OPERATION & MAINTENANCE MANUAL

Water Quality Biofiltration Swale

Manual prepared: February/2021

DFI No. D01347

Figure 1: DFI No. D01347, looking [East]

Identification

Drainage Facility ID (DFI):	D01347
Facility Type:	Water Quality Biofiltration Swale
Construction Drawings:	(V-File Numbers) 54V-046
Location:	District: 08
	Highway No.: 270
	Mile Post: -4.46 to -4.45, Rt.

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: West

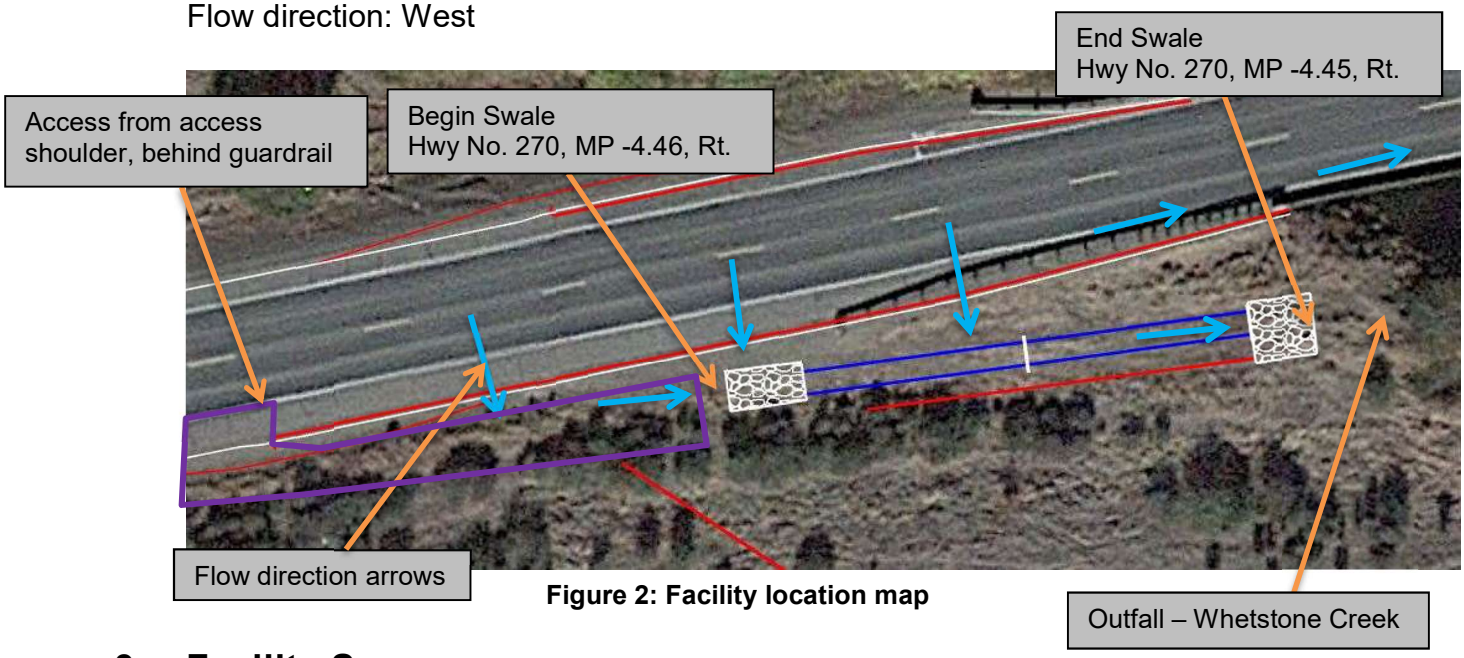


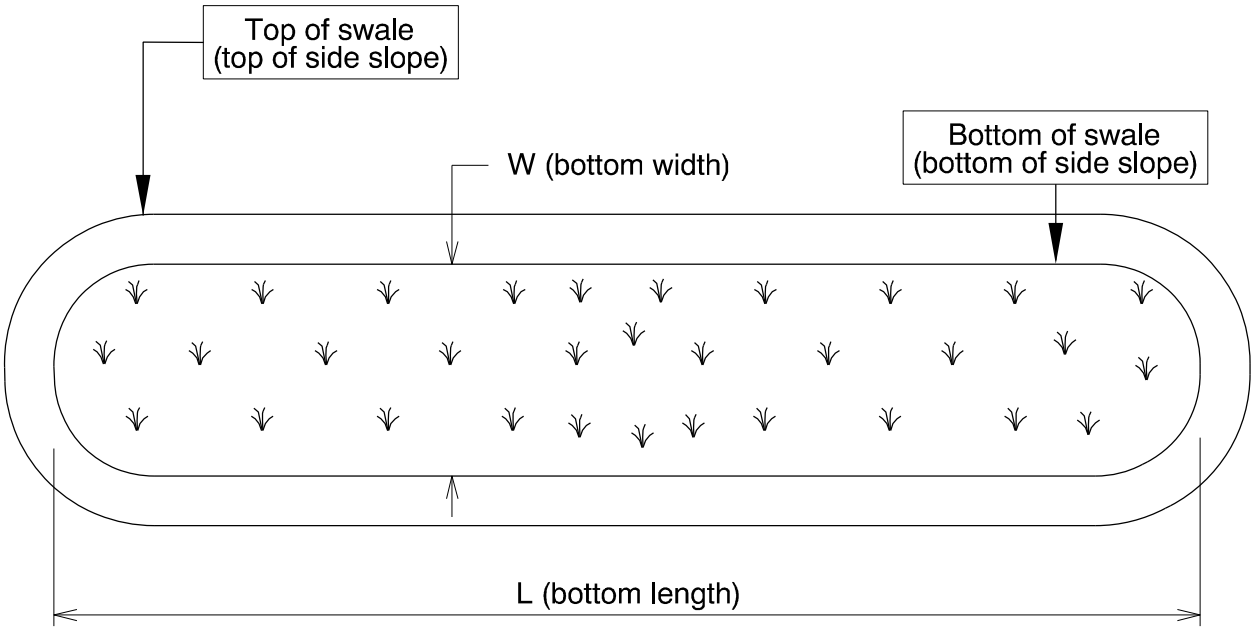
Figure 2: Facility location map

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:

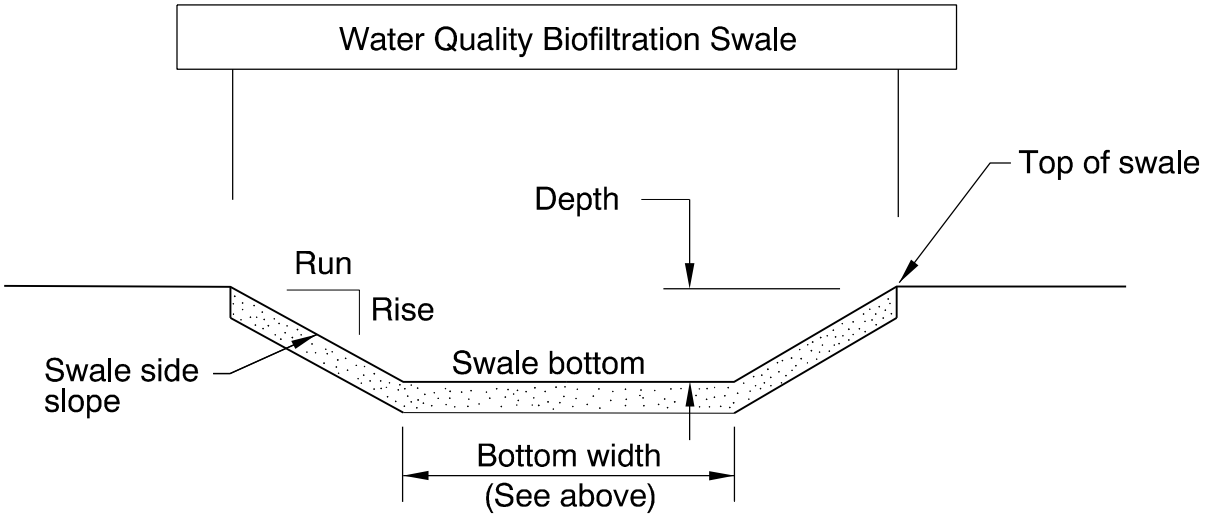
Bottom Length (feet)	Bottom Width (feet)
100	5


Top of swale
(top of side slope)
W (bottom width)
Bottom of swale
(bottom of side slope)
L (bottom length)

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)
1	1	3



Site Specific Information: The swale is located behind guardrail and is at a shallow elevation compared to the highway.

4. Facility Access

Maintenance access to the facility:

☐Roadside pad	☒Roadside shoulder
☐Access road with Gate	☐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:

☒ 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
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**

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 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

