OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: January 2019

DFI No. D00577 and D00578

Figure 1: DFI No. D00577, looking northeast

Figure 2: DFI No. D00578, looking northwest

Identification

Drainage Facility ID (DFI):	D00577
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45V-105
Location:	District: 2B Highway No.: 092 Mile Post: 13.22-13.24 (Left Side)

Drainage Facility ID (DFI):	D00578
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 45V-105
Location:	District: 2B Highway No.: 092 Mile Post: 13.22 (Left Side)

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 shoulder

Flow direction: South/Southwest for D00577 and Northeast for D00578

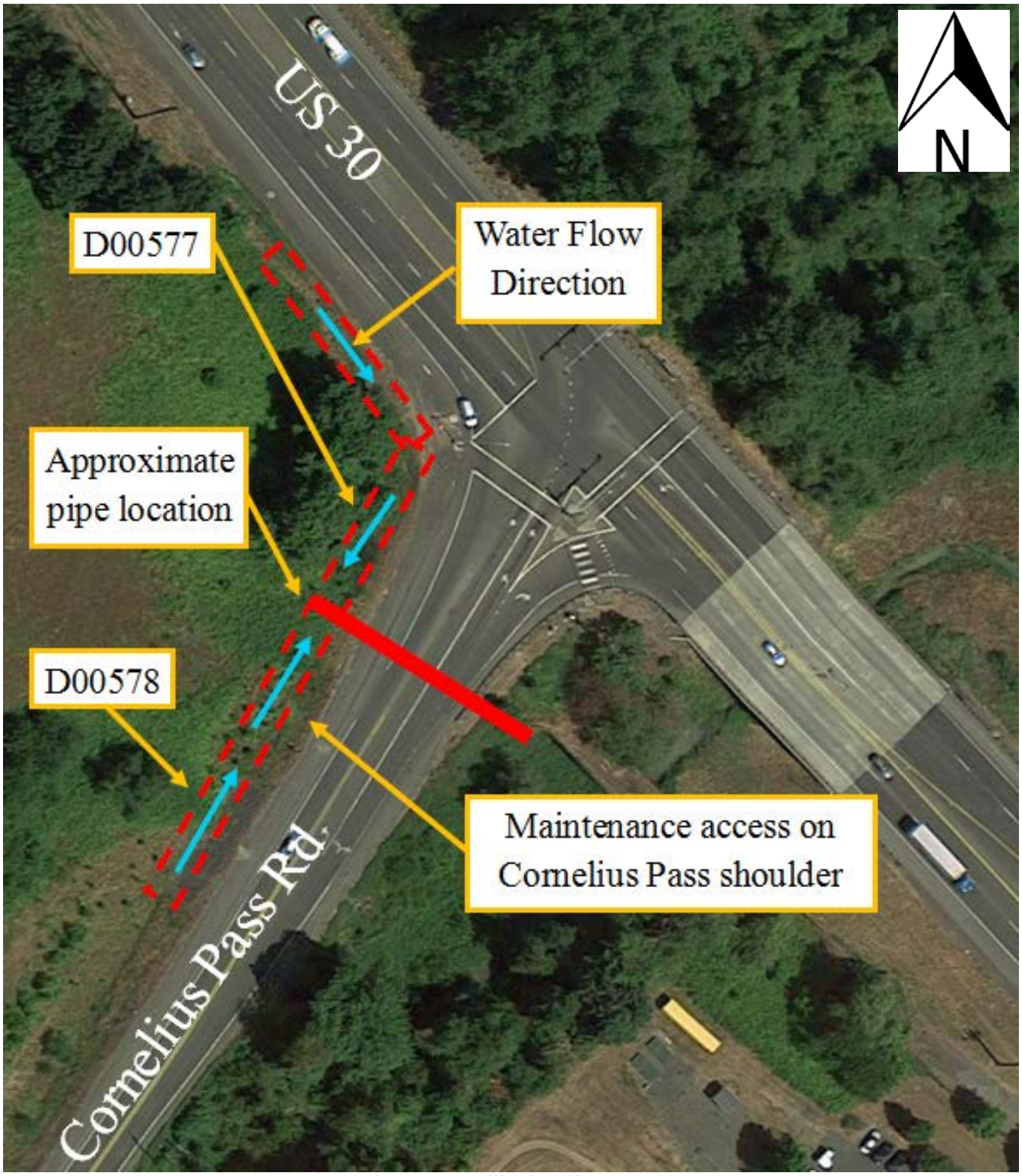


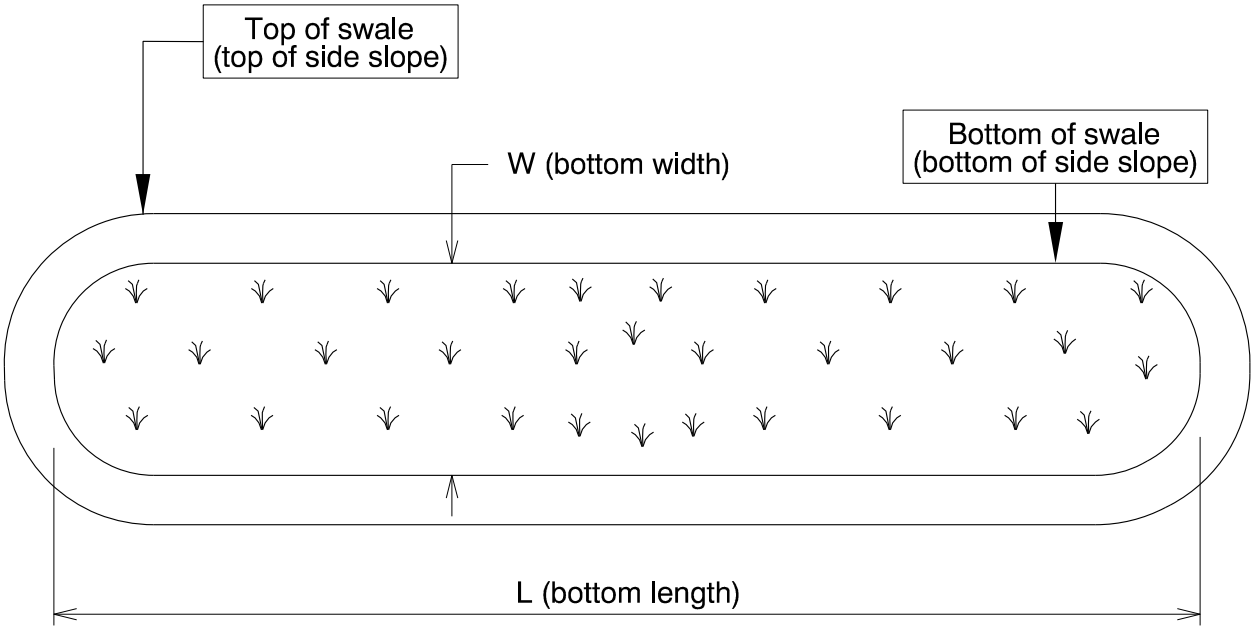
Figure 3: Facility location map

3. Facility Summary

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

The bottom length and bottom width of the swale is:

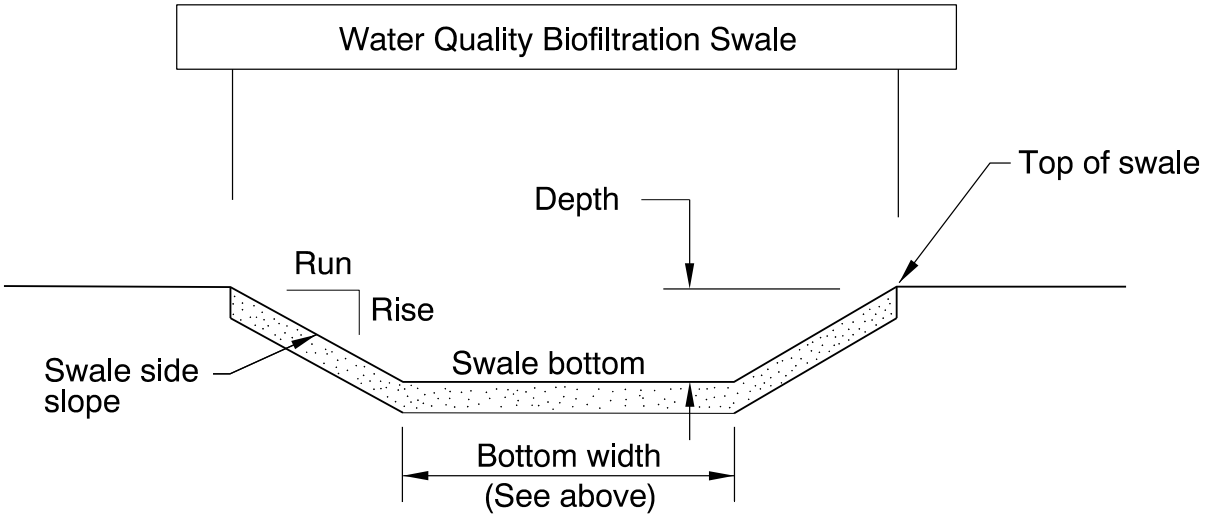
Facility	Bottom Length (feet)	Bottom Width (feet)
D00577	**265**	**4**
D00578	**218**	**4**



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:

Facility	Rise (Fore slope)	Run (Fore slope)	Depth	Rise (Back slope)	Run (Back slope)
D00577	**1 ft.**	**4 ft.**	**1 ft.**	**1 ft.**	**Varies (2 or 4 ft.)**
D00578	**1 ft.**	**4 ft.**	**1 ft.**	**1 ft.**	**Varies (2 or 4 ft.)**



Site Specific Information: The water from both facilities flow into the same 18" culvert that drains into McCarthy Creek.

4. Facility Access

Maintenance access to the facility:

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

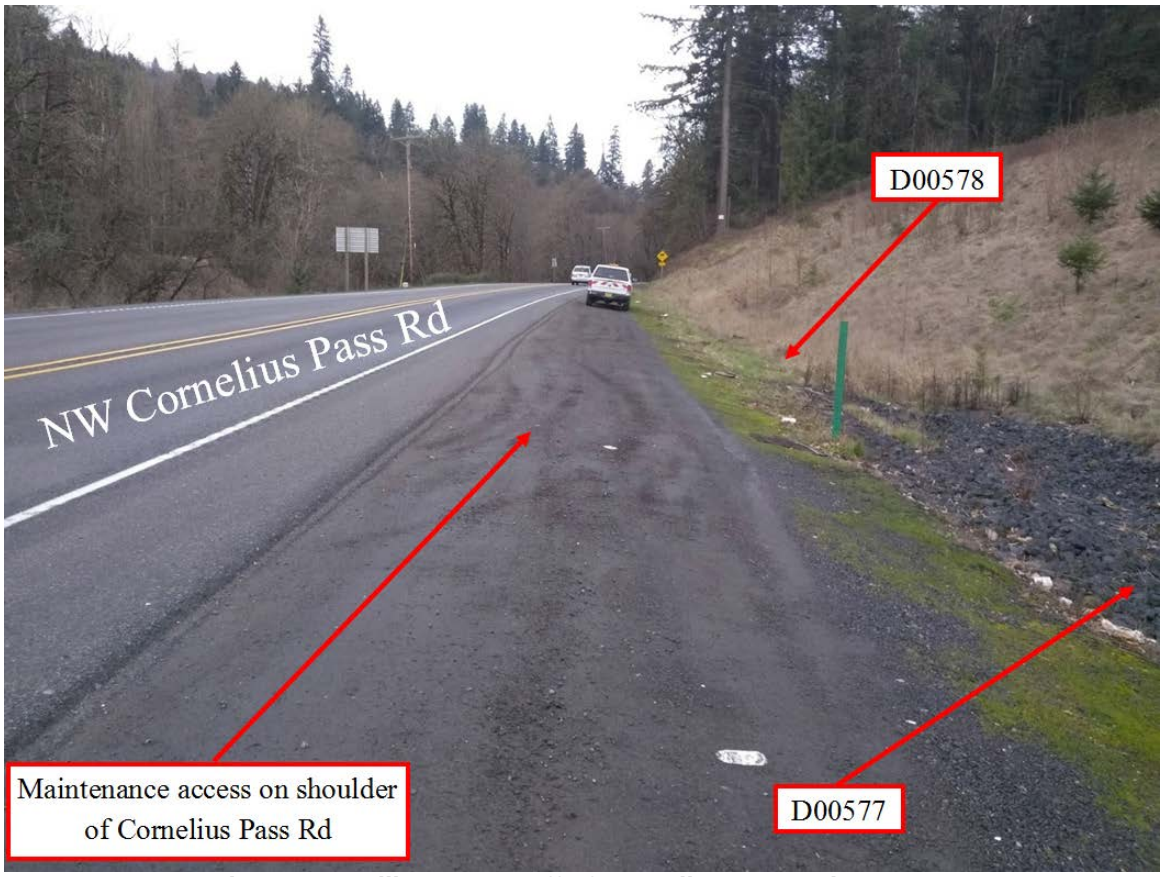


Figure 4: Facility access off of Cornelius Pass Rd

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 January 2019) 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
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.

