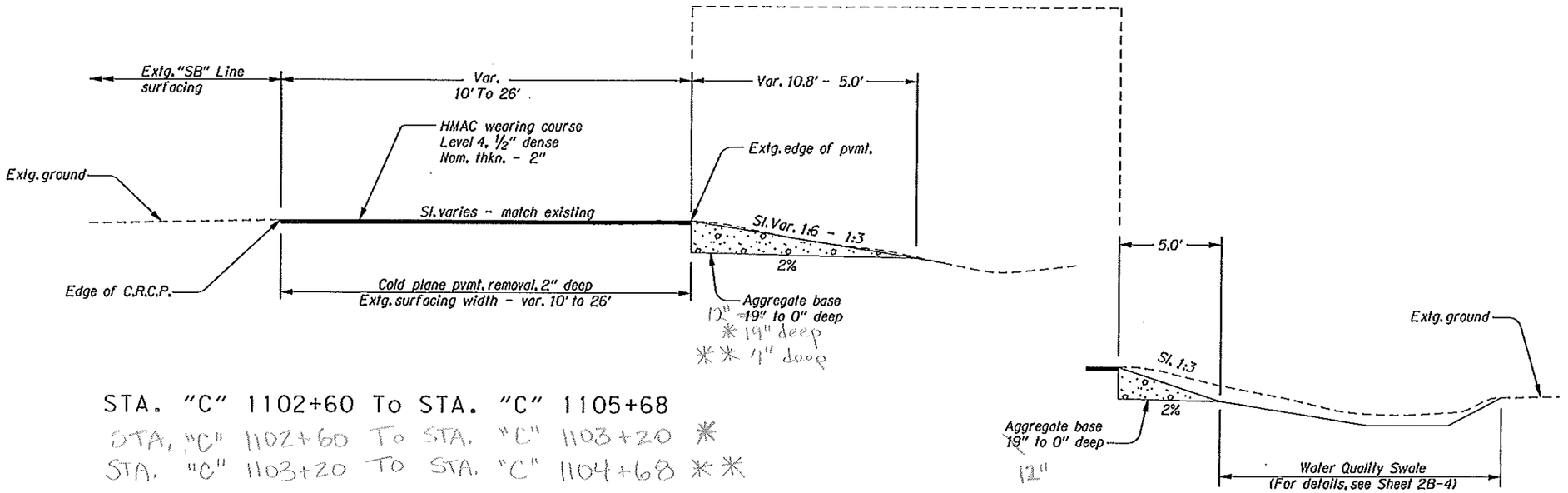
Gene Wilborn

DATE 7/19/13

QUINCY ENGINEERING, INC.

I-5: SANTIAM HWY. O'XING, SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	HPP-S001(418)	1A

