# OPERATION & MAINTENANCE MANUAL

# Water Quality Biofiltration Swale

**Manual prepared: October, 2021**

**DFI No. D01403**

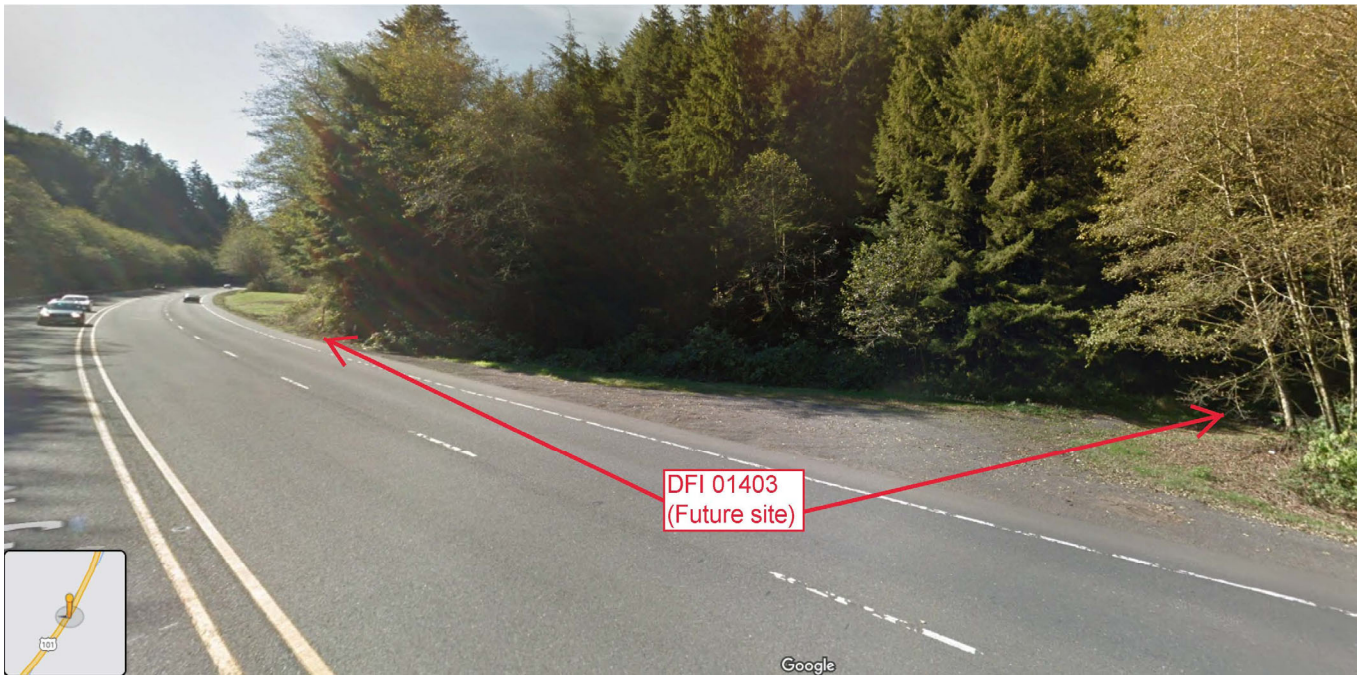



**Figure 1: DFI No. D01403, looking southwest**

## Identification

| | |
|---|---|
| Drainage Facility ID (DFI): | D01403 |
| Facility Type: | Water Quality Biofiltration Swale |
| Construction Drawings: | (V-File Numbers) 55V-014 |
| Location: | District: 01 |
| | Highway No.: 009 |
| | Mile Post: 26.34 to 26.37, right |