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**

Figure 5: D00577, looking northeast

Figure 6: Granular drainage blanket

Figure 7: Drainage outlet for D00577 and D00578

Figure 8: D00578

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 (Choose applicable weight: no, light, med., heavy) duty 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:

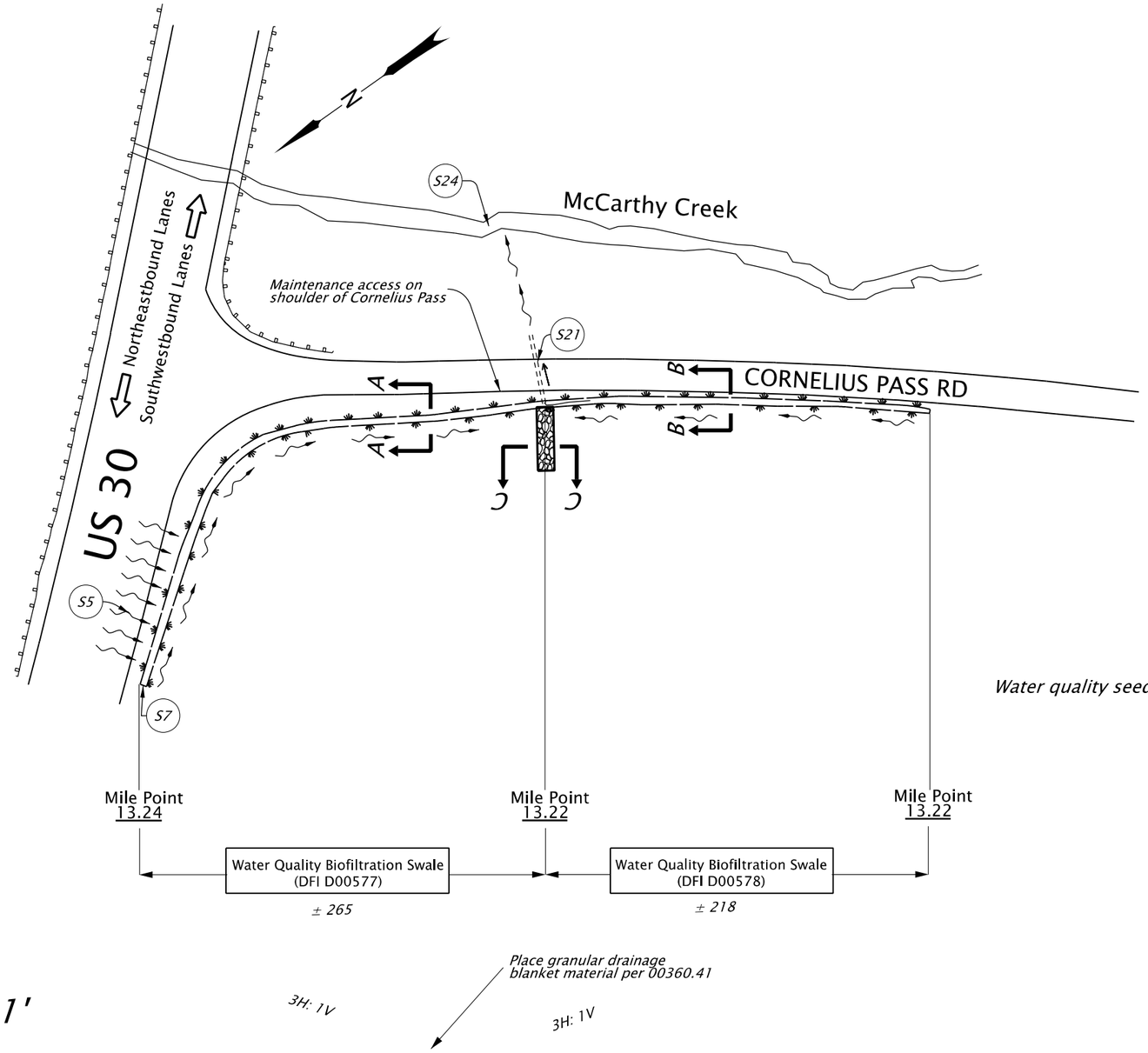
ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 667-7442

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

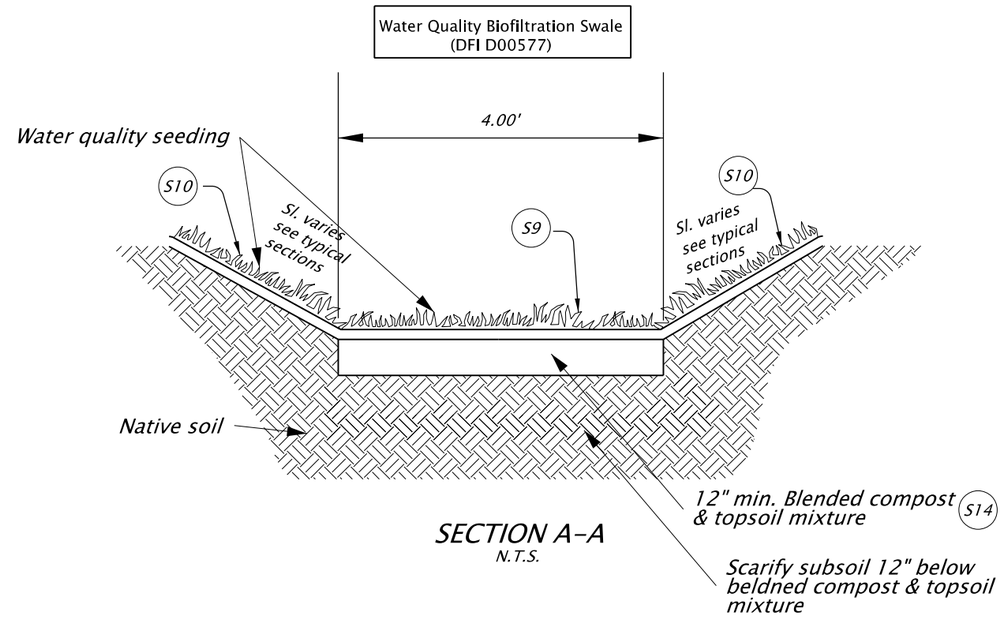
A Appendix A – Site Specific Operational Plan

Contents:

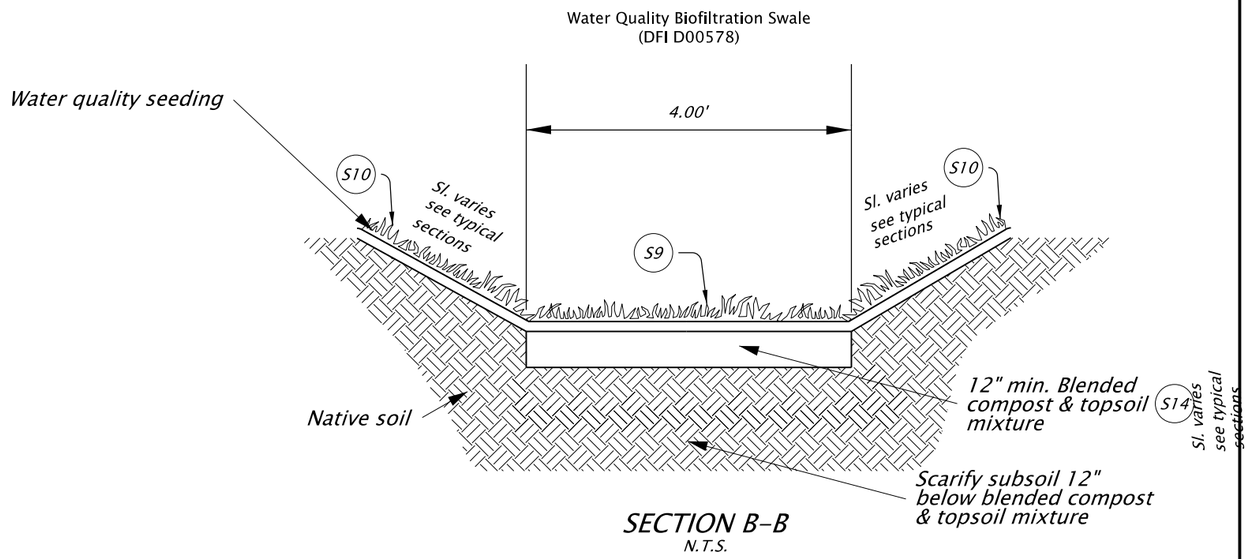
Operational Plan: DFI D00577 and D00578



SECTION C-C
N.T.S.



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

Legend:

- Photo Direction/Location
- Pipe (Facility)
- Traffic Flow Direction
- Conveyence Direction
- Water Flow Direction

Sht. 01 of 01

Prepared By: Katrina Sepulveda

Drafted By: Katrina Sepulveda

OREGON DEPARTMENT OF TRANSPORTATION

DFI D00577 and D00578
MAINTENANCE DISTRICT 2B HWY 092
Water Quality Biofiltration Swale
LOWER COLUMBIA RIVER HWY MP 13.22-13.24
Multnomah County

H_DFI_D00577_WQ_Swale.dgn :: Default 4/22/2019 1:49:32 PM hwye35i

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 45V-105

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

STATE OF OREGON
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

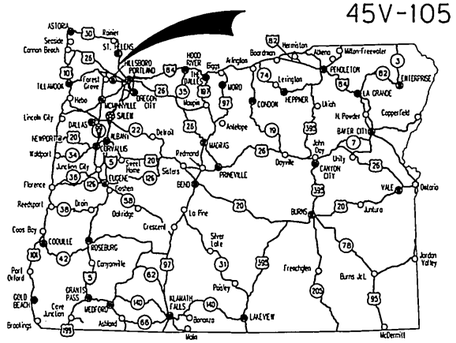
GRADING, DRAINAGE, PAVING, SIGNING, SIGNALS & ROADSIDE DEVELOPMENT

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.

LOWER COLUMBIA RIVER HIGHWAY

MULTNOMAH COUNTY
SEPTEMBER 2012

45V-105

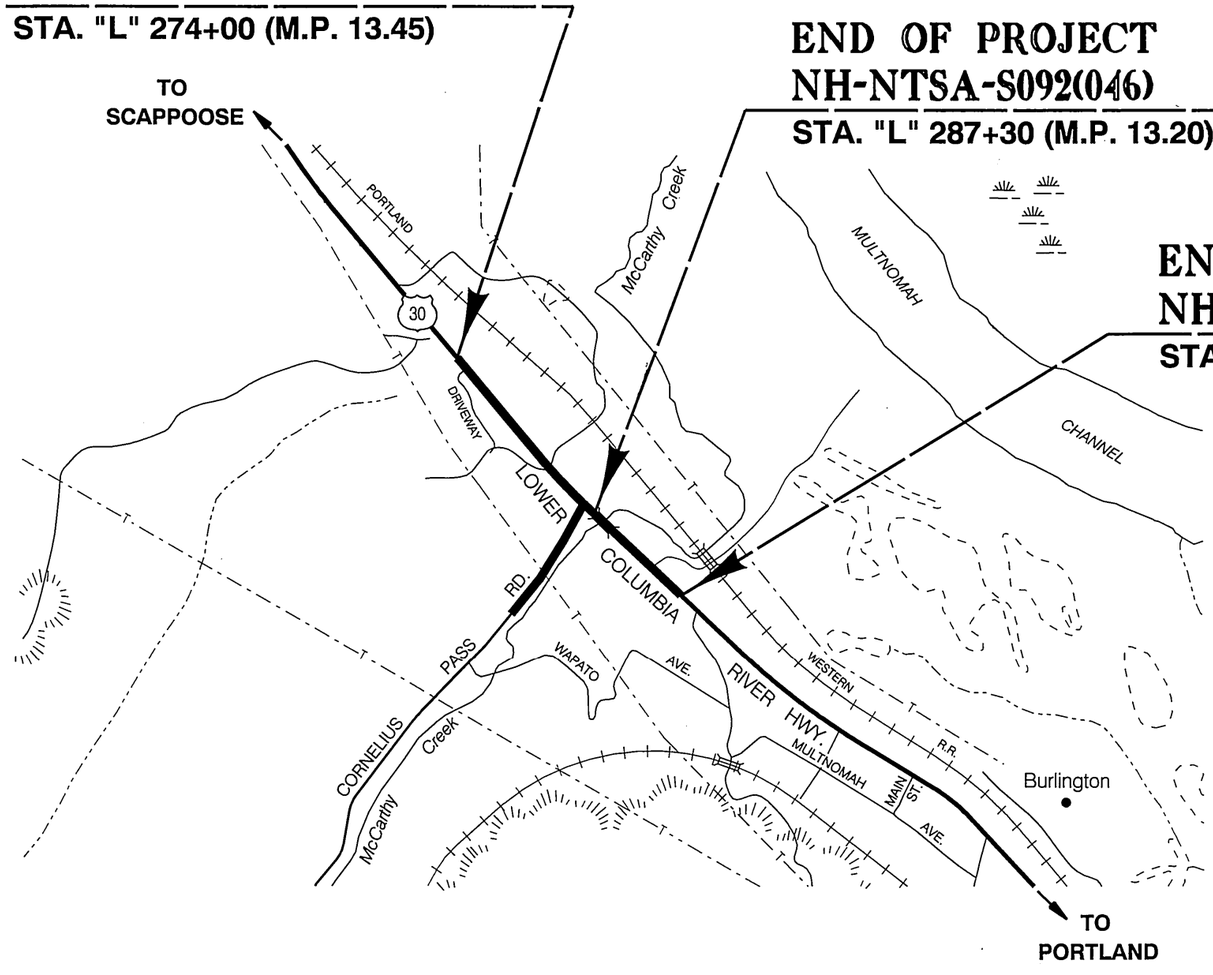


Overall Length Of Project - 0.42 Miles

BEGINNING OF PROJECT
NH-NTSA-S092(046)
STA. "L" 274+00 (M.P. 13.45)

END OF PROJECT
NH-NTSA-S092(046)
STA. "L" 287+30 (M.P. 13.20)

END OF CONTRACT
NH-NTSA-S092(046)
STA. "L" 296+25 (M.P. 13.03)



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

OREGON TRANSPORTATION COMMISSION

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

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: Naveen Y Chandra
Naveen G. Chandra, P.E.
Project Delivery Manager, Region 1

Concurrence by ODOT Chief Engineer

N

T. 2 N., R. 1 W., W.M.

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	NH-NTSA-S092(046)	1

PE001716-000

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INDEX OF SHEETS, CONT'D.