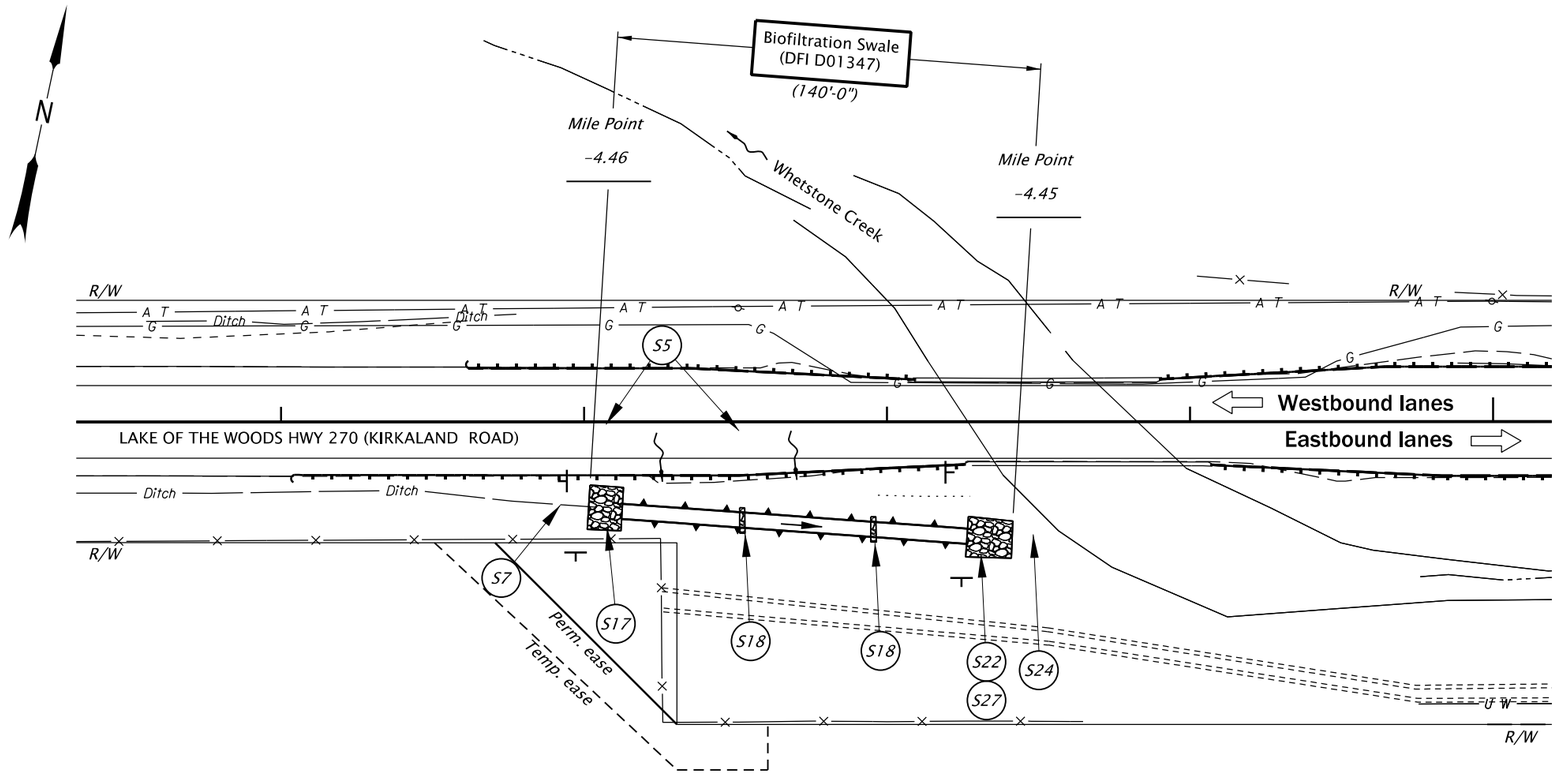
Contact any of the following for more detailed information about management of waste materials found on site:

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

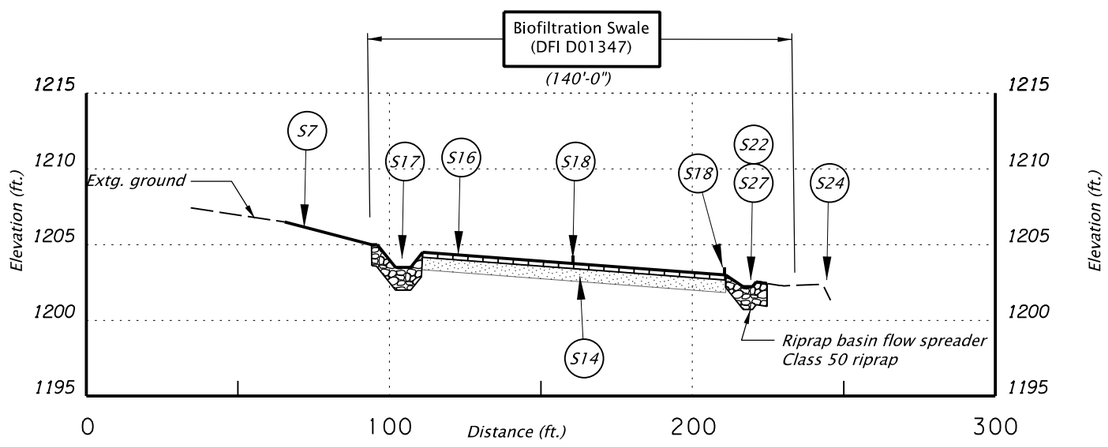
A Appendix A – Site Specific Operational Plan

Contents:

Operational Plan: DFI D01347



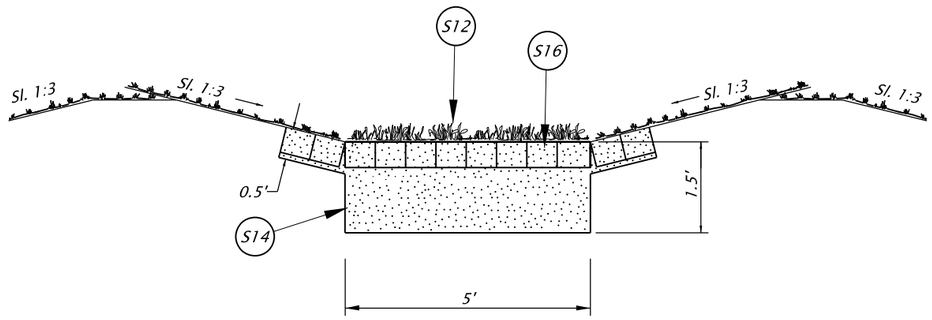
PLAN
NO SCALE



SECTION A-A

LEGEND

- X# = Facility component (see table 1 in O&M Manual)
- = Storm pipe
- = Existing San Pipe
- = Conveyance direction
- = Pavement / Facility flow path
- = Traffic flow direction