## 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: North

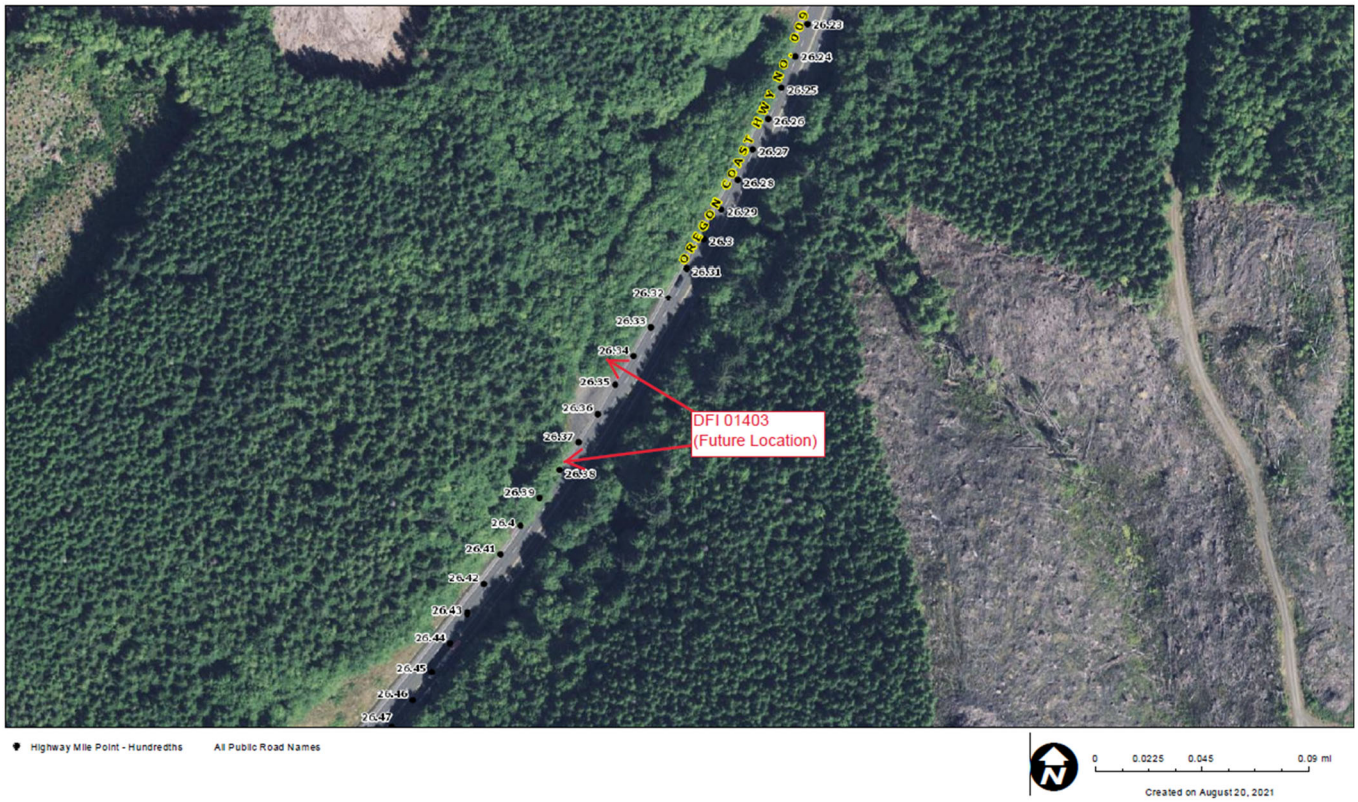


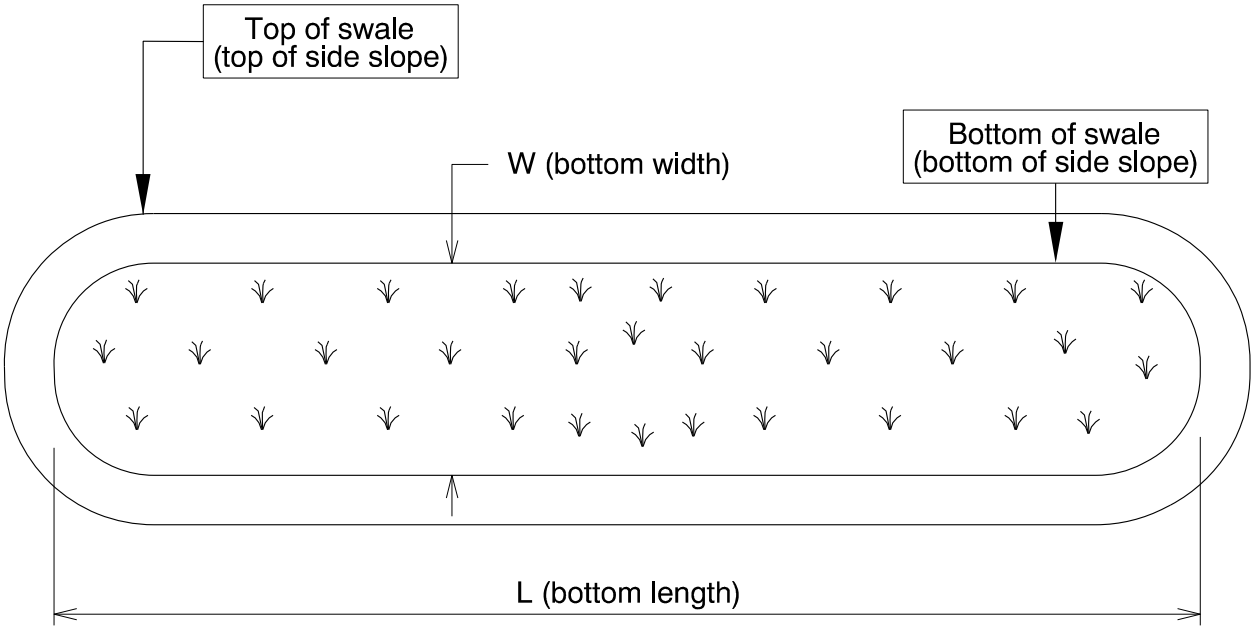

**Figure 2: Facility location map**

## 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:

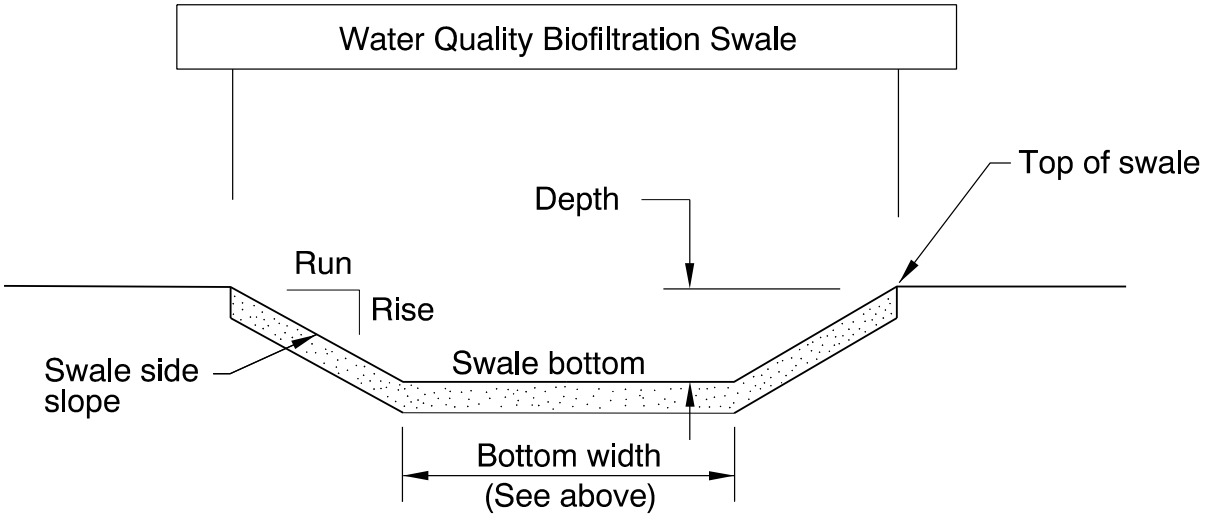
| Bottom Length (feet) | Bottom Width (feet) |
|---|---|
| **130** | **4.25** |



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 | Var. 1.25 – 2 |

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**Site Specific Information:** The swale has a blended compost and topsoil mixture. The swale bottom is grassed and has five riprap flow spreaders spaced 32.5 feet apart.