SHEET NO.	DESCRIPTION
2, 2A Thru 2A-3	Typical Sections
2B Thru 2B-3	Details
2C	Detour Plans
2C-2 & 2C-3	Traffic Control Plans
2D	Pipe Data Sheet
3	Alignment & General Construction
3A	Drainage & Utilities
3B	Profile
3B-2 & 3B-3	Profile
4	Alignment & General Construction
4A	Drainage & Utilities
5	Alignment & General Construction
5A	Drainage & Utilities
5B	Profile
GEO/HYDRO	
GA Thru GA-4	Erosion Control Plan
GB Thru GB-14	Geotechnical Data
GN Thru GN-11	Roadside Development
PERMANENT PAVEMENT MARKINGS	
ST & ST-2	Striping Plan
PERMANENT SIGNING	
S-13196 Thru S-13201	Permanent Signing
TRAFFIC SIGNALS	
16576	Legend
16577	Removal Plan
16578	Temporary Signal Plan
16579	Signal Plan
16580	Detector Plan
16581	Utility Plan
16582 Thru 16584	Details

Standard Drg. Nos.

RD140 - Roadway Cross Slopes Superelevated Sections
RD150 - Slope Rounding

RD300 - Trench Backfill, Bedding, Pipe Zone And Mult. Installations
RD302 - Street Cut
RD316 - Sloped Ends For Metal Pipe
RD318 - Sloped Ends For Concrete Pipe
RD319 - Miscellaneous Culvert Details
RD320 - Paved End Slope For Culverts 60" Maximum Pipe Size
RD326 - Coupling Bands For Corrugated Metal Pipe
RD380, RD384, RD386, RD390 - Pipe Fill Height Tables
RD399 - Stormwater Treatment and Storage Facility Field Markers

RD400, RD405, RD410, RD415, RD435, RD440 - Guardrail

RD610 - Asphalt Pavement Details

RD705 - Islands
RD710 - Accessible Route Islands
RD715 - Approaches And Non-Sidewalk Driveways
RD755 - Sidewalk Ramp Details
RD756, RD757 - Sidewalk Ramp Placement
RD759 - Truncated Dome Detectable Warning Surface Details And Locations

RD810 - Barbed And Woven Wire Fences

RD1005 - Check Dams

BR203 - Transition Concrete Bridge Rail To Guardrail

TM200 - Sign Installation Details
TM201 - Miscellaneous Sign Placement Details
TM204 - Flag Board Mounting Details
TM211 - Signing Details
TM223, TM224 - Directional Sign Layout
TM230, TM231, TM233 - Mounting Details For Removable Legend

TM450 - Mast Arm Pole Details
TM457 - Vehicle, Ped. Signal & Push Button Mounting Details
TM460 - Vehicle Signal Details
TM462 - Adjustable Signal Head Mounting Details
TM465 - Overhead Sign, Fire Preemption & Photoelectronic Details
TM467 - Ped. Signal And Ped. Push Button Details
TM470 - Color Code Charts
TM472 - Traffic Signal Junction Boxes
TM475 - Loop Details
TM480 - Loop Entrance Details
TM482 - Controller Cabinet And Foundation Details
TM485 - Service Cabinets And Service Cabinet Wiring Details
TM488 - Terminal Cabinet Detail
TM490 - Crosswalk Closure Detail
TM498 - Interconnect Wiring Details

TM500, TM501, TM502, TM503 - Pavement Marking Standard Details
TM515 - Raised Pavement Markers
TM520 - Durable Pavement Markings
TM530 - Intersection Pavement Markings
TM531 - Turn Arrow Marking Details
TM560, TM561 - Alignment Layout
TM570 - Traffic Delineators
TM571 - Traffic Delineators Steel Post Details
TM576 - Traffic Delineator Installation

TM600, TM601 - Multi-Post Breakaway Sign Supports
TM602 - Triangular Base Breakaway Multi-Direction Slip Base

TM629, TM630 - Slip Base & Fixed Base Luminaire Supports

TM635 - Breakaway Sign & Luminaire Supports
TM650, TM651, TM652, TM653 - Traffic Signal Supports
TM670 - Wood Post Sign Supports
TM671 - 3 Second Gust Wind Speed Isotach
TM675 - Extruded Aluminum Panels
TM676 - Sign Attachments
TM677 - Sign Mounts
TM679 - Signal Mast Arm Street Name Sign Mounts
TM680 - Signal Pole Mounts
TM681, TM687, TM688 - Square Tube Sign Supports

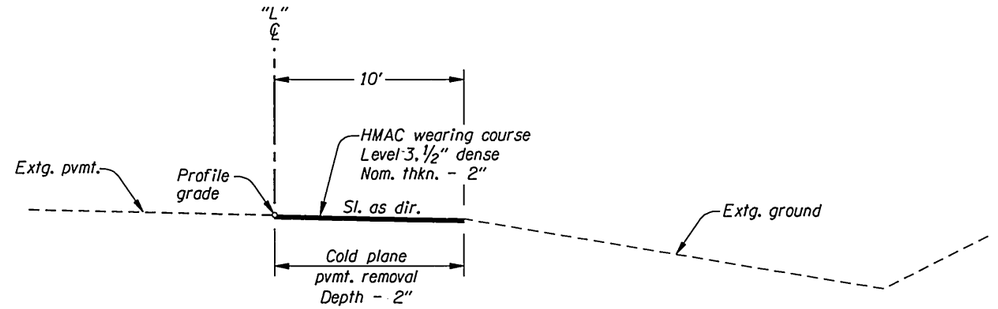
TM800 - Tables, Abrupt Edge And PCMS Details
TM810 - Temporary Reflective Pavement Markers
TM820 - Temporary Barricades
TM821 - Temporary Sign Supports
TM830 - Temporary Concrete Barrier And Rumble Strips
TM841, TM842, TM843 - Intersection Details
TM850 - 2-Lane, 2 Way Roadways
TM851, TM852 - Non-Freeway Multi-Lane Sections