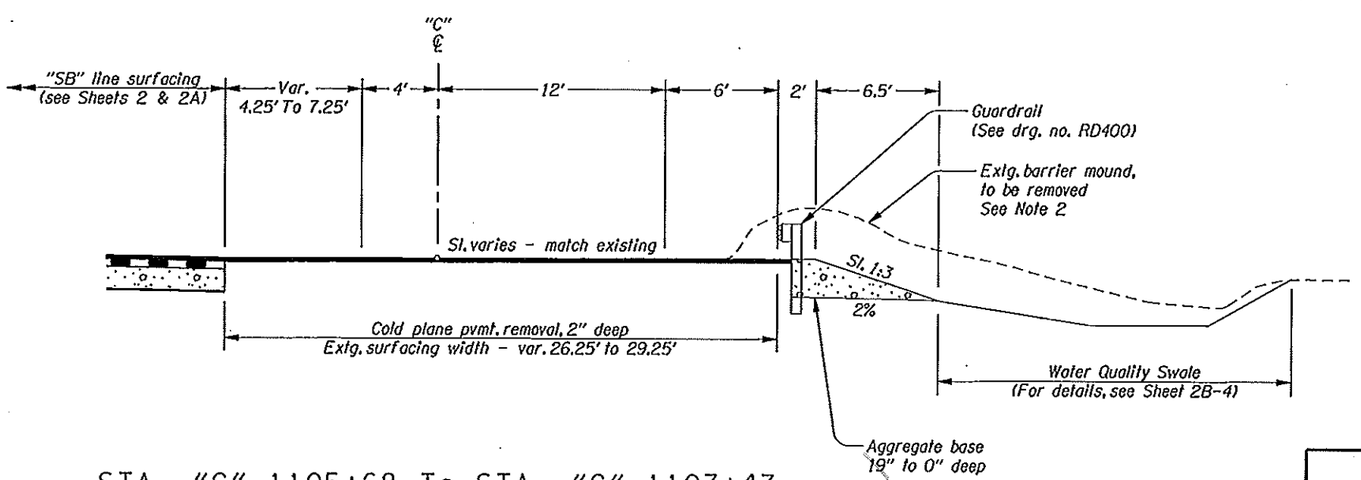


STA. "C" 1102+60 To STA. "C" 1105+68

STA. "C" 1102+60 To STA. "C" 1103+20 *

STA. "C" 1103+20 To STA. "C" 1104+68 **

STA. "C" 1104+65 To STA. "C" 1105+68



STA. "C" 1105+68 To STA. "C" 1107+47

REVISED AS CONSTRUCTED

Gene Wilborn

Gene W

DATE 7/19/13

Notes:

1. *Side-slopes are shown as vert. to horiz.*
2. *Extg. pavement limits under barrier mound unknown - see Sheet 2A for any necessary full-depth shoulder widening.*

REGISTERED PROFESSIONAL ENGINEER
56205PE
OREGON
JULY 13, 2007
RUSSELL W. NORTON

RENEWS: 12-31-2012

OREGON DEPARTMENT OF TRANSPORTATION

QUINCY ENGINEERING, INC.

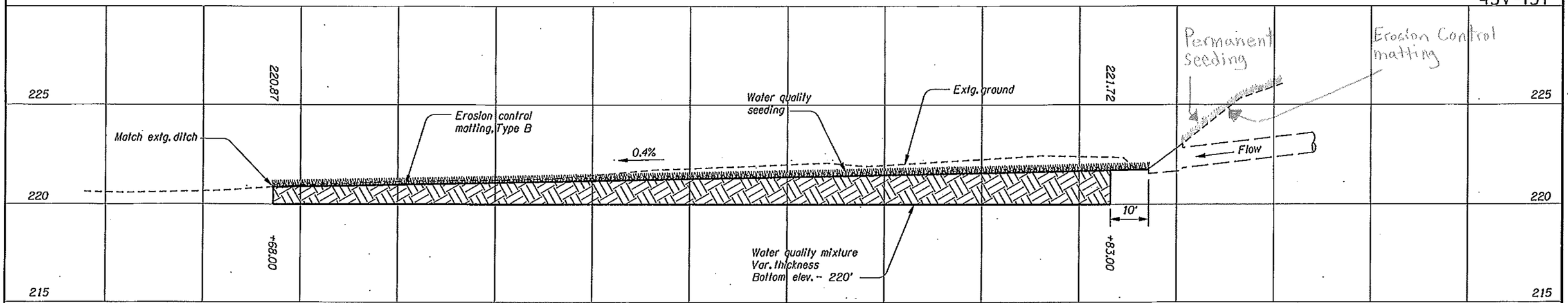
I-5: SANTIAM HWY. O'XING
SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