## 4. Facility Access

Maintenance access to the facility:

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

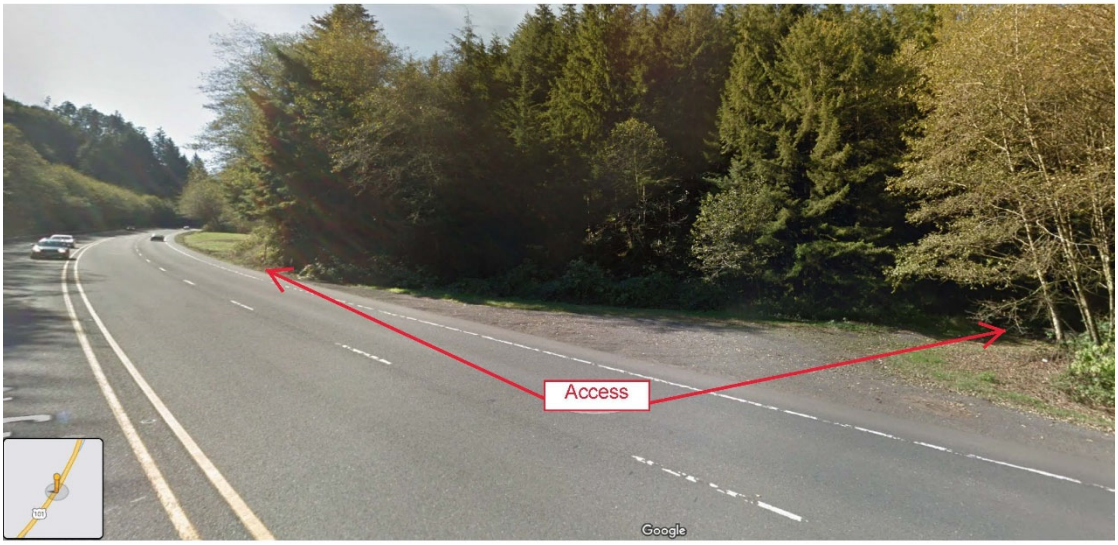



**Figure 3: post construction facility access location**

## 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** |
| Riprap flow spreader (every 32.5 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**<br>☐ **L**<br>☐**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

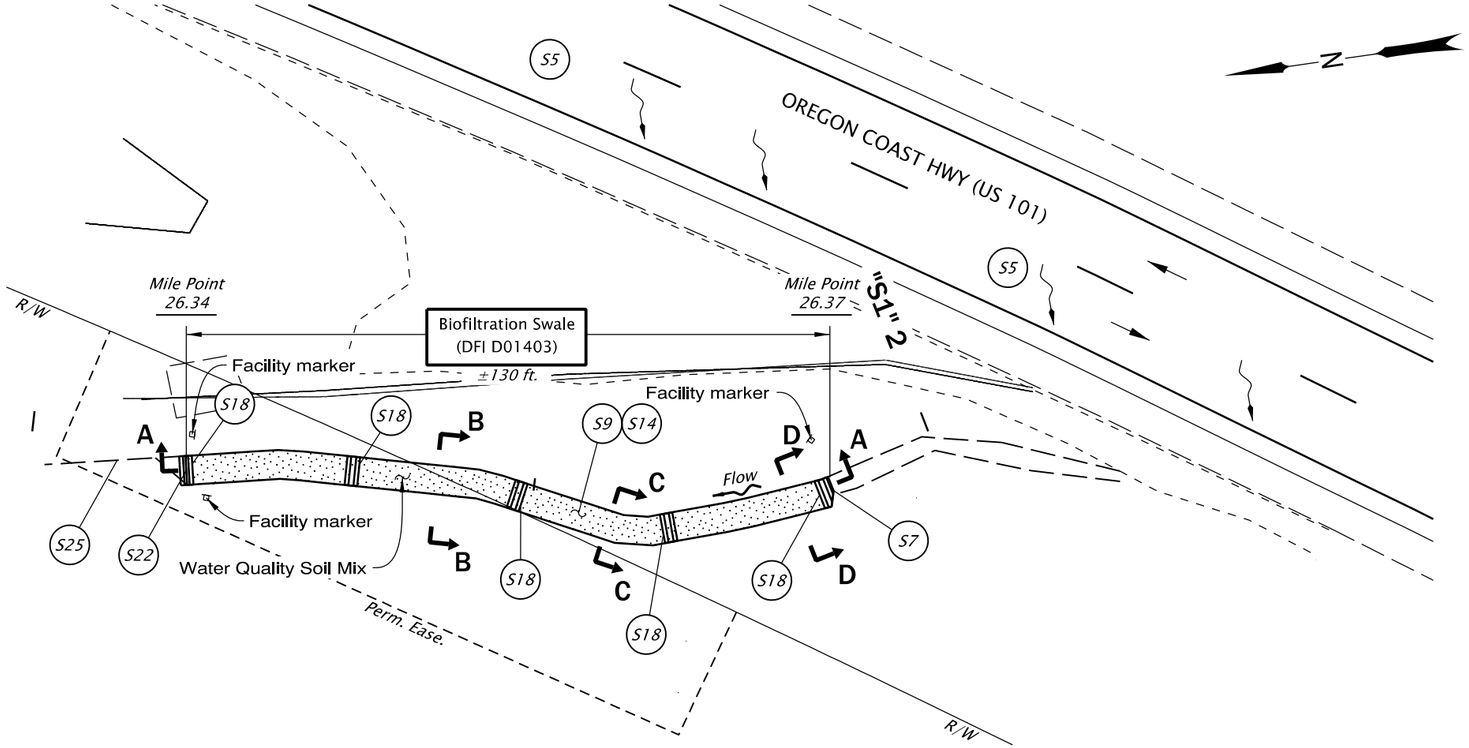
Contact any of the following for more detailed information about management of waste materials found on site:

| | |
|---|---|
| ODOT Materials Management Coordinator | (503) 731-8493 |
| 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 |

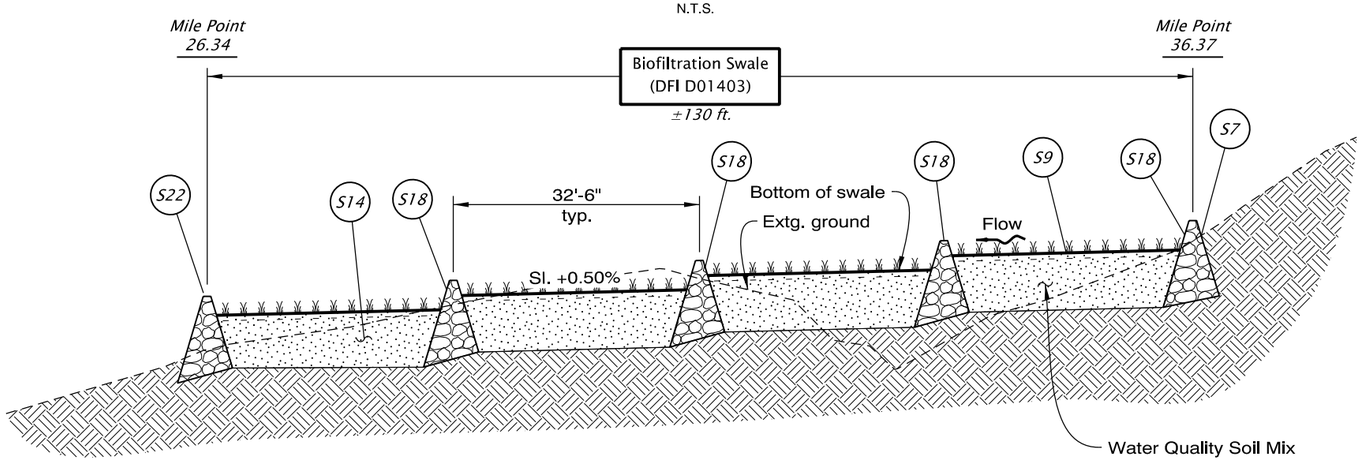
# A Appendix A – Site Specific Operational Plan