R/W map No. 11B-05-0032

Standard Drawings located on the web at:
http://www.oregon.gov/ODOT/HWY/ENGSERVICES/standard_drawings_home.shtml

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	NH-NTSA-S092(046)	1A



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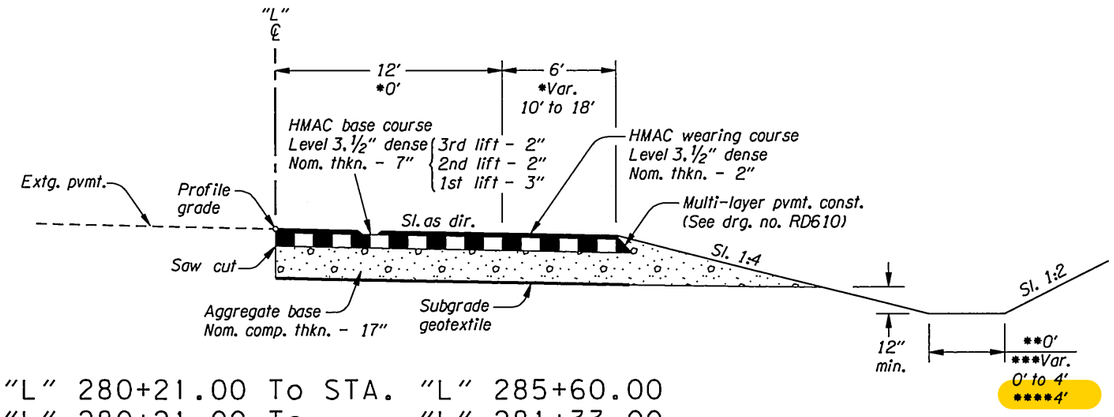

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*"L" 280+21.00 To "L" 281+33.00
**"L" 280+21.00 To "L" 285+00.00
***"L" 285+00.00 To "L" 285+50.00
****"L" 285+50.00 To "L" 285+60.00

NOTE:
1. Side-slopes are shown as vert. to horiz.
2. For standard superelevation, see drg. no. RD140.
3. For slope rounding, see drg. no. RD150.

REGISTERED PROFESSIONAL ENGINEER
56,138 PE
OREGON
JULY 9, 2002
JASON M. GRASSMAN
RENEWAL DATE: 6-30-2013

OREGON DEPARTMENT OF TRANSPORTATION

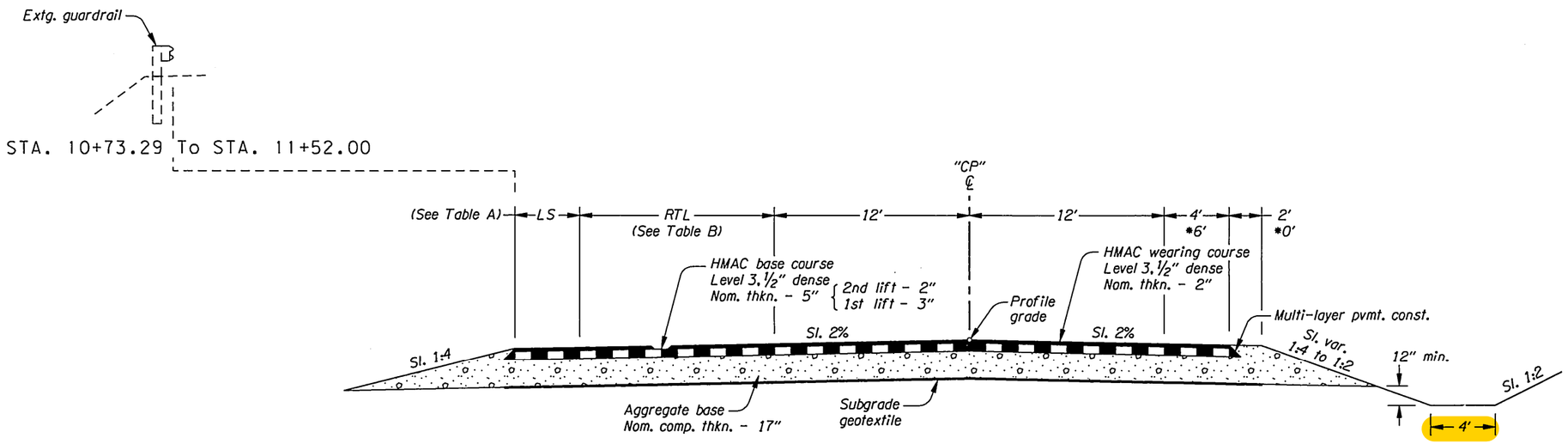
REGION 1 - ROADWAY ENGINEERING SECTION

US30: LOWER COLUMBIA RIVER HWY
@ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Design Team Leader - John Wolf
Designed By - Jason Grassman
Drafted By - Jalal Heydarpour

TYPICAL SECTIONS

SHEET NO. 2



STA. "CP" 10+84.58 To STA. "CP" 13+75.00
*"CP" 10+84.58 To "CP" 12+16.65

TABLE A

STA. TO STA.		LS (feet)
10+84.58	11+38.20	4.00
11+38.20	11+48.69	4.00 to 18.00
11+48.69	12+90.00	18.00 to 4.00
12+90.00	15+10.00	4.00
15+10.00	16+25.00	4.00 to 3.00

TABLE B

STA. TO STA.		RTL (feet)
10+84.58	12+90.00	12.00
12+90.00	14+70.00	12.00 to 0.00
14+70.00	16+25.00	0.00

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2. For standard superelevation, see drg. no. RD140.
3. For slope rounding, see drg. no. RD150.

REGISTERED PROFESSIONAL ENGINEER
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Jason Grassman
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July 9, 2002
JASON M. GRASSMAN
RENEWAL DATE: 6-30-2013