TYPICAL SECTION

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 2

Prepared By: Wade J. Coatney

Drafted By: Michael L. Graves

DFI D01347
MAINTENANCE DISTRICT 8 HWY 270
BIOFILTRATION SWALE
HIGHWAY MP -4.45to -4.46
JACKSON COUNTY

B Appendix B – Project Contract Plans

Contents:

Site Specific Subset of Project Contract Plan 54V-046

54V-046

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
A01	*Title Sheet*
A02	*Index Of Sheets Cont. & Std. Dwg. Nos.*

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

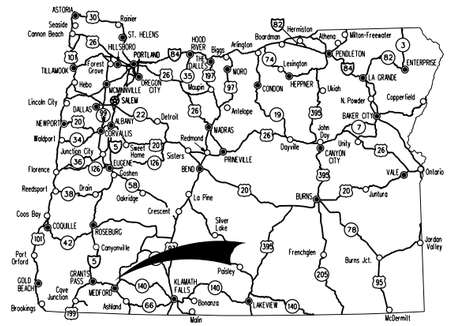
PLANS FOR PROPOSED PROJECT

PAVING, STRUCTURES, CURB RAMPS & SIGNING

OR 140: BEAR CREEK - 5th STREET SEC.

LAKE OF THE WOODS HIGHWAY

JACKSON COUNTY
APRIL 2021

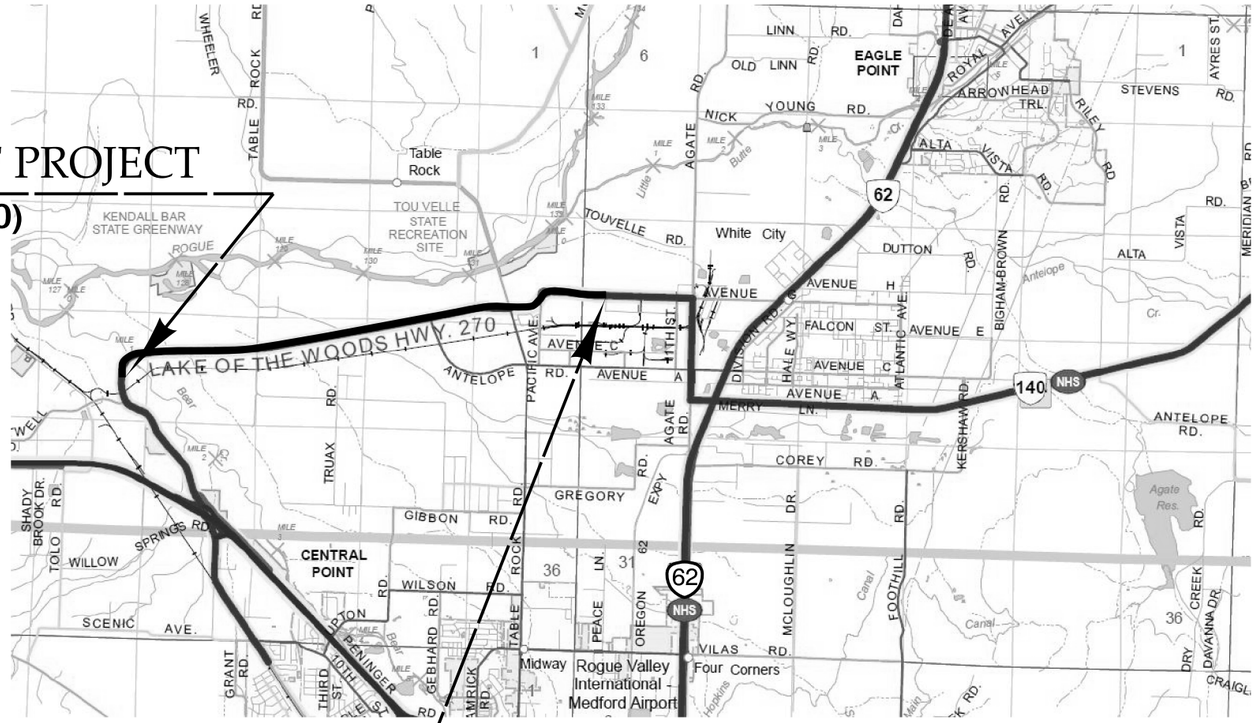


Overall Length Of Project – 4.68 Miles

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.)