## Contents:

**Operational Plan: DFI D01403**



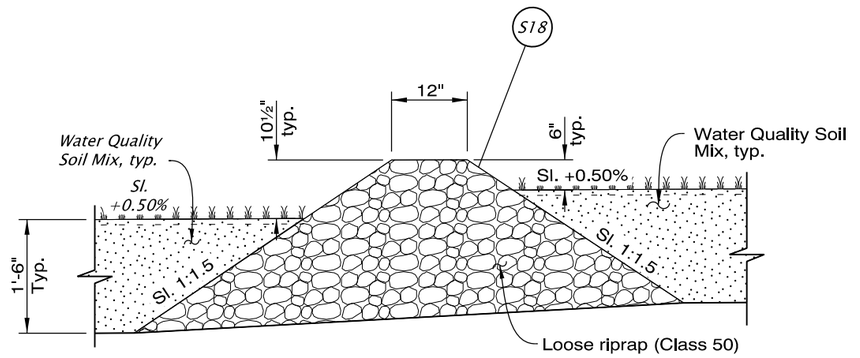

PLAN
N.T.S.




SECTION A-A
N.T.S.

## LEGEND:

- Photo Location / Direction
- S# — Facility component (see table 1 in O&M Manual)
- Biofiltration swale boundry
- Biofiltration swale bottom
- Ditch bottom
- Pavement / facility flow path
- Traffic flow direction




RIPRAP FLOW SPREADER
N.T.S.

Note:
For Section B-B, C-C, D-D and E-E see sht. 2

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 1 of 2

Prepared By: Jason Stroud

Drafted By: Michael Skelton

**DFI D01403**
**MAINTENANCE DISTRICT 1 HWY US101**
**WATER QUALITY BIOFILTRATION SWALE**
HIGHWAY MP 26.34 - 26.37
CLATSOP COUNTY

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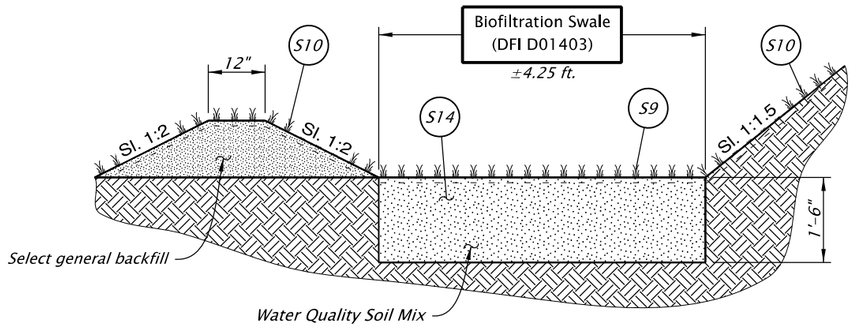
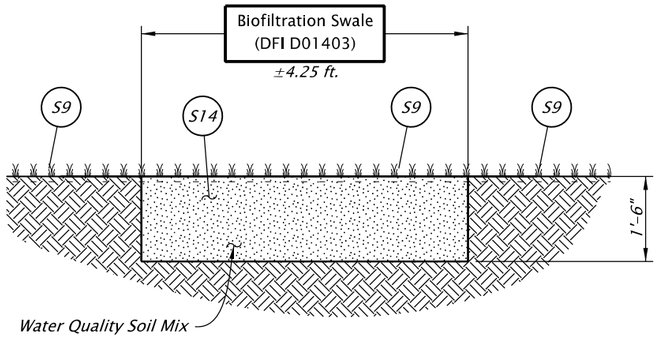
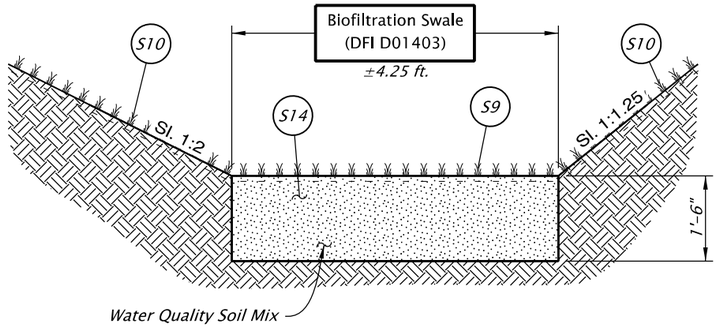
Rotation: 261.8263° Scale: Full Size 1=1




SECTION B-B
N.T.S.




SECTION D-D
N.T.S.




SECTION C-C
N.T.S.

OREGON DEPARTMENT OF TRANSPORTATION

Sht. 2 of 2

Prepared By: Jason Stroud

Drafted By: Michael Skelton

**DFI D01403**
**MAINTENANCE DISTRICT 1 HWY US101**
**WATER QUALITY BIOFILTRATION SWALE**
HIGHWAY MP 26.34 - 26.37
CLATSOP COUNTY

# B Appendix B – Project Contract Plans

## Contents:

**Site Specific Subset of Project Contract Plan 55V-014**

55V-014

| 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

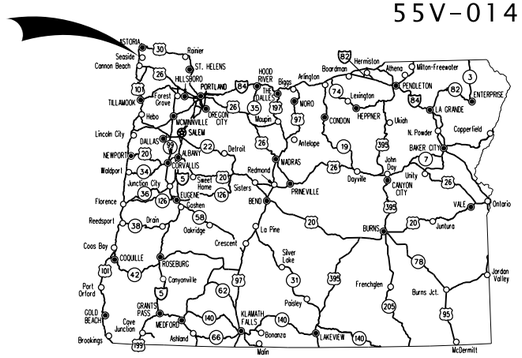
## GRADING, DRAINAGE, PAVING, CURB RAMPS, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