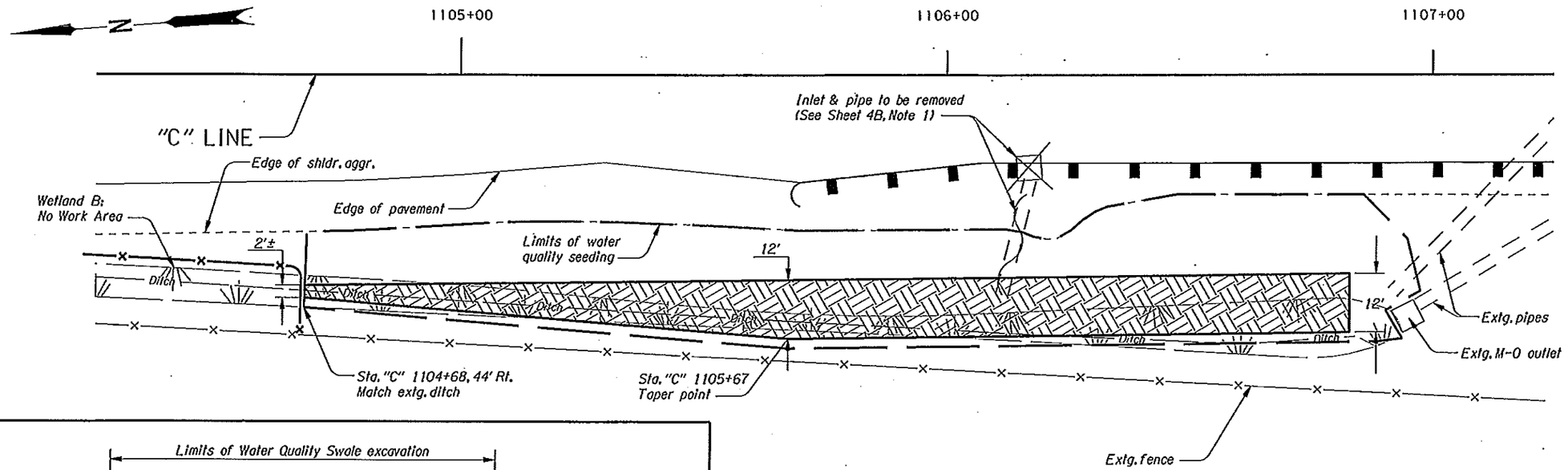
Design Team Leader - Russell W. Norton
Designed By - Jeremy Mikkelsen
Drafted By - Jeremy Mikkelsen

TYPICAL SECTIONS

SHEET NO. 2A-2

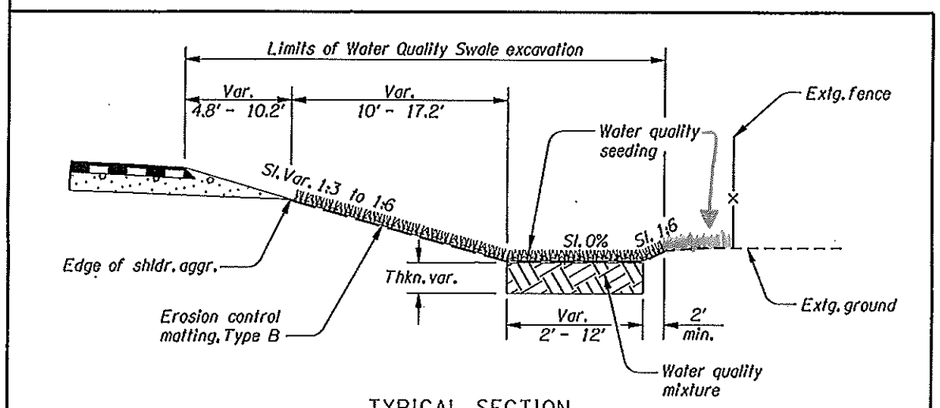
45V-157





Notes:

1. Water quality mixture shall be a blend of soil and medium compost mulch. Limits of mixture shown thus:
   See Section 01012 for details.
2. Elevations shown are at swale flow line (top of water quality mixture).
3. Grade swale to match existing ditch beyond treatment length.
4. See drg. no RD399 for Stormwater Treatment and Storage Facility Field Marker placement details.
5. Retain and protect extg. fence.



TYPICAL SECTION
No Scale

REVISED AS CONSTRUCTED
Gene Wilborn
GwWi
DATE 7/19/13

WATER QUALITY SWALE
Scale: 1" = 25' Horz.
1" = 5' Vert.
(See Sheet 4B, Note 12)

REGISTERED PROFESSIONAL ENGINEER
56205RE
OREGON
MAY 13, 2003
RUSSELL W. NORTON
RENEWS: 12-31-2012

OREGON DEPARTMENT OF TRANSPORTATION

QUINCY ENGINEERING, INC.

I-5: SANTIAM HWY. O'XING
SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

Design Team Leader - Russell W. Norton
Designed By - Jeremy Mikkelsen
Drafted By - Jeremy Mikkelsen