OREGON DEPARTMENT OF TRANSPORTATION

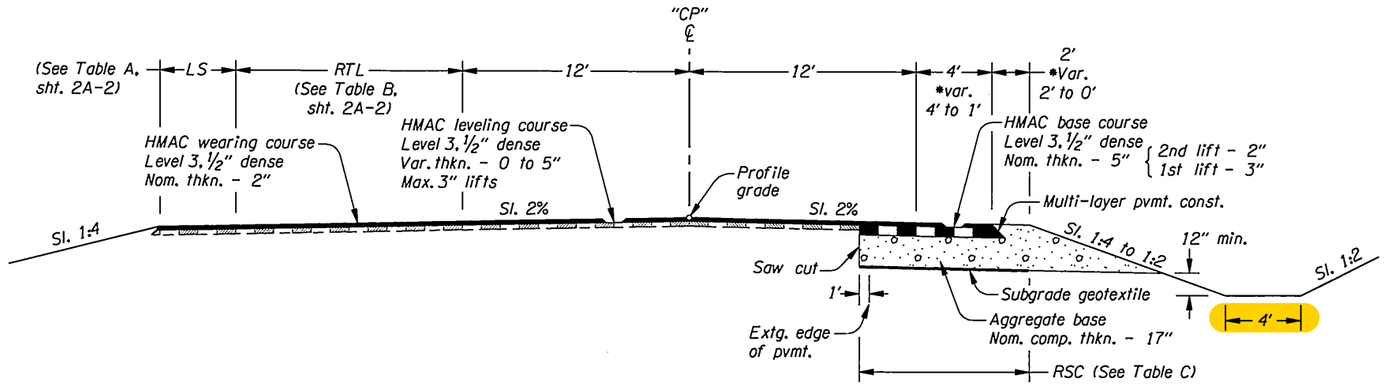
REGION 1 - ROADWAY ENGINEERING SECTION

US30: LOWER COLUMBIA RIVER HWY
@ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Design Team Leader - John Wolf
Designed By - Jason Grassman
Drafted By - Jalal Heydarpour

TYPICAL SECTIONS

SHEET NO. 2A-2



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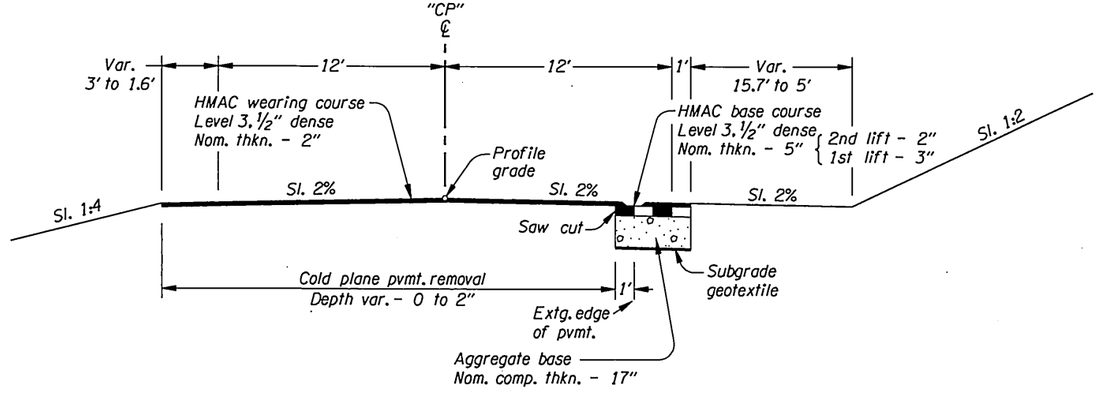
*"CP" 15+50.00 To "CP" 16+25.00



STA. "CP" 16+25.00 To STA. "CP" 16+71.92

TABLE C

STA. TO STA.		RSC (feet)
13+75.00	14+00.00	14.64 to 13.17
14+00.00	14+25.00	13.17 to 11.95
14+25.00	14+50.00	11.95 to 11.04
14+50.00	14+70.00	11.04 to 10.08
14+70.00	15+00.00	10.08 to 9.04
15+00.00	15+25.00	9.04 to 8.31
15+25.00	15+50.00	8.31 to 7.74
15+50.00	15+75.00	7.74 to 5.83
15+75.00	16+00.00	5.83 to 3.49
16+00.00	16+25.00	3.49 to 1.33
16+25.00	16+50.00	1.33 to 1.01
16+50.00	16+71.92	1.01 to 1.00

NOTE:
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3. For slope rounding, see drg. no. RD150.

REGISTERED PROFESSIONAL ENGINEER
56,138 PE
Jason Grassman
OREGON
July 9, 2002
JASON M. GRASSMAN
RENEWAL DATE: 6-30-2013

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

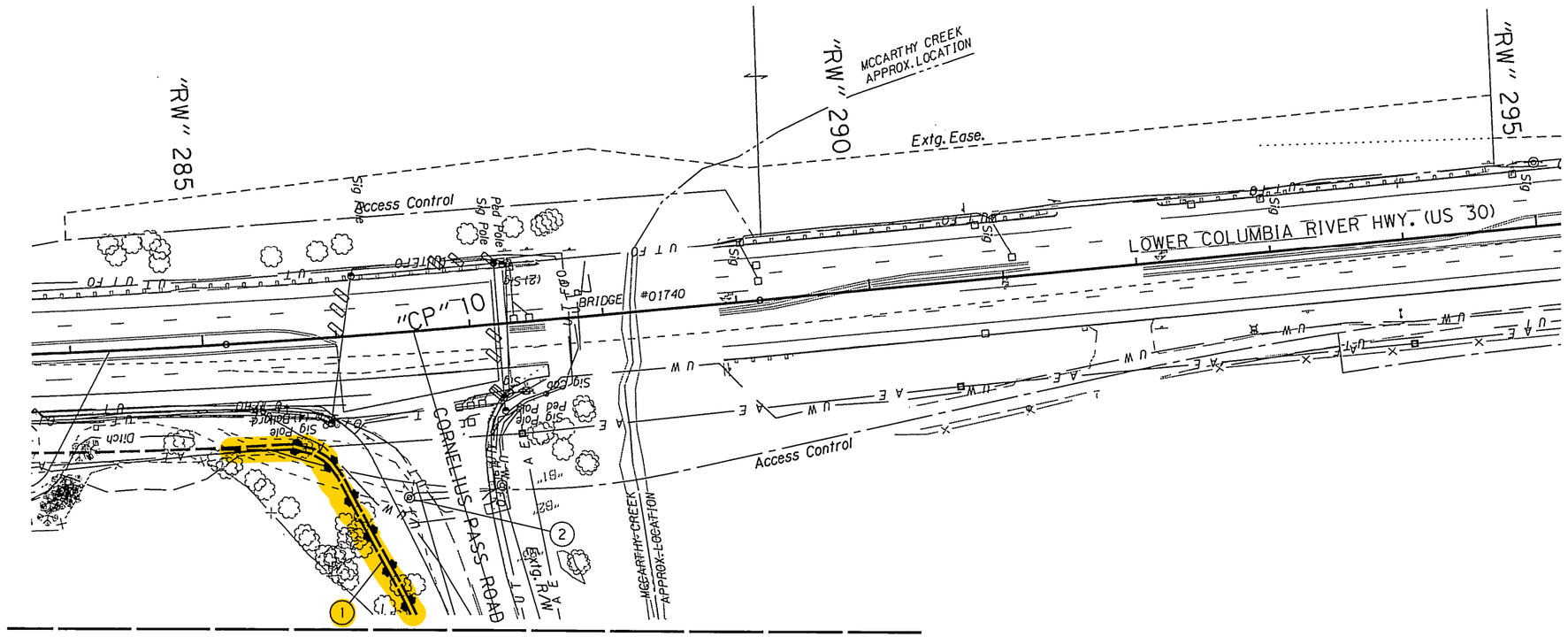
Design Team Leader - John Wolf
Designed By - Jason Grassman
Drafted By - Jalal Heydarpour

TYPICAL SECTIONS

SHEET NO. 2A-3

Sec. 18, T. 2 N., R. 1 W., W.M.