# US101: AVE A - AVE K (SEASIDE) SEC.

## OREGON COAST HIGHWAY

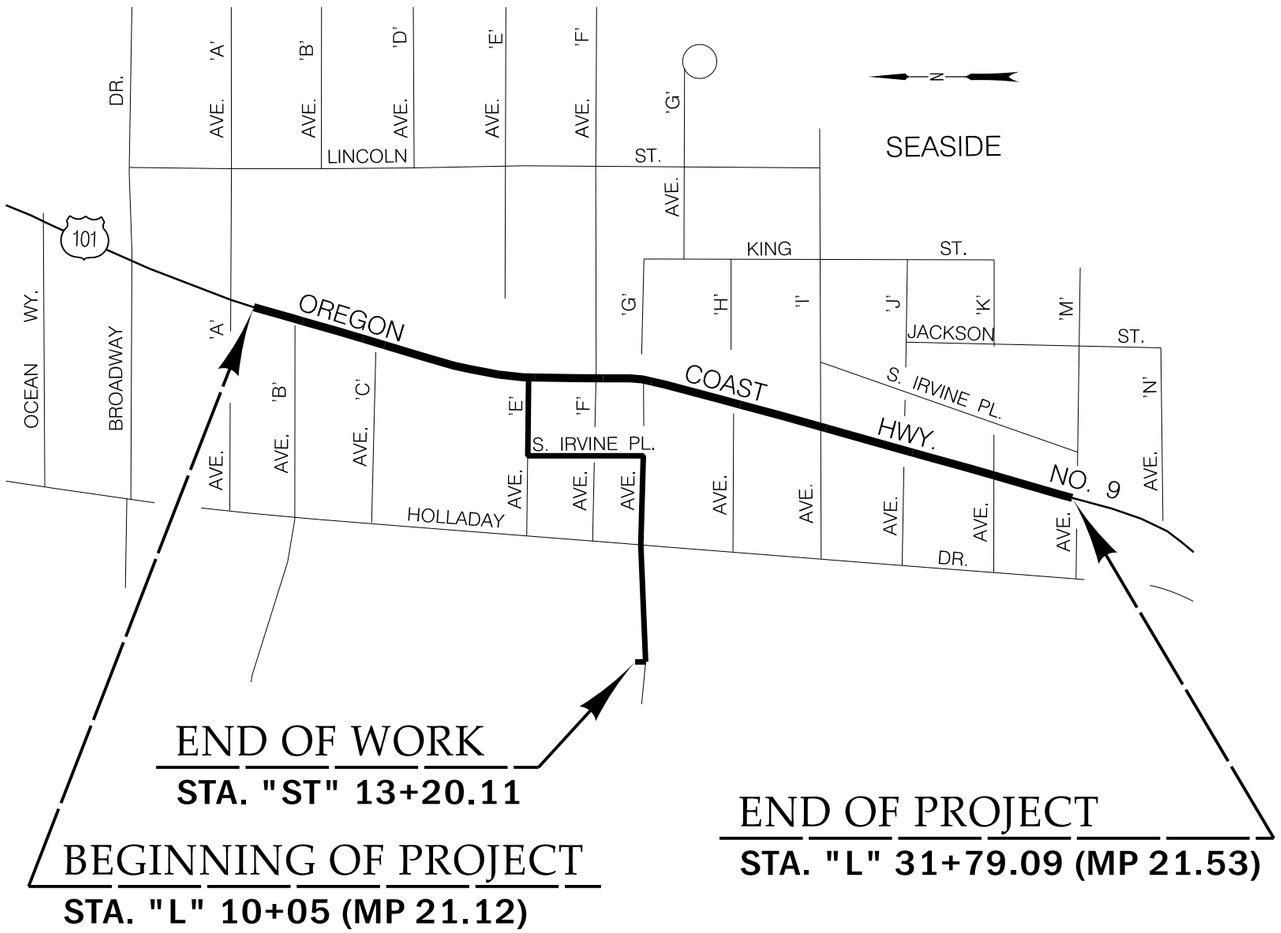
## CLATSOP COUNTY

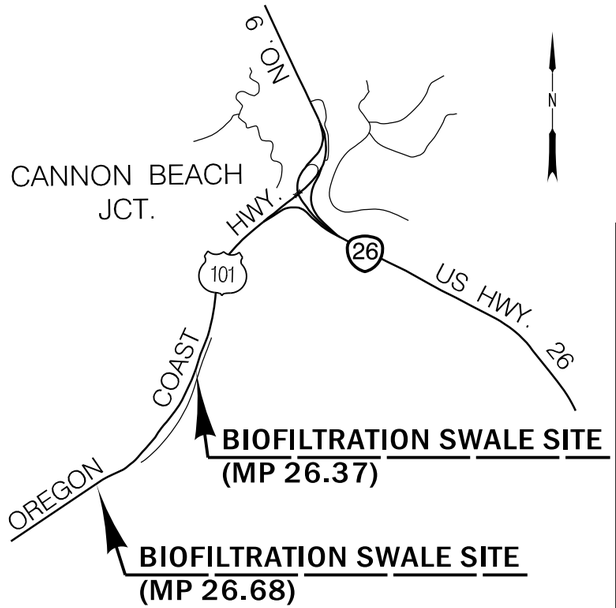
## JULY 2022




*Overall Length Of Project – 0.41 Miles*

**ATTENTION:**
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0001 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).




T. 6 N., R. 10 W., W.M.


OREGON TRANSPORTATION COMMISSION

| | |
|---|---|
| Robert Van Brocklin | CHAIR |
| Alando Simpson | COMMISSIONER |
| Julie Brown | COMMISSIONER |
| Sharon Smith | COMMISSIONER |
| Marcilynn Burke | 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

Carol Cartwright-R2 Tech Center Manager
Print name and title

_____
Concurrence by ODOT Chief Engineer

**US101: AVE A - AVE K (SEASIDE) SEC.**
OREGON COAST HIGHWAY
CLATSOP COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | S009(484) | A01 |

PE002747 000

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FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Rotation: 0° Scale: 1"=100'