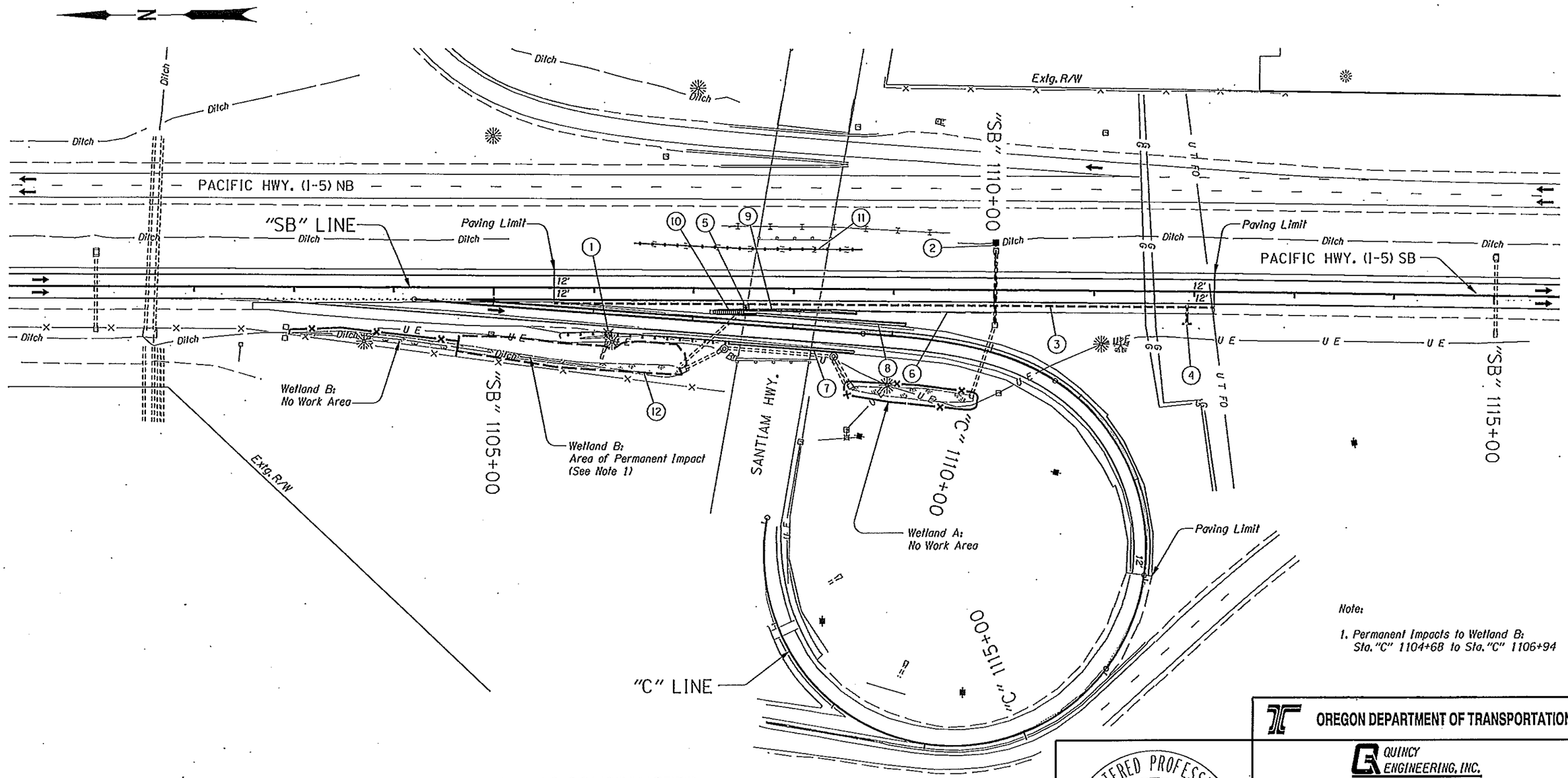
DETAILS

SHEET NO. 2B-4

Sec. 9, T. 11 S., R. 3 W., W.M.

SANTIAM HIGHWAY INTERCHANGE

45V-157



Note:

1. Permanent Impacts to Wetland B:
   Sta. "C" 1104+68 to Sta. "C" 1106+94

NOT REVISED AS CONSTRUCTED

Gene Wilborn

DATE 7/19/13

REGISTERED PROFESSIONAL ENGINEER
56205PE
OREGON
MAY 13, 2003
RUSSELL W. NORTON
RENEWS: 12-31-2012

OREGON DEPARTMENT OF TRANSPORTATION

QUINCY ENGINEERING, INC.