SAFETY FIRST
LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

BEGINNING OF PROJECT
STA. 9+43 (MP -6.60)



END OF PROJECT
STA. 256+00 (MP -1.92)

N

T. 36 S., R. 2 W., W.M.
T. 36 S., R. 1 W., W.M.

OREGON TRANSPORTATION COMMISSION

Robert Van Brocklin	CHAIR
Alando Simpson	COMMISSIONER
Maurice Henderson	COMMISSIONER
Julie Brown	COMMISSIONER
Sharon Smith	COMMISSIONER
Kristopher W. Strickler	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: _____
Signature & date

Mark Thompson, Region 3 TCM
Print name and title

_____
Concurrence by ODOT Chief Engineer

OR 140: BEAR CREEK - 5th STREET SEC.
LAKE OF THE WOODS HIGHWAY
JACKSON COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	S270(041)	A01

PE002803-000

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FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

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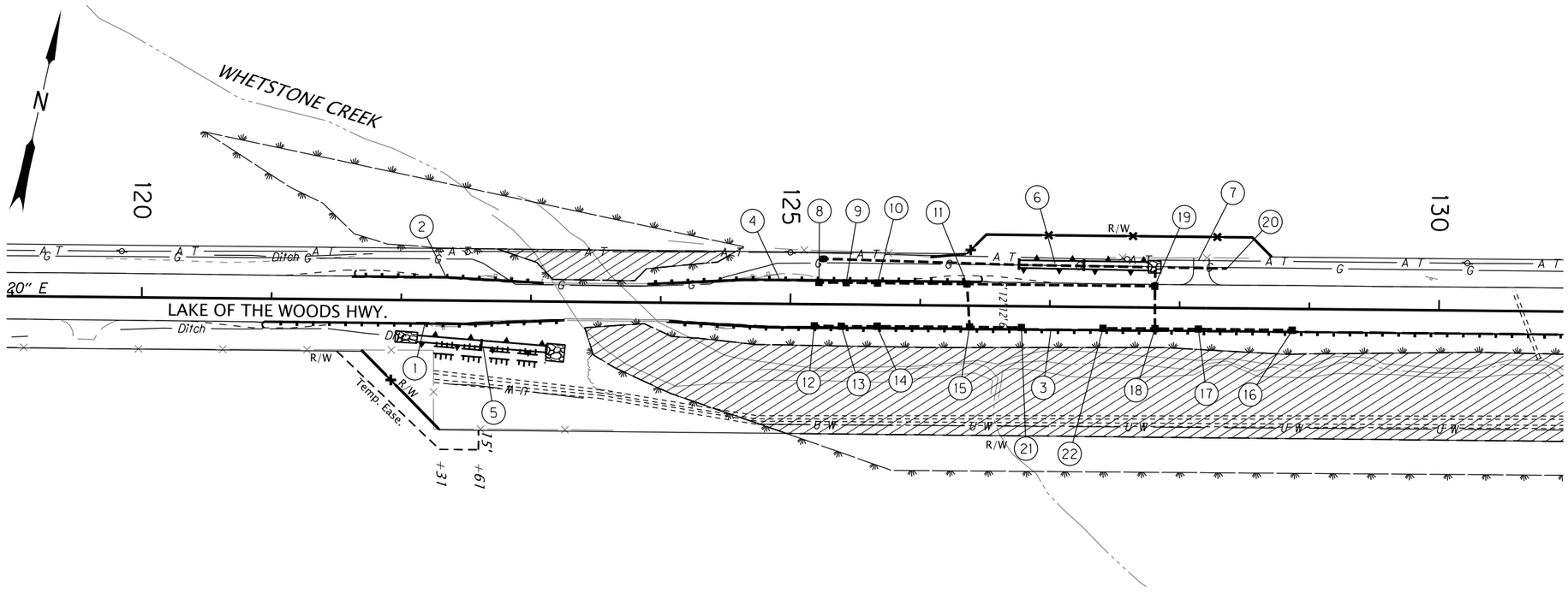
54V-046

Sec. 22, T. 36S, R.02W, W.M.



1. *Sta. 122+00.0 to Sta. 123+25.2, Rt.*
   Const. P.C. conc. Drainage curb - 190'
   (See dwg. RD701)

2. *Sta. 121+35.0 to Sta. 123+09.4, Lt.*
   Const. P.C. conc. Drainage curb - 105'

3. *Sta. 124+06.8 to Sta. 131+45.0, Rt.*
   Const. P.C. conc. Drainage curb - 730'

4. *Sta. 123+89.7 to Sta. 126+05.0, Lt.*
   Const. P.C. conc. Drainage curb - 225'

5. *Sta. 122+01.0 to 123+41.3, Rt*
   Const. water quality swale - DFI D01347
   (For details, see sht. HA02)

6. *Sta. 125+21.9 to Sta. 127+85.3, Lt*
   Const. water quality swale - DFI D01348
   (For details, see sht. HA03)

7. *Sta. 128+16, Lt.*
   Const. access
   (For details, see sht. HA05)

8. *Sta. 125+21.8, Lt.*
   Const. inlet, type "G-2", w/ 1.5' sump
   Const. 12" storm. pipe - 21'
   5' depth
   Slope - 0.005 '/ft
   I.E. - 1200.32'
   (See dwgs. RD300, RD302, RD336, RD339, RD364 and RD365)