## INDEX OF SHEETS, CONT.

| ROADWAY DETAILS | |
|---|---|
| A03, A04 | Survey Control Data |
| SHEET NO. | DESCRIPTION |
| A05 Thru A08 Incl. | Curb Ramp Layout Sheet |
| BA01, Thru BA17 Incl. | Typical Sections |
| BB01 Thru BB13 Incl. | Details |
| BC01 Thru BC33 Incl. | Curb Ramp Details |
| BD01 | Pipe Data Sheet |
| | |
| ROADWAY CONSTRUCTION | |
| C01 | Alignment |
| C01A | General Construction |
| C01B | Construction Notes |
| C01C | Drainage And Utilities |
| C01D | Drainage Notes |
| C01E, C01F | Profile |
| C02 | Alignment |
| C02A | General Construction |
| C02B | Construction Notes |
| C02C | Drainage And Utilities |
| C02D | Drainage Notes |
| C02E | Profile |
| C02F | Profile |
| C02G | Profile |
| C03 | Alignment |
| C03A | General Construction |
| C03B | Construction Notes |
| C03C | Drainage And Utilities |
| C03D | Profile |
| C03E | Profile |
| C04 | Alignment |
| C04A | General Construction |
| C04B | Drainage And Utilities |
| C04C | Profile |
| C04D | Profile |
| C05 | Alignment |
| C05A | Drainage And Utilities |
| C05B | Drainage Notes |
| C05C | Profile |
| | |
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| EB01, EB02 | Traffic Control Detour Plan |
| EC01 Thru EC04 Incl. | Traffic Control Plan |
| ED01 Thru ED03 Incl. | Traffic Control Plan |
| EE01 Thru EE03 Incl. | Traffic Control Plan |
| EF01, EF02 | Traffic Control Plan |
| EG01 Thru EG04 Incl. | Traffic Control Plan |
| EH01 Thru EH03 Incl. | Traffic Control Plan |
| EJ01, EJ02 | Traffic Control Plan |

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| ROADSIDE DEVELOPMENT | |
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| FA15 | Roadside Development Schedules |
| | |
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| FB01 | Erosion And Sediment Control Layout |
| FB02 Thru FB11 Incl. | Erosion & Sediment Control Plan |
| | |
| GEOTECHNICAL | |
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| GB02 | Details |
| GB03 Thru GB05 Incl. | Tall Curb Plan And Elevation |
| GB06 | Details |
| | |
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| HA01 Thru HA07 Incl. | Stormwater Plan |
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| LB01 | Sign Details |
| LC01 Thru LC04 Incl. | Sign & Post Data Table |
| | |
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| MA02 | Existing utilities |
| MB01 | Flashing Beacon Plan |
| MB02 | Existing utilities |
| MC01, MC02 | Details |
| | |
| ILLUMINATION | |
| PA01 | Illumination Legend And Light Pole Table |
| PA02 | Illumination Plan |
| PA03 | Geotechnical Data |
| PA04 | Illumination Plan |
| PA05 | Geotechnical Data |
| PB01 | Illumination Details |
| | |
| PERMANENT PAVEMENT MARKINGS | |
| QA01 | Pavement Marking Details |
| QB01 | Pavement Marking Plan |

*Standard Dwg. Nos.*

- RD300 – Trench Backfill, Bedding, Pipe Zone And Multiple Installations
- RD302 – Street Cut
- RD335 – Standard Storm Sewer Manhole
- RD336 – Standard Manhole Details
- RD339 – Pipe To Structure Connections
- RD344 – Standard Manhole Base Section
- RD345 – Pipe To Manhole Connections
- RD346 – Large Precast Manhole
- RD348 – Manhole With Inlet
- RD356 – Manhole Covers And Frames
- RD360 – Manhole Frame Adjustment
- RD363 – Gutter Transition At Inlet
- RD364 – Concrete Inlets Type G-1, G-2, G-2M & G-2MA
- RD365 – Frames & Grates For Concrete Inlets
- RD366 – Concrete Inlets Type CG-1, CG-2
- RD371 – Concrete Inlet Base Type CG-3
- RD372 – Concrete Inlet Top, Option 1, Type CG-3
- RD373 – Concrete Inlet Top, Option 2, Type CG-3
- RD374 – Area Drainage Basin Or Field Inlet
- RD386 – Fill Height Tables For Circular Concrete Pipe
- RD388 – Fill Height Tables For PVC Pipe
- RD390 – Fill Height Table For Corrugated HDPE Pipe
- RD393 – Fill Height Tables For Polypropylene Pipe
- RD399 – Stormwater Treatment And Storage Facility Field Markers
- RD610 – Asphalt Concrete Pavement (ACP) Details
- RD615 – Surface Edge Details
- RD700 – Curbs
- RD705 – Islands
- RD710 – Accessible Route Islands
- RD720 – Curb Line Sidewalks
- RD721 – Separated Sidewalks
- RD722 – Sidewalk Joints And Transition Panels
- RD770 – Metal Handrail
- RD771 – Metal Handrail Details
- RD900 – Curb Ramp Components And Legend
- RD901 – Curb Ramp Legend And Corner Identification
- RD902 – Detectable Warning Surface Details
- RD904 – Detectable Warning Surface Placement For Curb Ramps
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- RD906 – Detectable Warning Surface Placement For Accessible Route
- RD910 – Perpendicular Curb Ramp
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- RD930 – Combination Curb Ramp
- RD936 – Combination Curb Ramp
- RD938 – Combination Curb Ramp Single Ramp
- RD950 – End of Walk Curb Ramp
- RD960 – Unique Curb Ramp
- RD1000 – Construction Entrances
- RD1005 – Check Dams Type 1, 3, And 4
- RD1010 – Inlet Protection Type 2, 3, 6, 7, 10 And 11
- RD1032 – Sediment Barrier Type 8
- RD1055 – Slope and Channel Matting
- RD1070 – Concrete Truck Wash Out
- TM200 – Sign Installation Details
- TM223 – Conventional Roads Directional Sign Layout Street Name Signs
- TM230 – Mounting Details For Removable Legend 4" Through 8" Letters & Numbers
- TM233 – Mounting Details For Removable Legend Various Arrow Sizes
- TM240 – Crosswalk Closure Details
- TM457 – Vehicle, Pedestrian Signal And Pushbutton Mounting Option Details
- TM467 – Pedestrian Signal Mount And Pedestrian Pushbutton Details
- TM471 – Trenching & Conduit Installation
- TM472 – Traffic Signal Junction Boxes/Hand Holes
- TM482 – Controller Cabinet & Service Cabinet Foundation Details
- TM485 – Service Cabinet Wiring Details
- TM500 – Pavement Marking Standard Detail Blocks
- TM501 – Pavement Marking Standard Detail Blocks
- TM503 – Pavement Marking Standard Detail Blocks
- TM521 – Durable & High Performance Pavement Markings Surface & Groove Installed Non-Profiled
- TM530 – Intersection Pavement Markings (Crosswalk, Stop Bar & Bike Lane Stencil)
- TM531 – Turn Arrow Marking Details
- TM539 – Median And Left Turn Channelization Details
- TM560 – Alignment Layout: General
- TM561 – Alignment Layout: Left Turn Lane, Centerline & Medians
- TM602 – Triangular Base Breakaway Multi-Directional Slip Base Design
- TM670 – Wood Post Sign Supports
- TM671 – 3 Second Gust Wind Speed Map
- TM675 – Extruded Aluminum Panels
- TM676 – Sign Attachments
- TM677 – Sign Mounts
- TM678 – Secondary Sign Mounting Details
- TM681 – Perforated Steel Square Tube (PSST) Sign Support Installation
- TM687 – Perforated Steel Square Tube (PSST) Anchor Foundation
- TM688 – Perforated Steel Square Tube (PSST) Slip Base Foundation
- TM689 – Temporary PSST Vane Anchor Installation
- TM800 – Tables, Abrupt Edge And PCMS Details
- TM810 – Temporary Pavement Markings
- TM820 – Temporary Barricades
- TM821 – Temporary Sign Supports
- TM822 – Temporary Sign Supports
- TM840 – Closure Details
- TM841 – Intersection Work Zone Details
- TM844 – Temporary Pedestrian Access Routing
- TM850 – 2-Lane, 2-Way Roadways
- TM852 – Non-Freeway Multi-Lane Sections
- TM853 – Non-Freeway Multi-Lane Sections