I-5: SANTIAM HWY. O'XING
SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

Design Team Leader - Russell W. Norton
Designed By - Jeremy Mikkelsen
Drafted By - Jeremy Mikkelsen

GENERAL CONSTRUCTION

SHEET NO. 4A

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1:1200 - 002

Sec. 9, T. 11 S., R. 3 W., W.M.
SANTIAM HIGHWAY INTERCHANGE

(1) Sta. "SB" 1106+15, Rt.
Remove inlet
Remove 12" CMP - 24'

(2) Sta. "SB" 1110+01, 47' Lt.
Remove inlet
Remove 15" conc. pipe - 70'
Const. Type M-E inlet
Inst. 12" storm sewer pipe - 82'
5' depth
S = 0.005 ft/ft
IE (12" out) = 224.14'±
Connect to exig. inlet
IE (12" in) = 223.9'±
(See drg. nos. RD300, RD368, & RD386)

(3) Sta. "SB" 1105+60 to Sta. "SB" 1112+20, Rt.
Inst. 4" subsurface drain pipe - 660'
(Connect to exig. pipe at ends of project)
Drainage geotextile, Type 1 - 318 sq. yd.
Granular drain material - 15 cu. yd.
(For details, see Sheet 2B)

(4) Sta. "SB" 1111+93, Rt.
Const. subsurface drain outlet
(See drg. no. RD312)

(5) Sta. "SB" 1107+52.50, Rt.
Adjust inlet
(See drg. nos. RD364 & RD376)
Connect 4" subsurface drain pipe to existing inlet

(6) Sta. "SB" 1108+62 to Sta. "SB" 1110+02, Rt.
Const. low profile mountable curb
(See drg. no. RD700)

(7) Sta. "C" 1108+88 to Sta. "C" 1110+13, Rt.
Remove exig. conc. shldr. barrier - 275'
~~Salvage and deliver to Agency~~
~~(See Section 00310.45 for details)~~
Remove earth mound
Const. tall conc. barrier - 125'
Const. guardrail - 100' (Type 2A)
Const. guardrail - 12.5' (Type 3)
Const. guardrail transition
Const. guardrail terminal, flared
Test Level 4
Flare rate=9.375:1, W=4', E=0'
(See drg. nos. RD400, RD405, RD410, RD415, RD420, & RD570)

(8) Sta. "C" 1109+00 to Sta. "C" 1110+63, Lt.
Remove exig. conc. shldr. barrier - 172'
~~Salvage and deliver to Agency~~
~~(See Section 00310.45 for details)~~
Const. tall conc. barrier, narrow base - 12.5'
Const. tall conc. barrier - 150'
Flare rate=0, E=2'
Backfill between barriers with aggregate base -120 tons
(See drg. no. RD545 & Sheet 2B-3 for details)

(9) Sta. "SB" 1107+50 to Sta. "SB" 1108+63, Rt.
Remove exig. conc. shldr. barrier - 75'
~~Salvage and deliver to Agency~~
~~(See Section 00310.45 for details)~~
Const. tall conc. barrier, narrow base - 87.5'
Const. tall conc. barrier - 25'
Flare rate=0, E=0'
(See drg. no. RD545)

(10) Sta. "SB" 1107+50, Rt.
Remove exig. impact attenuator and backup wall
Inst. impact attenuator, Type K
Const. conc. base and backup wall
(For details, see Sheet 2B-3)

(11) Sta. "SB" 1106+60 to Sta. "SB" 1108+50, Lt.
Remove cable barrier system
Const. TL-3 cable barrier system - 225'

(12) Sta. "SB" 1104+68 to Sta. "SB" 1106+94, Rt.
Const. water quality swale
w/ 12' flat bottom, 1:6 slopes
Type B erosion control matting - 673 sq. yd.
(For details, see Sheet 2B-4 & drg. no. RD1055)

REVISED AS CONSTRUCTED
Gene Wilborn
DATE 7/19/13

REGISTERED PROFESSIONAL ENGINEER
56205PE
OREGON
MAY 13, 2003
RUSSELL W. NORTON
RENEWS: 12-31-2012

OREGON DEPARTMENT OF TRANSPORTATION

QUINCY ENGINEERING, INC.

I-5: SANTIAM HWY. O'XING
SB LANES (ALBANY) SECTION
PACIFIC HIGHWAY
LINN COUNTY

Design Team Leader - Russell W. Norton
Designed By - Jeremy Mikkelsen
Drafted By - Jeremy Mikkelsen

NOTES

SHEET NO. 4B