9. *Sta. 125+42.9, Lt.*
   Const. inlet, type "G-2", w/ 1.5' sump
   Const. 12" storm. pipe - 24'
   5' depth
   Slope - 0.005 '/ft
   I.E. - 1200.21'

10. *Sta. 125+67.0, Lt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 69'
    5' depth
    Slope - 0.005 '/ft
    I.E. - 1200.09'

11. *Sta. 126+36.0, Lt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 145'
    5' depth
    Slope - 0.003 '/ft
    I.E. - 1199.74'

12. *Sta. 125+18.6, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 21'
    5' depth
    Slope - 0.003 '/ft
    I.E. - 1200.20'

13. *Sta. 125+39.4 Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 28'
    5' depth
    Slope - 0.003 '/ft
    I.E. (e/w) - 1200.14'

14. *Sta. 125+66.8, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 72'
    5' depth
    Slope - 0.003 '/ft
    I.E. - 1200.06'

15. *Sta. 126+38.3, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 34'
    5' depth
    Slope - 0.003 '/ft
    I.E. - 1199.84'

16. *Sta. 128+87.2, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 73'
    5' depth
    Slope - 0.005 '/ft
    I.E. - 1200.48'

17. *Sta. 128+14.6, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 34'
    5' depth
    Slope - 0.005 '/ft
    I.E. (e/w) - 1200.12'

18. *Sta. 127+81.2 Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 33'
    5' depth
    Slope - 0.005 '/ft
    I.E. (e/w) - 1199.95'
    (See dwgs. RD325, RD326 & RD380)

19. *Sta. 127+80.8, Lt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 13'
    5' depth
    Slope - 0.003 '/ft
    I.E. (in, e/w) - 1199.31'
    I.E. (in, n/s) - 1199.79'
    I.E. (out, n/s) - 1199.31'

20. *Sta. 127+90.5 to Sta. 128+36.2, Lt.*
    Const. 18" culv. pipe - 46'
    5' depth
    Slope - 0.027 '/ft
    I.E. (inlet) - 1200.54'
    I.E. (outfall) - 1199.32'

21. *Sta. 126+78.3, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 40'
    5' depth
    Slope - 0.005 '/ft
    I.E. - 1200.04'

22. *Sta. 127+41.1, Rt.*
    Const. inlet, type "G-2", w/ 1.5' sump
    Const. 12" storm. pipe - 40'
    5' depth
    Slope - 0.003 '/ft
    I.E. - 1200.15'

No Work Zone:

REGISTERED PROFESSIONAL ENGINEER
87978
OREGON
MARCH 12, 2013
WADE JOSH COATNEY
RENEWS: 12-31-2021

OREGON DEPARTMENT OF TRANSPORTATION

OR 140: BEAR CREEK - 5th STREET SEC.
LAKE OF THE WOODS HIGHWAY
JACKSON COUNTY

Designer: Wade J. Coatney | Reviewer: Chad M. Howard
Drafter: Wade J. Coatney | Checker: N/A