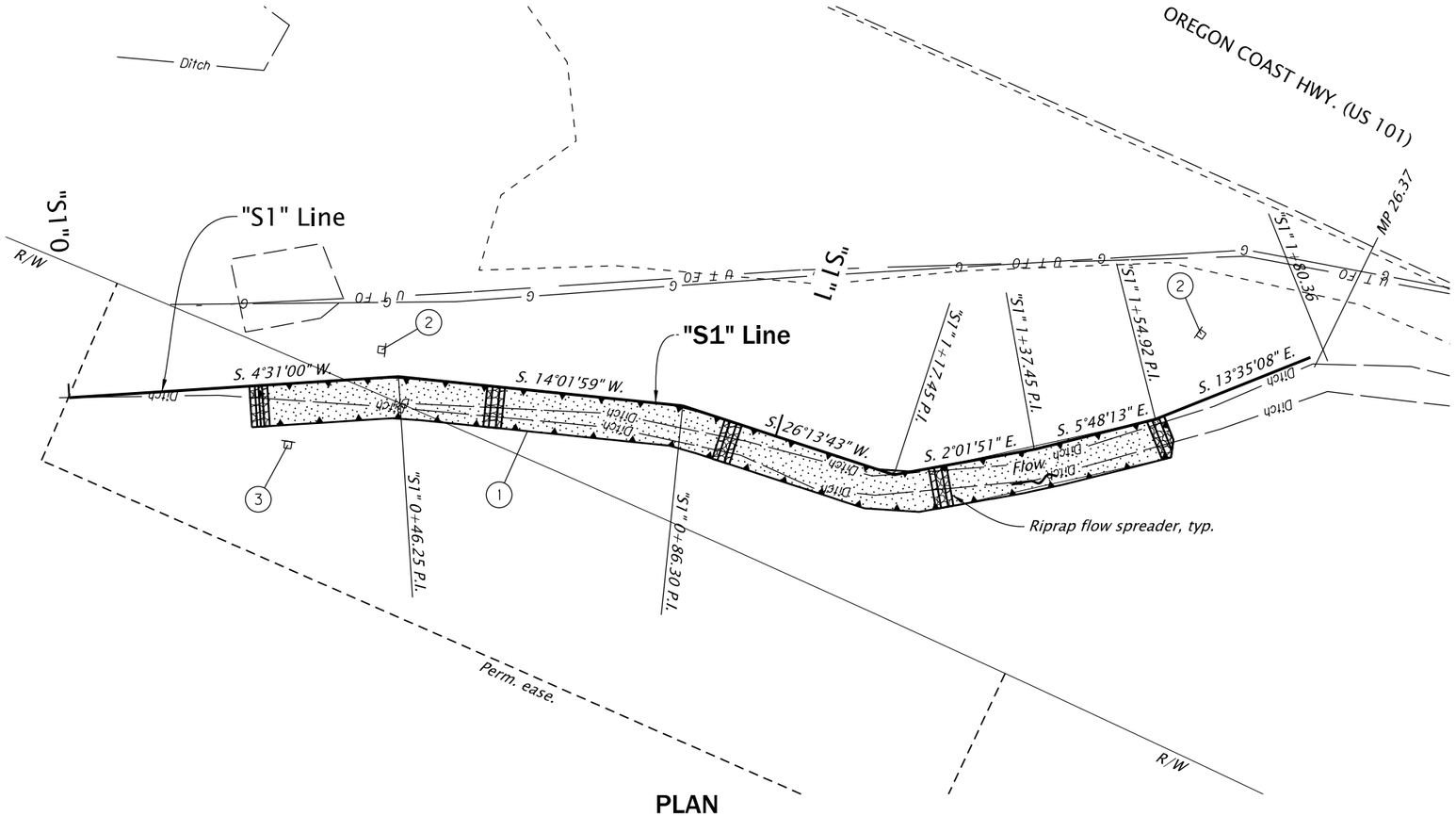
*R/W Map RW9635M*

*Standard Drawings located on the web at:*
*http://www.oregon.gov/ODOT/Engineering/Pages/Standards.aspx*

OREGON DEPARTMENT OF TRANSPORTATION

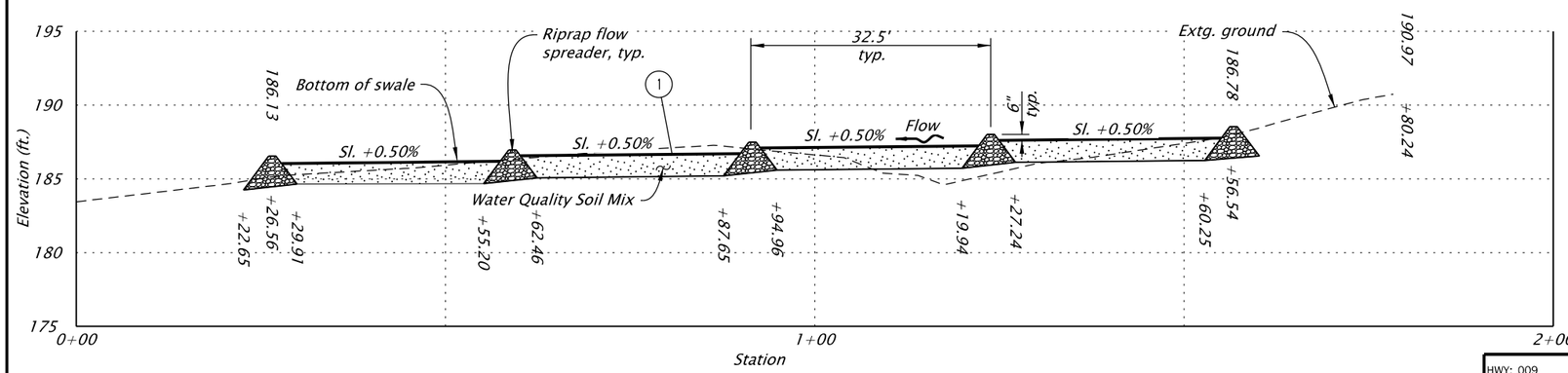
**US101: AVE A - AVE K (SEASIDE) SEC.**
OREGON COAST HIGHWAY
CLATSOP COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | SEE SHEET A01 | A02 |