45V-105

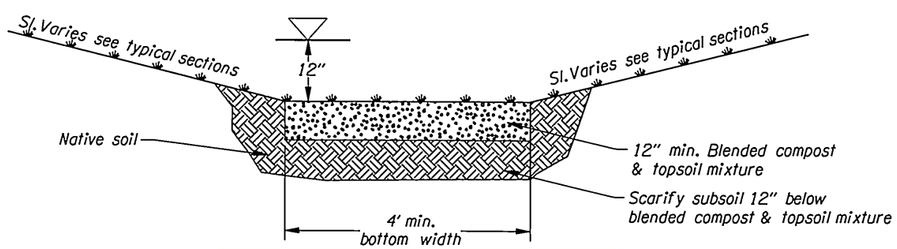


MATCH LINE
SEE SHEET 5A

1 Sta. "RW" 285+50.00 to "CP"12+98.60 Rt.
Const. water quality swale - 265'
(Drainage facility ID# D00577)
(For details, see below & drg.no.RD399)

2 Minor adjust manhole
(by others)

D00577 and D00578:



WATER QUALITY SWALE
Not to scale

REGISTERED PROFESSIONAL ENGINEER
74492PE
OREGON
JAN. 13, 2009
JERED W. CARPENTER
EXPIRES: 12-31-2013

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - GEO/HYDRO/HAZMAT UNIT

US30: LOWER COLUMBIA RIVER HWY
@ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Ed Foltyn
Designed By - Jered Carpenter
Drafted By - Billy Shafer

DRAINAGE & UTILITIES

SHEET NO. 4A

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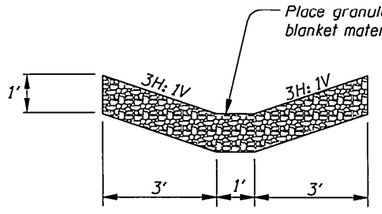
Sec. 18, T. 2 N., R. 1 W., W.M.

45V-105

1. Sta. "CP" 12+98.60, 44.25' Rt. to Sta. "CP" 13+03.06, 44.56' Lt.
   Inst. 18" culv. pipe - 89'
   10' depth
   Const. paved end slope Lt & Rt - 70 sq.ft.

2. Sta. "CP" 12+98.60 to "CP" 15+12.0
   Const. water quality swale - 218'
   (Drainage facility ID# D00578)
   (For details, see sht. 4A & drg. no. RD399)

3. Install granular drainage blanket - 27'
   (For details see below)



1. Place drainage blanket from toe of slope to top of slope in order to prevent segregation of materials
2. Place drainage blanket as directed by the engineer

SECTION VIEW
Not to scale

GRANULAR DRAINAGE BLANKET CONSTRUCTION DETAIL

REGISTERED PROFESSIONAL ENGINEER
74492PE
OREGON
JAN. 13, 2009
JERED W. CARPENTER
EXPIRES: 12-31-2013

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - GEO/HYDRO/HAZMAT UNIT

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.
LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Reviewed By - Ed Foltyn
Designed By - Jered Carpenter
Drafted By - Billy Shafer

DRAINAGE & UTILITIES

SHEET NO. 5A

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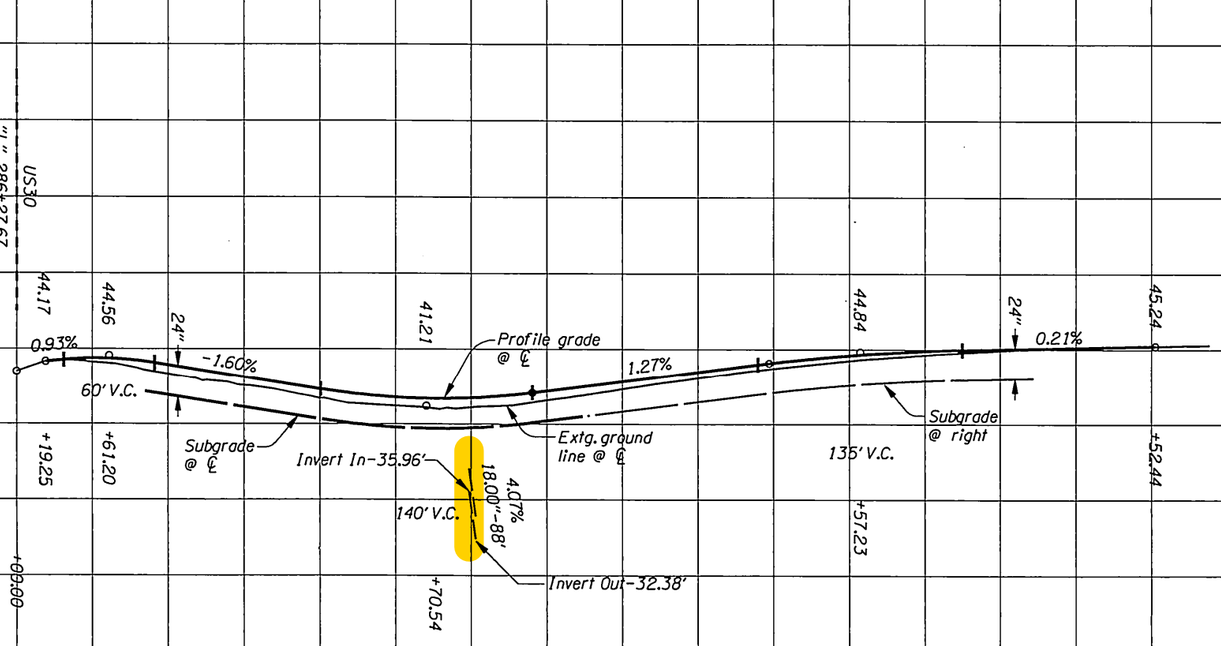
"CP" LINE



REGISTERED PROFESSIONAL ENGINEER
56,138 PE
OREGON
July 9, 2002
JASON M. GRASSMAN

RENEWAL DATE: 6-30-2013

OREGON DEPARTMENT OF TRANSPORTATION

REGION 1 - ROADWAY ENGINEERING SECTION

US30: LOWER COLUMBIA RIVER HWY @ CORNELIUS PASS RD SEC.

LOWER COLUMBIA RIVER HIGHWAY
MULTNOMAH COUNTY

Design Team Leader - John Wolf
Designed By - Jason Grossman
Drafted By - Jalal Heydarpour

PROFILE

SHEET NO. 5B