STORMWATER FACILITY PLAN | SHEET NO. HA01

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

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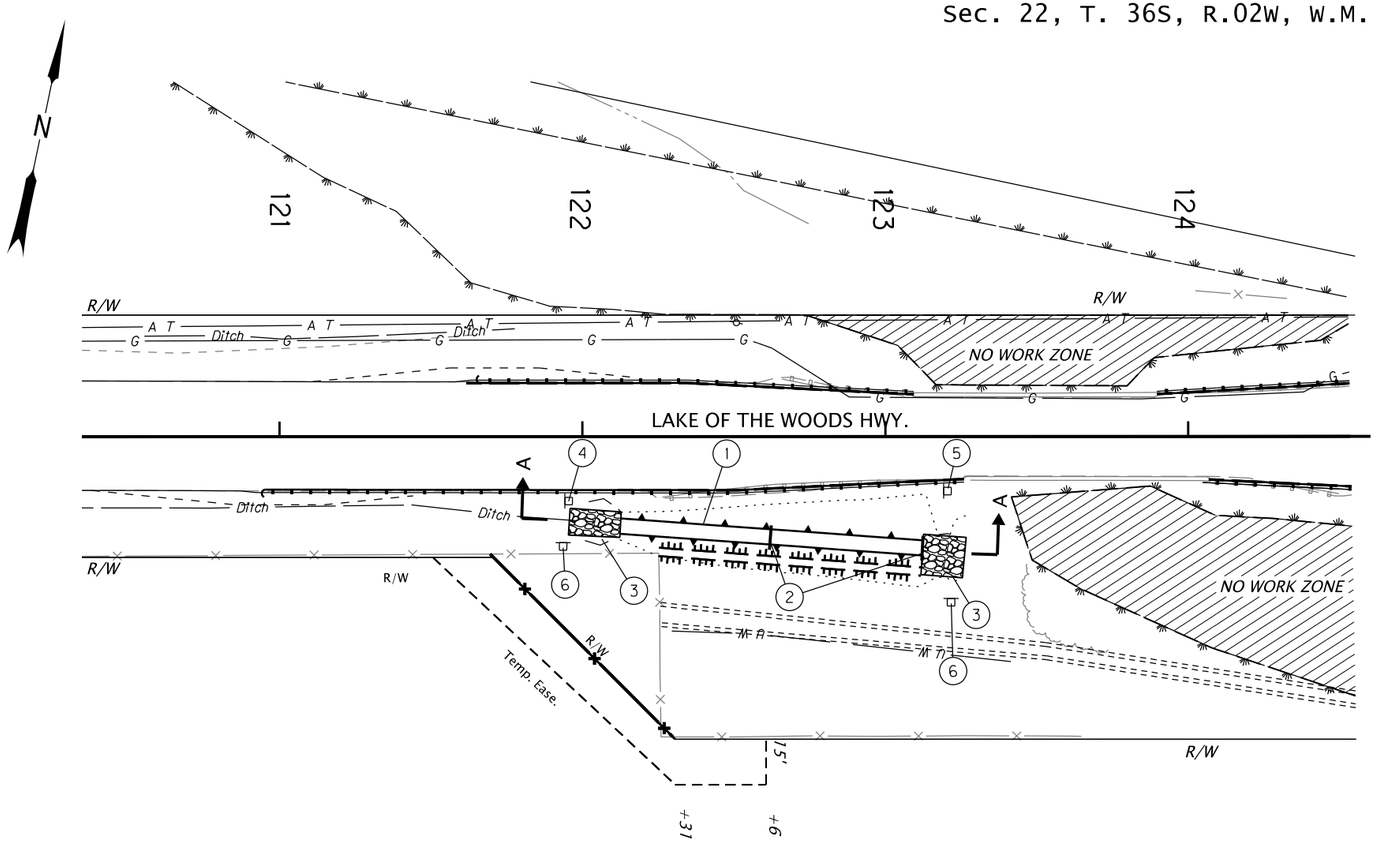
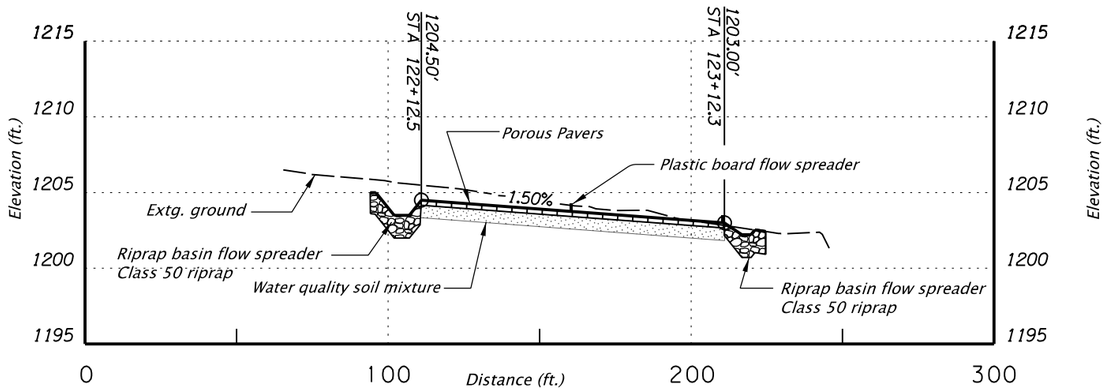
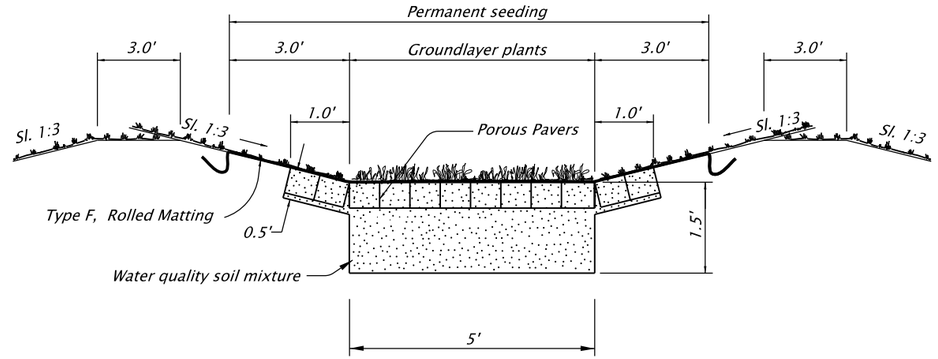


PLAN



SECTION A-A

1. *Sta. 122+01.0 to Sta. 123+41.3, Rt*
   Const. water quality biofiltration swale - DFI no. D01347
   Exc. - 70 cu. yd.
   Porous pavers - 500 sqft
   Matting, Type F - 130 sqyd
   Granular drain backfill - 5 cu. yd.
   Water Quality Mixture - 35 cu. yd.
2. *Const. plastic board flow spreaders - 14'*
   (For details, see sht. HA04)
3. *Const. riprap basin flow spreaders - 18.5 cu. yd.*
   (For details, see sht. HA05)
4. *Inst. Type S-1 marker - red*
   (See dwg. RD399)
5. *Inst. Type S-1 marker - green*
   (See dwg. RD399)
6. *Inst. type S-2 marker - 2*
   (See dwg. RD399)