## PLAN

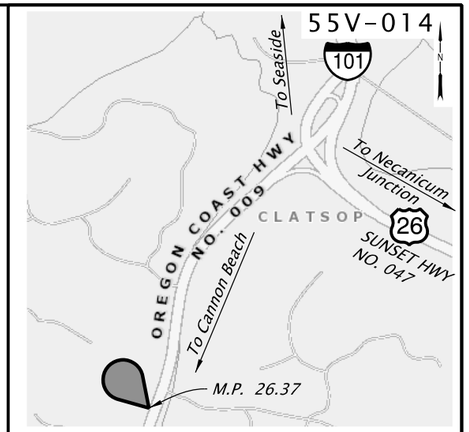
Scale: 1" = 20'




## PROFILE "S1" LINE

HORIZ. SCALE: 1":20'
VERT. SCALE: 1":10'

*NOTE:*
*Elevations shown are based on North American Vertical Datum 1988 (NAVD88).*

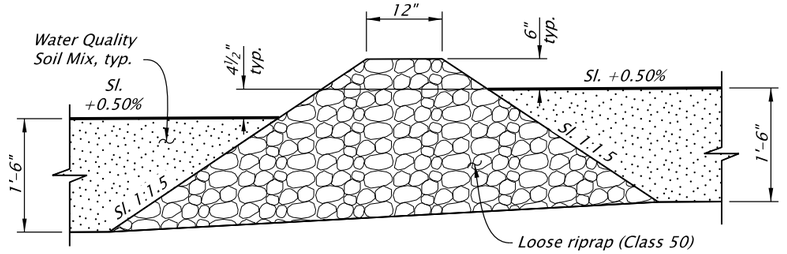



## LOCATION MAP

SEC. 15, T5S, R10W, WM
LAT. 45.92436, LONG. -123.931146

## CONSTRUCTION NOTES

1. *Sta. "S1"0+26.56 to Sta. "S1"1+56.54*
   *Const. Water Quality Biofiltration Swale*
   *DFI no. D01403*
   *General excavation – 43 cu. yd.*
   *Select General Backfill – 7 cu. yd.*
   *Water Quality Soil Mix – 31 cu. yd.*
   *Riprap Flow Spreader (Class 50) – 7 cu. yd.*
2. *Inst. Type S1 marker (See sht. RD399)*
3. *Inst. Type S2 marker (See sht. RD399)*




## RIPRAP FLOW SPREADER

No Scale

*Note:*
*For swale Typical Sections see sht. HA05.*

*Slopes are shown as Vertical to Horizontal, unless otherwise shown.*

| | |
|---|---|
| HWY: 009 | |
| M.P.: 26.37 | |
| UNIT FILE CODE | N/A |
| DFI/TSSU NO. | D01403 |

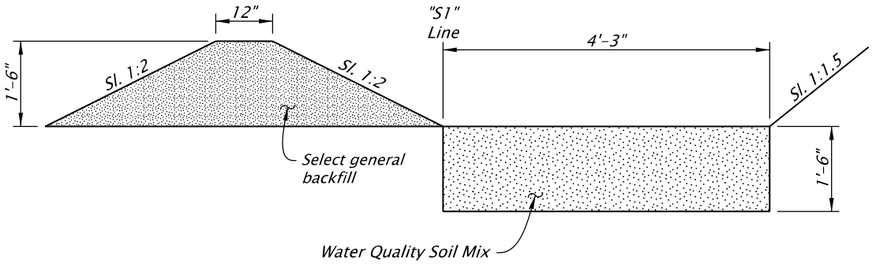
REGISTERED PROFESSIONAL ENGINEER
89,721
OREGON
JULY 10, 2018
JASON DAVID STROUD
RENEWS: 06-30-2022
FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

OREGON DEPARTMENT OF TRANSPORTATION

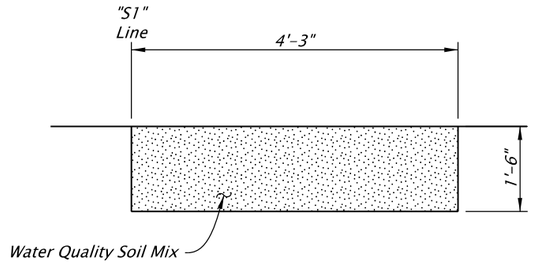
**US101: AVE A - AVE K (SEASIDE) SEC.**
OREGON COAST HIGHWAY
CLATSOP COUNTY

Designer: Aiman Mahmoud — Reviewer: Jason Stroud
Drafter: Michael Skelton — Checker: N/A

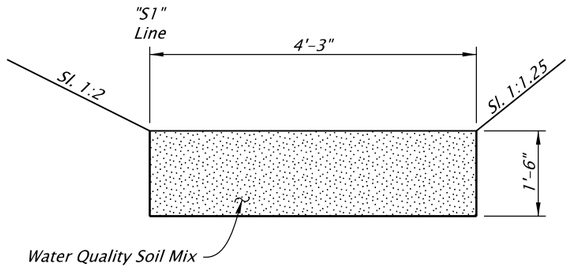
**STORMWATER PLAN** — SHEET NO. HA04




**TYPICAL**
**Sta. "S1"0+26.56 To Sta. "S1"0+55.00**
*No Scale*




**TYPICAL**
**Sta. "S1"1+05.10 To Sta. "S1"1+56.54**
*No Scale*




**TYPICAL**
**Sta. "S1"0+55.00 To Sta. "S1"1+05.00**
*No Scale*

*Note:*
*Slopes are shown as Vertical to Horizontal.*

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| Designer: Aiman Mahmoud | Reviewer: Jason Stroud |
| Drafter: Michael Skelton | Checker: N/A |
| **STORMWATER PLAN** | SHEET NO.: HA05 |