STA. 122+12.5 to STA. 123+12.3

TYPICAL SECTION

REGISTERED PROFESSIONAL ENGINEER
87978
OREGON
MARCH 12, 2013
WADE JOSH COATNEY
RENEWS: 12-31-2021

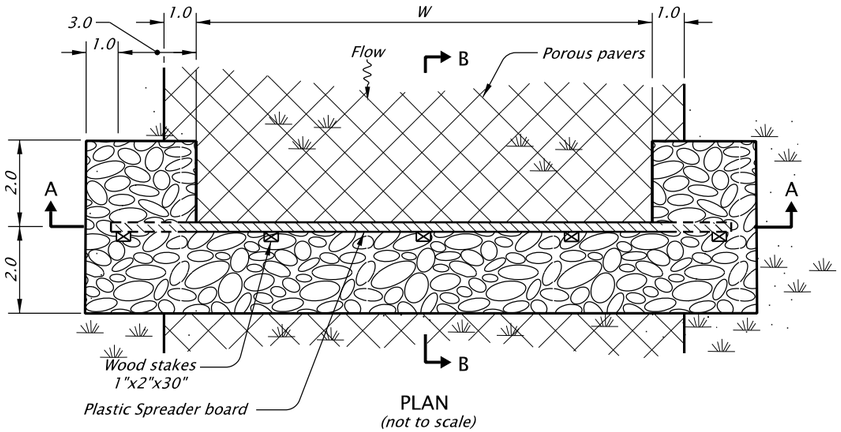
OREGON DEPARTMENT OF TRANSPORTATION

OR 140: BEAR CREEK - 5th STREET SEC.
LAKE OF THE WOODS HIGHWAY
JACKSON COUNTY

Designer: Wade J. Coatney | Reviewer: Chad M. Howard
Drafter: Michael L. Graves | Checker: n/a

STORMWATER FACILITY PLAN | SHEET NO. HA02

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST



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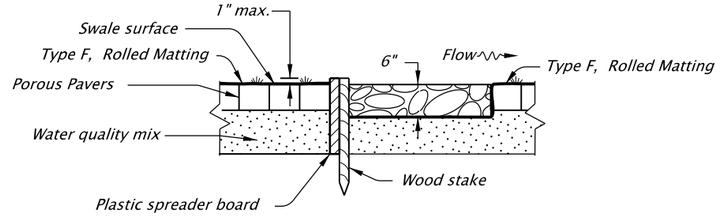

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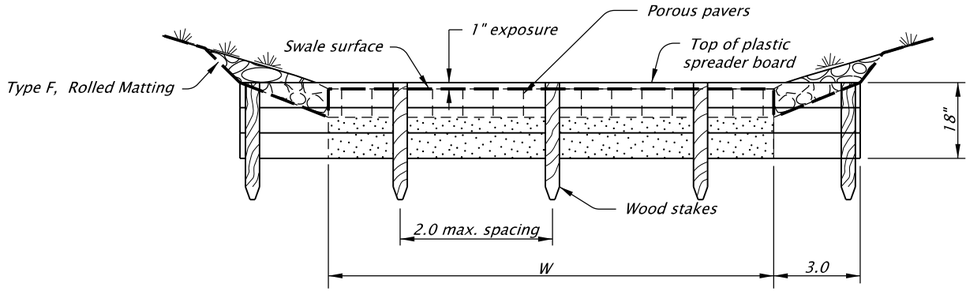

SECTION A-A
(not to scale)

SECTION A-A

PLASTIC BOARD FLOW SPREADER

NOTES:
1. Construct spreader boards level.
2. Extend spreader boards a minimum of 3 feet into side slopes.
3. Reinforce side slopes at flow spreader locally with 1½"-¾" granular drain backfill material. .
4. Fasten wood stakes to spreader boards with 2½" galvanized wood screws every 2" (minimum).
5. Place plastic board flow spreader at beginning and end of swale and every 50 feet throughout length of biofiltration swale.
6. Install matting according to RD1055 channel application. Omit check slots.

Water Quality Mix

1½"-¾" Granular Drain Backfill Material

GROUNDLAYER PLANT PLUGS

Scientific Name	Common Name	Type	Spacing	Swale Quantity D01347 (each)	Swale Quantity D01348 (each)
Carex Densa	Dense Sedge	Plugs	1 per 2 sq. ft.	250	300
Eleocharis Palustris	Common Spikerush	Plugs	1 per 2 sq. ft.	250	300
Juncus Tenuis	Poverty Rush	Plugs	1 per 2 sq. ft.	250	300
Mimulus Guttatus	Seep Monkeyflower	Plugs	1 per 2 sq. ft.	250	300

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RENEWS: 12-31-2021

OREGON DEPARTMENT OF TRANSPORTATION

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LAKE OF THE WOODS HIGHWAY
JACKSON COUNTY

Designer: Wade J. Coatney | Reviewer: Chad M. Howard
Drafter: Wade J. Coatney | Checker: N/A

STORMWATER DETAILS | SHEET NO. HA04

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Rotation: 0° Scale: 1"=100'